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Maintaining Victoria's Rail Infrastructure Assets

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Victorian Auditor-General's Office

Auditing in the Public Interest

The Hon. Robert Smith MLC
President
Legislative Council
Parliament House
Melbourne

The Hon. Jenny Lindell MP
Speaker
Legislative Assembly
Parliament House
Melbourne

Dear Presiding Officers

Under the provisions of section 16AB of the *Audit Act 1994*, I transmit my report *Maintaining Victoria's Rail Infrastructure Assets.*

Yours faithfully

DDR PEARSON
Auditor-General

23 May 2007

Foreword

A more accessible and reliable transport system is critical to the Victorian Government's achievement of its economic, social and environmental goals. The rail system in particular is expected to have an increasing role in supporting sustainable growth by carrying a greater proportion of freight traffic and passenger journeys in Victoria.

In recent years, upgrades to parts of the rail system, additional services, lower fares for regional passengers and rises in fuel prices have led to a surge in passenger numbers across Victoria. The freight task in Victoria is also expected to grow significantly over the coming years and these changes place greater demands on the rail system.

In this context, it is important that the state's rail infrastructure, that is the facilities used to operate the railway such as the track and the power and signalling systems, are well maintained. The audit examined how well the current lease arrangements for maintaining the metropolitan, regional and interstate rail infrastructure had contributed to the delivery of reliable train services.

The audit found that the maintenance arrangements for the metropolitan infrastructure and the interstate infrastructure linking Victoria with New South Wales and South Australia were satisfactory. There is, however, room to improve and better apply the existing lease arrangements with respect to documenting plans, checking that they have been implemented, and measuring the effectiveness of infrastructure maintenance.

In contrast, the arrangements for the regional, intrastate infrastructure did not provide for adequate maintenance and renewal. Over the last 3 years, the Department of Infrastructure (DoI) has worked to improve this situation. The audit identified significant areas of improvement, such as the introduction of new access arrangements to better define service levels on the freight network and the funding of additional, essential renewals on the passenger network.

There remains, however, a need to ensure that the planning and monitoring of maintenance and renewal better reflect the government's better practice asset management principles. The recent buyback of the regional infrastructure lease provides DoI with the opportunity to ensure that this happens.

DDR PEARSON
Auditor-General

23 May 2007

Contents

1 Executive summary

1.1 Audit scope and objectives

Each year Victoria's rail system carries more than 140 million passengers and 17 per cent of the freight passing through Victoria's major ports. The 5 000 kilometres of rail routes include:

- the metropolitan rail network, serving the residents of Melbourne
- the regional, intrastate network carrying passengers and freight throughout Victoria
- the Victorian sections of the national, interstate network, meeting the demand for interstate passenger and freight transport.

In 1999, responsibility for maintaining the metropolitan, intrastate and interstate infrastructure was contracted to private companies through leasing arrangements. The Department of Infrastructure (DoI) is responsible, on behalf of the state, for managing these arrangements.

The government commitment to develop rail as part of a strategy to meet the transport needs of a growing Victorian population is included in the *Growing Victoria Together* policy. For rail to attract more business it needs to provide a safe, convenient and reliable alternative to road-based travel. Delivering these attributes requires, among other things, the cost-effective maintenance of the existing infrastructure and trains so that they reliably deliver planned services.

In 1995, the Department of Treasury and Finance encouraged a better practice approach through the guidance in the *Asset Management Series*. This advice recognised that assets needed to be managed across their entire life cycle to deliver cost-effective service outcomes. Investment in timely and appropriate maintenance lowers the risk of poor performance and avoids the need for more costly remedies where problems have grown unchecked. The government's *Sustaining our Assets* policy, published in 2000, is consistent with this approach.

We examined whether current arrangements were:

- adequate when compared with established better practice asset management principles
- effective in the light of information on condition and trends in infrastructure-related safety and reliability incidents.

To assess these arrangements, we reviewed the material held by DoI on the arrangements and infrastructure performance, and inspected the condition of samples of the metropolitan, intrastate and interstate infrastructure in Victoria.

1.2 Audit conclusion

Overall maintenance arrangements for the metropolitan and the Victorian sections of the national, interstate networks are satisfactory. In contrast, the regional, intrastate infrastructure arrangements have not sustained the 1999 levels of service because the condition of the infrastructure has deteriorated.

The assets which make up the rail infrastructure are diverse, complex and range in age from less than a year to more than 50 years old. The state faces a significant challenge in cost-effectively maintaining the performance of the infrastructure. Nowhere is this more apparent than in the management of the signalling infrastructure which is critical to the safety and reliability of the rail system.

The condition and performance of the metropolitan infrastructure is “fit-for-purpose” at the current level of operation. Infrastructure-related incidents were responsible for around 10 per cent of all metropolitan passenger delays in 2005. Signal failures accounted for most of the infrastructure-related delays and DoI recognised the need to improve infrastructure maintenance and renewal as part of the 2004 rail refranchising.

The arrangements, agreed in April 2004, incorporated an improved approach to maintenance and renewal and included programs to resolve problems directly attributable to past neglect. To provide assurance that the new arrangements would maintain the infrastructure as fit-for-purpose, DoI commissioned an infrastructure review in April 2004. The review made recommendations in 2005 to further improve the maintenance and renewal of the signalling system and other rail assets.

DoI has reviewed these recommendations and agreed a comprehensive set of actions with the infrastructure manager[1] to address the most important issues. DoI and the infrastructure manager have agreed timelines for the short-term actions and will agree deadlines for completing the longer-term actions by the end of 2007. A focused program of preventative maintenance and renewals within a firm timeline promises improved performance of the signalling system. DoI has provided additional funding to expand the program of preventative maintenance and the infrastructure manager has started to implement these actions.

Although the metropolitan maintenance and renewal arrangements work well, they could be further improved by:

- better documenting the rationale for the planned maintenance and renewal of rail assets as part of a long-term, asset management strategy

[1] The Transport Act 1983, p. 157-158, defines those responsible for carrying out the maintenance and repair of the rail infrastructure as “managers of rail infrastructure”.

- ensuring that the infrastructure manager also better documents the basis for prioritising maintenance and renewals in the asset management plan by drawing on the detailed working documentation it generates to inform priorities
- completing the current review of key performance indicators (KPIs) and implementing the improvements from this review.

The national, interstate infrastructure in Victoria is fit-for-purpose at the current level of operation. While we found the 1999 maintenance arrangements to be adequate, we identified areas where DoI should look to improve or better apply the arrangements with the cooperation of the infrastructure manager. These include:

- demonstrating more clearly how the infrastructure manager's plans for maintenance and renewal works are consistent with a life cycle approach
- developing a more systematic approach to verify that the infrastructure manager has completed the activities set out in the maintenance and renewal plans agreed with DoI
- defining KPIs that measure the effectiveness of infrastructure maintenance and renewal
- agreeing with the infrastructure manager formal mechanisms to review performance and implement agreed improvements.

The fall in the percentage of the interstate network covered by temporary speed restrictions since mid-2004 indicates that the infrastructure manager has appropriately responded to the concerns raised by Public Transport Safety Victoria (PTSV) relating to the non-metropolitan network. Maintaining ageing signalling equipment between Melbourne and Albury, however, remains a challenge. This will be addressed by the planned renewal of equipment on this corridor over the next 4 years.

In contrast to the metropolitan and interstate infrastructure, the regional, intrastate arrangements established in 1999 did not provide for the adequate maintenance and renewal of the infrastructure. This situation was not substantially changed when the lease was transferred to a new infrastructure manager, Pacific National, in 2004.

However, since 2004, the combined actions of DoI, the infrastructure manager and the finalisation of new access arrangements for the regional freight network have improved the maintenance and renewal regime. For example, the new access arrangements better define service levels on the freight network and DoI has made sure that additional, essential renewals were completed on the passenger network. There, however, remains a need to further improve the planning and monitoring of maintenance and renewal so that they conform to the government's better practice asset management principles.

The condition of the intrastate infrastructure had deteriorated because levels of maintenance and renewal have not been sustained at the 1999 levels of service. This has contributed to an increase in safety-related incidents up to the middle of 2004.

Since August 2004, the infrastructure manager has increased the number and duration of temporary speed restrictions in response to the condition of the infrastructure. It has flagged that further extension of these restrictions would be required if additional, major track renewals did not occur. In 2005-06, DoI funded $59 million of additional renewals to avoid widespread speed restrictions affecting passenger services.

Between late 2005 and the middle of 2006, the government completed the major upgrade of rail infrastructure on the Ballarat, Bendigo, Geelong and Latrobe Valley lines through the Regional Fast Rail project. This involved upgrading 500 kilometres of track, the installation of more than 460 000 concrete sleepers and the upgrading of the railway signalling system. These upgrades will benefit passenger and freight traffic using these corridors.

The government's recent buyback of the regional infrastructure lease provides the opportunity to reassess practices and to define service levels consistent with established policies and objectives, and to reconcile the level of resources necessary to meet agreed service levels.

1.3 Recommendations

Metropolitan infrastructure

1.1 That DoI documents a long-term asset management strategy detailing its rationale for the maintenance and renewal of rail assets.

1.2 That DoI ensures that future plans document the infrastructure manager's methodology for prioritising maintenance and renewals.

1.3 That DoI completes its current review of the KPIs and implements improvements so that they better describe:

- infrastructure condition
- infrastructure performance
- the effectiveness of maintenance and renewal activities.

1.4 That DoI ensures that the infrastructure manager addresses the recommendations of the infrastructure review by implementing the agreed action plan.

Regional intrastate infrastructure

1.5 That DoI takes the opportunity afforded by the buyback of the infrastructure lease to implement the government's better practice asset management principles and to improve the monitoring of infrastructure condition and performance.

National interstate infrastructure

1.6 That DoI works with the infrastructure manager to ensure that Asset Management and Annual Works Plans are provided by the infrastructure manager which:

- describe fully the methodology used for estimating maintenance and renewal works consistent with managing these assets across their life cycles.
- demonstrate how these works will ensure that the maintenance and renewal obligations of the lease are met.

1.7 That DoI works with the infrastructure manager to develop clear protocols to verify that the infrastructure manager has completed maintenance and renewal activities according to its plans.

1.8 That DoI works with the infrastructure manager to develop KPIs which measure the effectiveness of infrastructure maintenance and renewal, including the improved monitoring of infrastructure condition.

1.9 That DoI works with the infrastructure manager to provide formal mechanisms through which it and the infrastructure manager can review performance and implement agreed improvements.

RESPONSE provided by Secretary, Department of Infrastructure

The Department welcomes the Victorian Auditor-General's Office's review of the Department's management of the metropolitan, intrastate and interstate infrastructure leasing arrangements, and the positive findings relating to the metropolitan and Victorian sections of the national, interstate networks.

The Report acknowledges the challenges faced by the Department in cost-effectively managing the diverse and complex nature of the Victorian rail network. The Department is pleased with the recognition given by the Victorian Auditor-General's Office of its efforts to affect change and improve the management of the network while enhancing relationships with the infrastructure managers.

The Department notes that as the audit commenced in July 2005, consideration of up to date information may result in different conclusions being reached relating to safety incidents (page 44, 45 and 67), sleeper renewals (page 62), speed restrictions (page 66) and spending on infrastructure maintenance and renewals (pages 77 and 78).

The conclusions and subsequent recommendations in the Report give appropriate recognition to the Department's efforts to date in progressing the issues raised. Detailed comments on the Report's recommendations are provided below.

RESPONSE provided by Secretary, Department of Infrastructure - continued

Metropolitan Infrastructure

The Victorian Auditor-General's Office's "support of DOI's current work on the condition of rail infrastructure" during their 2005 review of "Franchising Melbourne's Train and Tram System" is reinforced at page 21 of this Report by the finding that the "current arrangements were satisfactory and provided DOI with the information it needed to be assured about the adequacy of the maintenance and renewal plans".

Recommendation 1.1

Agree. Implementation is ongoing.

The Report states on page 29 that the DOI is implementing the government's "Meeting our Transport Challenges" plan to address system obsolescence and medium to long term capacity constraints over the next 10 years.

The Department has also initiated two key strategies to address long-term asset management:

The establishment, in 2006, of a strategic planning group which is tasked with developing visions and schemes for the entire network for the next 50 years [current focus is primarily on the metropolitan network].

The development and documentation of a whole-of-life Asset Management Strategy for rail infrastructure assets.

The Department will continue to develop and implement these two key strategies with the forward program of capital works reflecting the outputs of these work streams.

Recommendation 1.2

Agree.

The Department will request that the infrastructure manager includes rationale for prioritisation as part of the works plan that the infrastructure manager submits to the Department each year.

Recommendation 1.3

Agree. Implementation is ongoing.

The Report states on page 36 that "in October 2006 DOI wrote to the infrastructure manager under Clause 22.3 of the lease to formally start a review of the Key Performance Indicators (KPIs)". This initial review has been completed and a new suite of KPIs has been drafted.

RESPONSE provided by Secretary, Department of Infrastructure - continued

The Department intends to undertake research to ascertain appropriate measures for these KPIs to be benchmarked against and to trial the KPIs to ensure that they better describe asset condition and performance. Further review of these KPIs will be undertaken periodically into the future.

Recommendation 1.4

Agree. Implementation is in progress.

Further to the Report's comment at page 47 that DOI has agreed a plan and specific actions to address specific locations where asset condition could be improved - the Department and Connex's action plan has now been in progress since the completion of this Audit and is addressing the actions in order of priority.

Regional Intrastate Infrastructure

The Report acknowledges at page 59 of the Report the challenges faced by the Department in managing the 1999 regional rail network arrangements introduced by the previous Government.

The Department is pleased with the recognition the Report gives at page 3 and 4 of the Department's actions since 2004 and the introduction of new access arrangements for the regional freight network that have improved the maintenance and renewal regime.

Although the contractual arrangements do not require the Department to contribute financially to the maintenance and renewal of regional lines, the Department funds additional infrastructure renewals for the passenger network, for example during 2005-06 the Department funded $59 million of additional track renewals to the regional passenger and freight networks.

The Department has also undertaken significant projects to improve the condition of the regional intrastate network such as the Regional Fast Rail Project (RFR), the reintroduction of passenger services to Ararat and Bairnsdale and improvements to the lines between Bendigo and Echuca and Toolamba and Echuca. The RFR project, completed in 2006, represents an intergenerational upgrade for large sections of the regional intrastate network.

Recommendation 1.5

Agree. Implementation is in progress.

Following the buy-back of the lease, the Department intends to implement a maintenance and renewal regime similar to the regime that currently applies to the metropolitan rail infrastructure lease. The Department also notes that the Report acknowledges the improvement in the condition of the network as a result of projects, such as the RFR project, which have been implemented despite the contractual restrictions that have existed prior to the buy back of the lease.

RESPONSE provided by Secretary, Department of Infrastructure - continued

The Department has increased staff levels to facilitate improvement in monitoring infrastructure condition and performance.

National Interstate Infrastructure

The Report correctly states at page 81 that "the State's focus for the National Interstate Network arrangements is on the maintenance and renewal of the infrastructure so that it does not deteriorate". The arrangements do not require the Department to review or comment on any material provided by ARTC, however, the Department is working with ARTC to improve the content of their plans and reports in line with the requirements of the lease.

Recommendation 1.6

Agree.

The Department will ensure that the content of the asset management plan, annual works plans and asset management reports submitted by the infrastructure manager comply with the requirements specified in the lease, and where possible will encourage the infrastructure manager to provide additional information to augment that required by the lease.

Recommendation 1.7

Agree. Implementation is in progress.

The Department will more rigorously monitor the planning and implementation of the infrastructure manager's maintenance and renewal activities and has increased staff levels to facilitate improvement in monitoring infrastructure condition and performance.

Recommendation 1.8

Agree. Implementation is in progress.

The Report on page 80 acknowledges DOI's view that there is merit in trialling the application of KPIs, proposed by the infrastructure manager, in lieu of the current condition survey method and that additional work is required to develop a comprehensive suite of KPIs.

The Department has obtained preliminary KPI information from the infrastructure manager that attempts to measure infrastructure condition and the effectiveness of infrastructure maintenance and renewal. The Department will continue to encourage the infrastructure manager to provide complete and detailed KPIs that better achieve this objective.

The Department will consider the incorporation of these KPIs into any amended infrastructure lease that may be negotiated into the future.

RESPONSE provided by Secretary, Department of Infrastructure - continued

Recommendation 1.9

Agree

The Department continues to work with the infrastructure manager to implement mechanisms to review performance and implement agreed improvements. The Department will consider the incorporation of these mechanisms into any amended infrastructure lease that may be negotiated into the future.

The Department has increased staff levels to facilitate improvement in monitoring infrastructure condition and performance.

2 About rail maintenance and renewal

2.1 Victoria's rail system

2.1.1 Role of Victoria's rail system

Victoria's rail system plays an important role in moving freight and in providing access to work and other services for Victorian residents and visitors.

The Department of Infrastructure (DoI) estimated that in 2004-05, rail transported 17 per cent, or about 7 million tonnes, of the freight passing through the ports of Melbourne, Geelong and Portland. Each year there are 135 million passenger journeys on the metropolitan rail system and the system provides an important alternative to roads for commuter travel. In regional Victoria, there are a further 6.5 million passenger journeys each year, with most commuting to and from Melbourne.

Figure 2A shows the 3 rail networks operating in Victoria and these include:

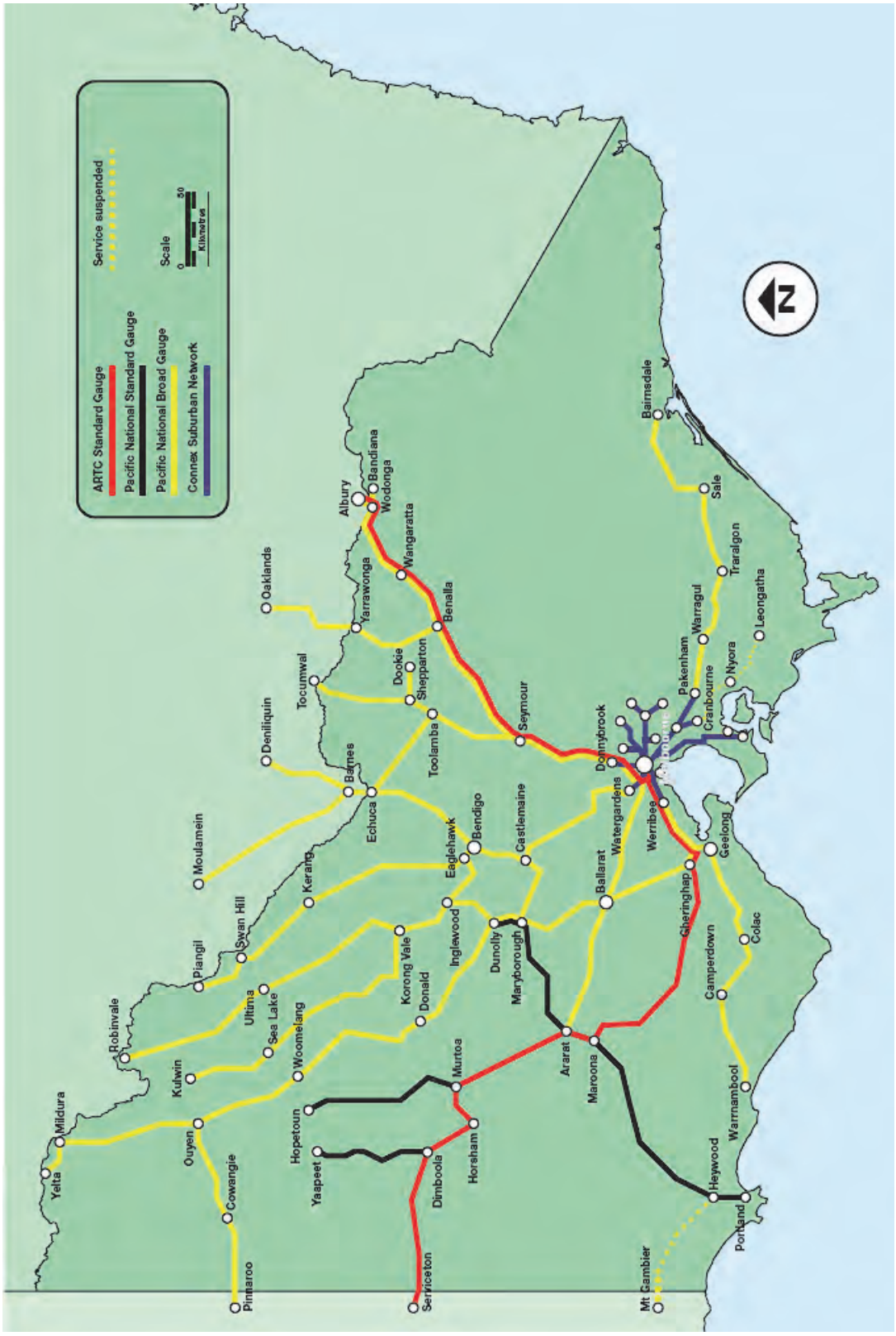
- the 17 routes over 366 kilometres serving metropolitan Melbourne (the blue lines)
- the 4 000 kilometres of intrastate routes moving freight and passengers within Victoria (the yellow and black lines)
- the Victorian sections of the interstate rail system covering 760 kilometres between Albury, Melbourne and the South Australian border, used mostly by freight trains with some interstate passenger services (the long red line connecting Albury and Serviceton via Melbourne).

These railways operate on 2 different types of tracks. The metropolitan network trains run on the wider, "broad gauge" track providing access predominately for passenger services within Melbourne, however, it also caters for the passage of freight services accessing the intrastate freight network.

The intrastate network is predominately broad gauge track, providing access for intrastate freight and passenger services[1], except for the lines marked in black where freight services operate on the narrower, "standard gauge" track. The interstate network has both freight and passenger services operating on "standard gauge" track.

[1] The intrastate track also includes the Western grain lines providing standard gauge access to the Port of Portland.

Figure 2A
Victoria's railway network



Source: Department of Infrastructure.

2.1.2 Defining “rail infrastructure” and “rail assets”

Throughout this report we use the term “rail infrastructure”. In the *Rail Corporations Act 1996*, this is defined as “a facility that is used to operate a railway”. Rail infrastructure includes:

- the track, sleepers and the foundation forming the track bed
- the structures that create a pathway for the track, such as tunnels, bridges, cuttings, earthworks and drainage works
- the train and passenger communications systems
- structures that provide access for customers to services and provide customer amenity such as station buildings and platforms
- the electrical power supply system
- the train communications system
- buildings associated with the operation and maintenance of the track, such as stations, depots and yards
- plant, machinery and other equipment used for maintenance and renewal tasks.

This report also uses the term “rail asset” to describe a component of the rail infrastructure. A component or group of components is treated as a separate asset where its combined importance warrants management on an individual basis. For example, a maintainer would manage a railway signal as a separate asset as part of a total signalling system.

2.2 Rail infrastructure responsibilities

2.2.1 Legislation and leases

The Victorian Rail Track Corporation (VicTrack) “owns” the railway land and infrastructure on behalf of the state. VicTrack leased the infrastructure to the director for public transport, with DoI assuming the responsibility for managing and maintaining the metropolitan, intrastate and interstate railways.

VicTrack retains responsibility for some active rail sidings and yards, and for rail infrastructure not in use, and is responsible for accounting for rail assets, including lease assets in its annual financial statements.

From an asset management perspective, VicTrack, as the owner of the state’s rail assets, should understand the condition of its assets. In addition, the Australian Accounting Standards and financial reporting requirements established by the state, impose an obligation on VicTrack to adequately account for and depreciate its assets. The accounting standards require VicTrack to periodically review the expected useful life of its assets to ensure that depreciation charges are materially correct. An asset’s condition and planned renewal and maintenance regime are key determinants of its useful life. On this basis, VicTrack needs to understand the condition of its assets to satisfy both asset management and accounting objectives.

DoI, under the *Transport Act 1983*, is responsible for the performance of the public transport system and for efficiently and effectively carrying out any contracts for the provision of transport services[2]. DoI is responsible, on behalf of the state, for ensuring that the infrastructure is effectively managed. Under the legislation, DoI may contract-out the provision of transport services.

Control over the state's rail infrastructure has been contracted-out to various parties since 1999. The legislation defines those responsible for carrying out the maintenance and repair of the rail infrastructure as "managers of rail infrastructure"[3].

Throughout this report, we refer to the lease holders as "infrastructure managers". In Victoria there are separate lease arrangements in place for the maintenance and renewal of the metropolitan, intrastate and interstate networks.

DoI is responsible for making sure that these lease arrangements work effectively:

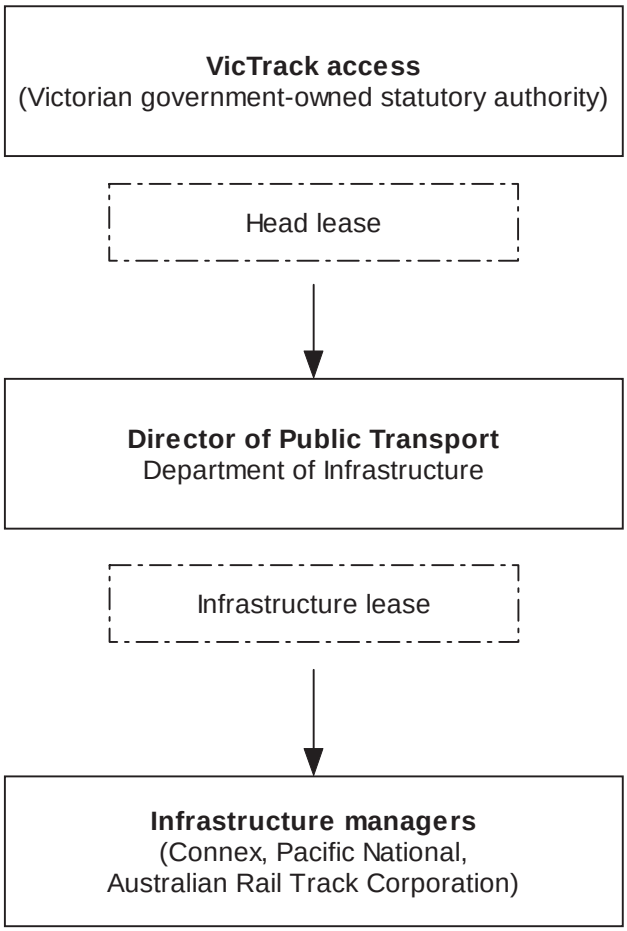
- to deliver the type and quality of services expected by the community
- to maintain the infrastructure so that its condition does not deteriorate and leave the government to pay for any shortfall in maintenance during the lease period after the infrastructure is returned
- to achieve the state's desired outcomes cost-effectively where the government contributes to the cost of maintenance and renewals.

Figure 2B summarises the leasing arrangements.

[2] *Transport Act 1983*, p. 15.

[3] Ibid., pp. 157-8.

Figure 2B
Rail infrastructure leasing arrangements



Source: Victorian Auditor-General's Office.

2.2.2 Development of the current leases

In 1999, Victoria's passenger and freight rail networks were leased to private infrastructure managers through rail infrastructure leases. These leases were developed as follows.

Metropolitan lease

Bayside Trains (owned then by National Express) and Hillside Trains (owned by Connex) operated metropolitan franchises on the routes radiating from the central business district of Melbourne for a 15-year period from 1999 to 2014.

In 2004, following the exit of National Express from the Victorian market, a new 5-year infrastructure lease for the metropolitan rail network was agreed with Connex. Connex is the only operator of metropolitan train services in Melbourne. It both maintains and renews the infrastructure.

Intrastate lease

In 1999, the Victorian country intrastate (largely broad gauge) rail network, covering passenger and freight routes, was leased for 15 years (with options for 2 further 15-year lease term extensions) to a private operator, Freight Victoria Limited[4]. In August 2004, when Pacific National purchased the owner of Freight Victoria Limited, the Director of Public Transport in DoI, consented to the change of control in ownership of Freight Victoria Limited from Rail America to Pacific National.

Interstate lease

The Australian Rail Track Corporation (ARTC) holds a 15-year lease[5] on the Victorian sections of the interstate, standard gauge infrastructure. The ARTC was set up by the Commonwealth Government to maintain, renew and build the capacity of the national rail infrastructure and to sell access to organisations wishing to operate interstate freight and passenger services.

2.3 Maintaining and renewing rail infrastructure assets

Asset management is the process that guides the creation, use, upkeep and disposal of assets to deliver train services safely and on time in a cost-effective way. Throughout the report we refer to planned service targets as the “levels of service”.

In this audit we focused on the upkeep of assets; that is, their maintenance and renewal. Maintenance includes the actions needed to keep infrastructure in a condition that allows it to deliver its intended service. Renewal involves activities to refurbish or replace existing assets or components with those of similar capability. The goal of maintenance and renewal is to sustain the assets in a condition that achieves planned “levels of service” while minimising the cost of doing this across the asset’s useful life.

2.3.1 Current maintenance and renewal arrangements

Metropolitan lease

Under the 1999 metropolitan lease, the infrastructure managers, National Express and Connex had to maintain the condition of the infrastructure to meet set targets. Condition was measured by calculating an index through regular surveys, but this outcome-based approach did not work because its methodology was considered flawed[6].

[4] Freight Victoria Limited subsequently took on the business name of Freight Australia, and throughout this report we refer to Freight Australia Limited as FAL.

[5] This lease was originally for a 5-year term, but was extended to 15 years.

[6] Department of Infrastructure 2003, *Passenger Rail Franchising in Victoria – An Overview*, Public Transport Division, Department of Infrastructure, Melbourne, p. 66.

In 2004, the state and Connex developed a new asset management regime as part of the public transport refranchising[7]. Connex agreed to a 5-year, input-based regime to achieve the objectives the government had set for the whole-of-life maintenance and renewal of the infrastructure.

To pay for the maintenance, renewal and operation of metropolitan rail services, Connex receives a proportion of the fare revenue paid by passengers and a subsidy from the state.

Intrastate lease

Under the terms of the Primary Infrastructure Lease, Pacific National (PN) must return the infrastructure used for freight traffic only in 39 years in a condition consistent with its current use, with a minimum requirement that the track can accommodate trains travelling at 20 km/h with 19-tonne axle loads. For network sections covered by access agreements with the passenger service operator (V/Line Passenger), PN must provide infrastructure consistent with the levels of service (for example operating speeds) set out in the agreement.

Aside from these obligations, there is no requirement for PN to maintain or renew rail infrastructure under its control until the last 5 years of the lease. However, the state and PN have agreed on additional renewals to be funded by the state.

Two major operators pay PN fees to use the network: Another division of PN is the only significant operator of rail freight services; and V/Line Passenger is the state-controlled operator of passenger services in regional Victoria. To fund its maintenance and renewal activities on freight-only lines, PN relies on access payments from its freight division. This division charges its customers for moving freight by rail and a significant proportion of these customers are grain growers.

Under the access agreements between 1999 and 30 June 2006, the maintenance and renewal of the intrastate passenger lines were funded from access payments made by V/Line Passenger. V/Line's operations were subsidised by the government, which means that the state contributes to the upkeep of regional passenger lines. Where freight trains also used passenger lines, some of the freight operator's access fees were redistributed towards the maintenance and renewal of these lines.

When the control of the lease transferred to PN in 2004, the state did not indicate that it would contribute to the maintenance and renewal of freight-only lines. However, in May 2006, the state announced an upgrade of the Mildura line for freight purposes and contributed $53 million towards the cost of this upgrade.

[7] In September 2005, reported to parliament on the public transport refranchising process, see *Franchising Melbourne's train and tram system*.

Interstate lease

The ARTC is required to maintain, replace and repair the interstate standard gauge infrastructure to a level where its condition is no worse than it was at the commencement of the lease. It is also required to provide information on infrastructure condition to the director of public transport. The state measures how well this objective has been achieved by measuring infrastructure condition using similar, survey-based measures to the 1999 metropolitan rail lease.

The ARTC funds infrastructure upkeep from the access payments made by freight operators and contributions from the Commonwealth Government. The Victorian Government makes no contribution to these activities, but instead receives annual rental and profit share payments from the ARTC.

2.3.2 Government asset management policy and good practice

In December 2000, the government set out its policy on asset management in *Sustaining our Assets*[8]. The policy and the principles of good asset management apply to physical assets with a useful life of more than one year, which require management by government departments[9]. These are consistent with policies and practices put in place by the Department of Treasury and Finance in 1995[10].

We used these principles to develop a set of criteria to enable us to assess the maintenance and renewal arrangements for Victoria's rail infrastructure.

2.4 This audit

2.4.1 Objective and scope

Our objective was to determine, through an audit of DoI, how effectively the state's rail infrastructure assets are being maintained and renewed. We addressed this objective by examining whether:

- The maintenance and renewal arrangements were adequate?
- These arrangements had been effective in terms of the performance[11] of the infrastructure?

We examined whether DoI could assure the state that rail assets had been properly maintained and renewed, based on the information it had access to.

[8] Department of Treasury and Finance 2000, *Sustaining our Assets. Government Asset Management Policy Statement*, Department of Treasury and Finance, Melbourne.

[9] Ibid,. p. 4.

[10] <www.dtf.vic.gov.au/dtf/bfmrwp.nsf/HeadingPagesDisplay/Asset+Management?OpenDocument>.

[11] We assess performance in terms of: past service delivery and infrastructure-related failures; and infrastructure condition to explain past and predict likely, future service delivery trends.

The scope of this audit focused on the maintenance and renewal of train infrastructure - including the track and its foundation, the structures creating a pathway for the track, and the signalling and electrical power systems - for the metropolitan, intrastate and interstate rail infrastructure.

Adequacy of maintenance and renewal arrangements

The current government set out its policy principles for the management of assets in *Sustaining our Assets*. This document referenced the earlier 1995 asset management series as providing detailed guidance material to assist with the practical application of these policies. We used the following audit criteria based on the principles described in these documents:

- Were service levels clearly defined and consistent with the government's objectives?
- Were maintenance and renewal plans well informed, with actions and priorities based on a proper appreciation of the costs, benefits and risks of alternative maintenance and renewal options over the lives of the assets under management? (This is the "whole- of-life" approach to maintenance and renewal referred to throughout this report.)
- Were plans implemented as intended?
- Were plans responsive to continuous performance monitoring?

Adequacy of infrastructure performance

We assessed infrastructure performance by examining DoI's records on service delivery and infrastructure condition. Service delivery trends and the reasons for poor performance help us to understand the impact of infrastructure-related failures. But as there may be a time lag before inadequate maintenance leads to service failure, service delivery does not provide a complete picture of performance.

Information on the condition of infrastructure provides direct evidence about the effectiveness of maintenance and renewal activities. Condition trends can explain why assets have failed and also predict future problems if these trends are not addressed.

We compared a more complete picture of the past and predicted effectiveness of the arrangements by combining information on service delivery and infrastructure condition.

2.4.2 How did we do this?

This report addresses the audit objective for the metropolitan (Part 3), intrastate (Part 4) and interstate (Part 5) infrastructure. For each, we describe the current maintenance and renewal arrangements, before examining the adequacy of these arrangements and the performance of the infrastructure.

In carrying out the audit, we examined relevant documents and when necessary spoke to personnel from:

- DoI, including information provided by PN, Connex and the ARTC, the infrastructure managers
- V/Line Passenger and VicTrack
- the Essential Services Commission, the state agency responsible for the regulation of rail access in Victoria
- the National Transport Commission, which coordinates national transport policy, and the Australian Competition and Consumer Commission, which regulates access to the national interstate rail network.

We also inspected small samples of rail infrastructure assets on the metropolitan, intrastate and interstate systems. The size of our samples means the findings on infrastructure condition from our inspections are indicative rather than representative of the condition of the entire rail network. However, we also reviewed recent studies of infrastructure condition which inspected larger, representative samples of the infrastructure. Our conclusions are based on the sum of this evidence.

The audit was performed in accordance with the Australian auditing standards applicable to performance audits, and included tests and procedures necessary to conduct the audit.

The total cost of this report was $845 000.

3 How effectively is the metropolitan infrastructure maintained and renewed?

At a glance

Background

We examined how well the metropolitan rail infrastructure had been maintained and renewed by reviewing the lease arrangements and the performance of the infrastructure.

Key findings

- We found that the current arrangements were satisfactory and provided the Department of Infrastructure (DoI) with the information it needed to be assured about the adequacy of the maintenance and renewal plans.
- However, arrangements could be improved by better documenting the basis for the maintenance and renewal plans, and by improving the key performance indicator (KPI) measures used to assess performance.
- The condition of the infrastructure was observed to be fit-for-purpose. Parts of the signalling infrastructure require improved maintenance and renewal and DoI has agreed a plan with the infrastructure manager to address these issues.

Key recommendations

3.1 That DoI documents a long-term asset management strategy detailing its rationale for the maintenance and renewal of rail assets.

3.2 That DoI ensures that future plans document the infrastructure manager's methodology for prioritising maintenance and renewals.

3.3 That DoI completes its current review of the KPIs and implements improvements so that they better describe:
- infrastructure condition
- infrastructure performance
- the effectiveness of maintenance and renewal activities.

3.4 That DoI ensures that the infrastructure manager addresses the recommendations of the infrastructure review by implementing the agreed action plan.

3.1 Introduction

In this section we examine the maintenance and renewal arrangements between DoI and Connex. We assess their adequacy to maintain and renew the rail infrastructure so that it continues to deliver the level of service required by the government. We examined the key aspects of the arrangements, namely:

- consistency with the government's objectives
- ability to sustain service levels in the long-term
- prioritising of maintenance and renewal activities
- planned versus actual spending
- DoI's performance in verifying whether the infrastructure manager has carried out the planned activities
- monitoring and continuous improvement.

We also examined information on the condition of the rail infrastructure and service delivery trends to assess its ability to deliver the levels of service stipulated in the agreements between the infrastructure manager and the government.

3.2 Maintenance and renewal arrangements

The infrastructure manager took over the operation of the entire Melbourne metropolitan train system on 18 April 2004 under a renegotiated 5-year lease. In this section we describe the changes made as a result.

3.2.1 Reasons for changing the 1999 arrangements

Under the original 15-year leases, 2 infrastructure managers had to maintain the condition of the infrastructure over the term of the lease and the government had the right to monitor performance. To understand the condition of the infrastructure, an initial survey of a sample of assets was carried out in 1999, and was to be repeated every 3 years.

The plan was that DoI would measure changes in infrastructure condition by comparing the survey results. Part of the franchisee's base subsidy was placed in a state-controlled bank account (an escrow account) which could only be used to fund maintenance and renewal. Compliance in respect of the outcome of periodic condition surveys would allow the infrastructure manager to keep any unspent escrow funds. Non-compliance would trigger additional spending by the infrastructure manager on maintenance and renewal.

However, the 1999 outcome-based approach did not work because the survey method was subjective and extremely complicated, and the status of the infrastructure condition was unknown between 3-yearly surveys. DoI concluded that "this regime did not represent a reliable contractual basis for moving forward"[1] and cancelled the 2000 surveys in favour of an approach based on regulating the resources devoted to maintenance and renewal.

3.2.2 Revised maintenance and renewal arrangements

The government's objectives

The Victorian Government communicated its objectives for asset maintenance and renewal as part of the 2003 re-franchising negotiations. These required the infrastructure manager to ensure that over the 5-year lease period[2]:

- the infrastructure remains fit-for-purpose in terms of its ability to deliver train services safely and reliably
- maintenance and renewal activities are consistent with a longer-term, whole-of-life approach with "no reduction in the average remaining effective life of the pool of assets" (Figure 3A explains what a "whole-of-life" approach means)
- works are properly prioritised and carried out efficiently and cost-effectively
- it provides clear evidence to DoI that it has achieved these objectives
- it maintains an adequate knowledge of the rail assets and the costs associated with maintenance and renewal.

Figure 3A explains the whole-of-life approach.

[1] Ibid., p.66.

[2] Department of Infrastructure 2003, *Passenger Rail Franchising in Victoria, Volume 9, Asset Management Plan Guidance Material – Train*, Public Transport Division, Melbourne, p. 3.

Figure 3A
A whole-of-life approach to maintenance and renewal

There are many ways to maintain and renew assets so that they deliver the services we want from them. A single asset type, such as railway signals with an expected useful life of about 50 years, can be used to illustrate the whole-of-life approach to maintenance and renewal. A railway signal asset includes a metal pole housing the signal lights and cables connecting the signal to the rest of the signal system.

The first step is defining the role of the signal in ensuring safe and reliable train services. To play its part, the signal must accurately and reliably communicate a “stop” or “go” command to approaching train drivers. In this case “accurately” might mean that the signal never returns a false “go” signal that could lead to a crash; and “reliably” might mean that it should not fail to function properly on more than, say, one in 10 000 operations.

Maintenance and renewal activities include: regular inspections and routine maintenance to check the condition and functioning of the signal components; the planned renewal of worn parts; and the unplanned work needed if the signal fails without warning.

In a whole-of-life approach, it is necessary to consider how best to combine these activities across the life of the asset in order to spend the minimum required to achieve these service levels. Across the whole class of signal assets, maintenance and renewal actions should be prioritised to deal urgently with those signals that present the greatest risk to performance. To assess these risks it is necessary to understand asset condition, the history of maintenance and performance, and the likelihood and consequences of the asset failing.

Adopting a whole-of-life approach to maintenance and renewal constitutes best practice. The opposite approach is to undertake maintenance on a short-term, reactive basis without a clear appreciation of the risks and the longer-term costs. In this case, service failures and problems are fixed as they come up. This is likely to lead to a worse long-term result because:

- the costs of some of these failures will far outweigh the cost of prevention because an early, well-informed intervention often costs less than a later, more major repair
- it stores up an (unseen) backlog of outstanding maintenance that will have to be paid for when the asset condition becomes so bad that it has to be fixed urgently.

Source: Victorian Auditor-General's Office.

Contractual arrangements

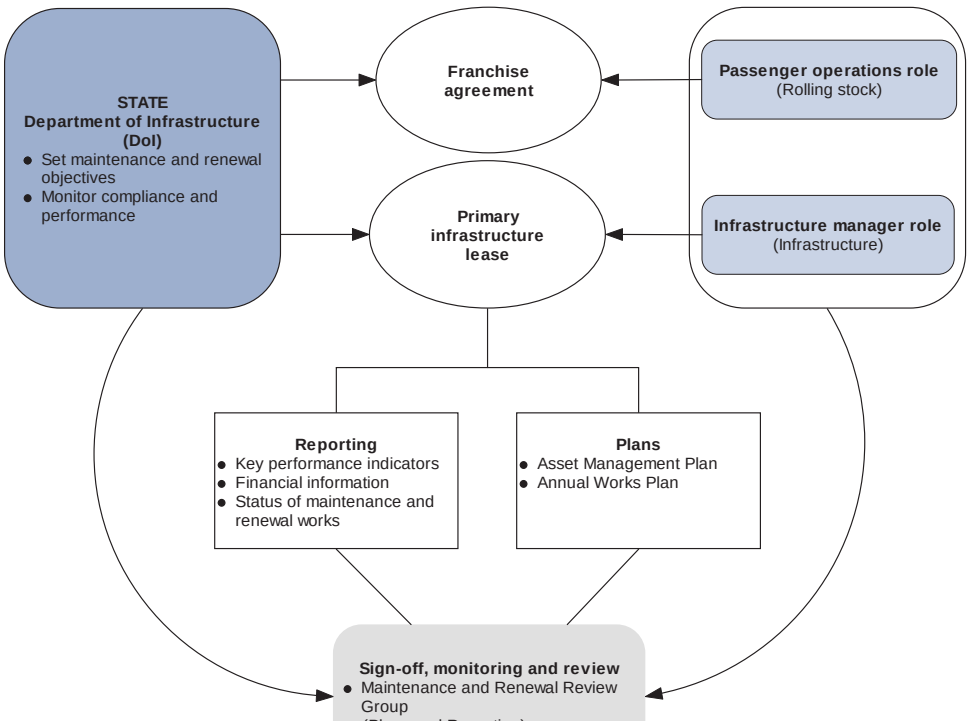
Figure 3B summarises the contractual arrangements.

The state signed a franchise agreement covering the operation of passenger services and a lease covering the maintenance and renewal of the infrastructure and trains. The lease defined the infrastructure manager’s planning and reporting requirements for maintaining and renewing the infrastructure.

The Asset Management Plan and Annual Works Plan set out:

- the infrastructure manager’s approach to maintenance and renewal
- asset inspection intervals and standards
- routine maintenance intervals and standards
- reactive maintenance response times
- the types and quantity of renewals in each lease year, together with a brief description of what these renewals would achieve and how they were determined.

Figure 3B
Contractual arrangements



Source: Victorian Auditor-General's Office.

To further strengthen the whole-of-life focus, the infrastructure manager had to incorporate a set of Minimum Prescribed Works within its planned renewals. These works were the government's assessment of the average, annual renewals needed to sustain service levels during and beyond the lease period (based on a 15-year time horizon).

The lease set out a reporting regime designed so that DoI could monitor the manager's performance. This regime included:

- KPIs reported on a quarterly basis
- information on expenditure
- reports on the inspections and works completed and on-site inspections of completed renewals.

Having agreed the infrastructure manager's plans, DoI monitors their progress using the reporting regime and through the Maintenance and Renewal Review Group (MRRG). This consists of representatives from DoI and the infrastructure manager and provides a mechanism for reviewing the delivery of the infrastructure manager's program and responding to adverse performance.

In summary, the infrastructure manager is responsible for the maintenance and renewal works in the lease period. It also bears the financial risk if these works cost more than expected or the infrastructure fails and trains are cancelled or delayed.

The government bears the risk for the condition of the infrastructure beyond the lease term. If the agreed plans are completed but fail to prevent the infrastructure from deteriorating, then after the lease ends, the government will have to pay to make up this ground and stop service levels falling. Accordingly, the government has stipulated that the infrastructure manager's plans must be consistent with a whole-of-life approach to the maintenance these assets.

3.3 Have the maintenance and renewal arrangements proved adequate?

3.3.1 Audit criteria

To assess the adequacy of the arrangements, we asked the following questions, based on criteria drawn from the government's best practice advice in *Sustaining our Assets*[3]:

- Were infrastructure service levels clearly defined and consistent with government objectives?
- Were maintenance and renewal decisions based on well-informed plans?
- Were plans implemented as intended?
- Were plans monitored and continuously improved?

3.3.2 Clearly defined service levels

Public transport users expect trains to be safe and to run on-time with very few cancellations. The government is committed to increasing the share of journeys made using public transport. Effective maintenance and renewal contributes to this aim by ensuring that the infrastructure's performance does not compromise the safety of the system or lead to passenger delays.

The arrangements set out service levels by:

- describing the train services that the infrastructure must support in a master timetable
- requiring the infrastructure manager to agree with DoI performance targets for on-time running and the maximum allowable number of train cancellations
- allocating responsibility for maintaining the infrastructure to run timetabled services safely and reliably
- establishing an Operational Performance Regime with strong financial incentives for the infrastructure manager to avoid service delays and cancellations.

[3] Department of Treasury and Finance 2000, *Sustaining our Assets – government asset management policy statement*. The policy applies to physical assets with a useful life of more than one year, which require management by government departments (p. 4.).

Conclusion

The arrangements incorporate service levels which are consistent with government objectives.

3.3.3 Decisions based on well-informed plans

We examined the activities described in the infrastructure manager's plans and asked 2 questions:

- Were they consistent with a whole-of-life approach?
- Were they prioritised to target assets in the most urgent need of repair representing the greatest risks to service delivery?

We also describe some ongoing development activities which, if completed, are likely to improve the quality of the maintenance and renewal plans.

Consistency with a whole-of-life approach

To ensure consistency with a whole-of-life approach, DoI defined Minimum Prescribed Works (renewals) as its assessment of the average annual level of renewal needed over a 15-year period to achieve this goal[4].

The franchise agreement included financial incentives for the infrastructure manager to avoid infrastructure failures during the lease period. The definition of minimum levels of renewal provided the basis for the continued achievement of target service levels during and beyond the term of the lease.

DoI included the list of Minimum Prescribed Works in the guidance material informing the infrastructure manager's Asset Management Plan. The infrastructure manager accepted many of the Minimum Prescribed Works and negotiated amendments with DoI where it could justify such changes.

Defining the Minimum Prescribed Works

In determining the level of Minimum Prescribed Works for each asset class, DoI:

- reviewed the available information on asset condition, performance and on past levels of renewal
- interviewed those responsible for the past maintenance of these assets
- considered options for maintaining and renewing these assets over the next 15 years and the cost and service performance implications
- set rates of renewal which would sustain current service levels over a 15 year period cost-effectively.

We verified this process by asking DoI to illustrate its application for several asset types. Figure 3C describes such an illustration for the replacement of signal heads.

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[4] Department of Infrastructure 2003, *Passenger Rail Franchising in Victoria Volume 9, Asset Management Plan Guidance Material – Train*, Public Transport Division, Melbourne, p. 6.

Figure 3C
Setting signal head renewal levels

The signal head[5] is the part of the signal which displays a colour light signal (green, amber or red) to a train driver. The older searchlight signals work by moving colour filters in front of a lamp to signal the driver. The newer signals use LED (light emitting diode) technology in place of lamps and filters. LED signals are made up of numerous, smaller individual light sources that each change colour when the system activates a signal change.

The modern LED signals provide a brighter, more visible signal to the driver, are more reliable and less expensive to maintain. The replacement of searchlight with LED signal heads involves the initial, upfront costs of purchasing the new signal head and the replacement of associated signalling and power equipment to make them compatible. The benefits of doing this are fewer signal failures and savings in ongoing maintenance expenditure.

The experience of operating the railway has shown that mixing the 2 different signal types on the same section of track reduces the effectiveness of the signal displays. Renewals should, therefore, be designed to change a whole section of the network to a consistent signal type.

In deciding on the basis for the Minimum Prescribed Works, DoI:

- examined the available information on the frequency and causes of signal failure;
- considered the costs of purchasing, installing and maintaining different types of signal head
- considered the practical constraints in setting renewal levels (the capacity of the maintainer to implement renewals)
- drew on the experience of past maintainers of the metropolitan rail system through interviews.

From this information DoI decided that its long-term strategy was the complete replacement of searchlight signals with LED signals. DoI considered 2 options to achieve this:

- an accelerated program replacing the older signals as soon as was practically possible, or
- a more gradual replacement program with wholesale replacement on corridors where major capacity upgrade projects had been scheduled and a smaller, additional replacement program.

DoI chose the gradual replacement option based on the practicality, costs and service reliability benefits of each option.

Source: Victorian Auditor-General's Office, based on interviews with DoI personnel.

DoI followed a similar process for other infrastructure assets including the approach to renewing track (for example, track sleepers) and electrical assets (for example, the overhead contact wire).

The library of franchising material contained many hundreds of items of technical material which informed the definition of the Minimum Prescribed Works. However, we found no documentation that pulled this information together to explain the process in terms of the options considered, their relative costs and benefits, and the reasons for choosing a preferred option.

[5] This is the part of the signal that displays a colour light signal to the train driver.

While the infrastructure manager accepted many of the Minimum Prescribed Works, it proposed amendments for some asset types. DoI required the infrastructure manager to justify these changes with more detailed evidence on performance, condition and the level of historic maintenance required to achieve acceptable performance.

Documenting a long term-plan

In April 2004, DoI appointed the engineering consultants, the Scott Wilson Group, to complete a substantial review of Melbourne's "operational" rail infrastructure. This "infrastructure review" inspected between 5 and 10 per cent of assets, and examined the lease and the infrastructure manager's plans.

The report stated that a cohesive investment strategy was needed to concentrate resources on the renewal of obsolete equipment to improve operational reliability[6]. It strongly recommended that DoI develop a long-term strategy for the network to drive individual asset maintenance and renewal policies[7].

This type of high level plan would set out target service levels and describe how assets would be created, maintained and renewed to achieve these service levels and address capacity constraints. This would involve:

- describing and justifying the long-term decisions sitting behind DoI's definition of the Minimum Prescribed Works
- setting out DoI's approach to addressing capacity issues
- showing how these combine to form a consistent, long-term plan.

In May 2006, the government announced the *Meeting our Transport Challenges* (MOTC) plan[8]. MOTC sets out a 10-year plan for shaping Victoria's transport system to meet the challenges it faces. For the metropolitan rail system, MOTC identified capacity constraints and the need to replace some obsolescent infrastructure as the key priorities. The major actions include track capacity upgrades, additional rolling stock, new train control and communications systems, and the upgrading of infrastructure within the Melbourne underground rail loop (MURL).

MOTC aimed to set out the government's actions to address the capacity constraints on the metropolitan rail system and the plan does this. MOTC is valuable because it identifies the parts of the rail infrastructure which need to be upgraded or expanded to meet these capacity challenges. The Scott Wilson review identified the need for a long-term strategy covering the maintenance and renewal of all rail assets and MOTC did not aim to do this.

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[6] Ibid., p. 40

[7] Ibid., p. 7

[8] State of Victoria 2006, *Meeting our Transport Challenges – Connecting Victorian Communities – The Plan.*

Setting clear priorities

The infrastructure manager is responsible for setting maintenance and renewal priorities over the lease period. The guidance material stated that the infrastructure manager should complete works "on a basis which is appropriately directed as to detail and priority, including the sequencing of activity and ensuring that work is undertaken where it is most needed"[9]. To be most effective, these resources should be targeted at the areas of greatest need in terms of maintaining and improving service delivery.

DoI assessed the adequacy of the infrastructure manager's priorities by:

- regularly inspecting parts of the infrastructure
- reviewing the KPIs produced by the infrastructure manager on a quarterly basis
- reviewing the monthly maintenance and renewal reports provided by the infrastructure manager in advance of the meetings of the MRRG
- examining the daily incident reports and making further inquiries about significant, adverse performance
- reviewing more detailed information held by the infrastructure manager on its approach to setting priorities
- following-up issues of concern with the infrastructure manager through day-to-day communication and through the more formal mechanism of the MRRG.

We examined the application of this process to a range of assets, including the replacement of railway sleepers, and this is described in Figure 3D.

[9] Department of Infrastructure 2003, *Passenger Rail Franchising in Victoria, Volume 9, Asset Management Plan Guidance Material – Train*, Public Transport Division, Melbourne, p. 3.

Figure 3D
Understanding priorities – Renewing timber sleepers

The Asset Management Plan included the replacement of 38 000 life-expired timber sleepers per year. The rail track is anchored to the sleepers which themselves rest on a formation of ballast (crushed rock). The sleepers are critical in keeping the track aligned and thus providing a smooth and safe pathway for trains.

There are about 1 460 sleepers per kilometre of track and the presence of an occasional broken or rotten sleeper will have minimal impact on the stability of the rails. However, where there are several adjoining defective sleepers on a particular section of the track this can make the rails unstable and misaligned. This will affect ride quality and if the deterioration is significant will lead to the infrastructure manager imposing a speed restriction so trains can continue to run safely.

The infrastructure manager regularly takes measurements of how well the tracks are aligned to highlight significant defects. The other measure of track condition is the extent of temporary speed restrictions put in place because of poor track condition. These restrictions are published weekly by the infrastructure manager.

We found that DoI actively monitors temporary speed restrictions and the infrastructure manager's quarterly measurements of track alignment. DoI followed-up adverse trends to understand why they were happening and how the infrastructure manager was planning to address them.

DoI supplemented these actions with informal monitoring of the track through weekly observations from the cabin of a train and other observations in the course of checking the infrastructure manager's renewals.

This process makes sure that the replacement program will not miss areas of the network showing signs of poor performance and deterioration.

Source: Victorian Auditor-General's Office, based on interviews with DoI personnel.

We also examined the application of this process for some power and signalling assets. We found evidence that DoI monitors performance and requires the infrastructure manager to address adverse trends. In this way, DoI can be sure that the infrastructure manager's renewal priorities encompass these assets most in need of replacement.

However, we found that the Asset Management Plan did not describe in sufficient detail how the infrastructure manager prioritised specific assets for maintenance and renewal. We observed for a sample of the assets that the infrastructure manager had detailed working documentation to guide its priority setting, but had not summarised the basis for priorities in the asset management plan.

Initiatives to improve planning

There are also some development activities which, if properly completed, should further improve the planning maintenance and renewals. These include:

- the infrastructure manager's development of an electronic asset management system
- DoI's further development of the Privatised Arrangements Support Systems PASS Assets database. This database, which sits above the asset management systems of the infrastructure manager, provides a (visual) window on all the information related to Victoria's rail infrastructure.

- the ongoing work to develop a consistent set of Victorian rail standards across all of Victoria's infrastructure managers.

Conclusion

The current maintenance and renewal plans were based on an analysis of what was needed in the longer-term to keep assets performing adequately as required by the lease. However, the basis for choosing specific, long-term renewal options could be better documented.

DoI's processes provide it with assurance that maintenance and renewals priorities include the most poorly performing assets. However, the maintenance and renewal plans could be improved to better explain the basis for the prioritising the maintenance and renewal of specific assets.

3.3.4 Implementing plans as intended

Well-informed plans are the foundation for effective maintenance and renewal. To realise these plans, the infrastructure manager needs to implement actions according to agreed design standards, timelines and budgets.

To determine whether plans have been implemented, DoI:

- monitors actual compared with planned expenditure
- monitors actual compared with planned activities
- inspects a sample of the completed renewals.

We reviewed these activities to determine whether DoI could be confident that maintenance and renewal plans had been implemented as intended.

We also assessed the progress made by the infrastructure manager and DoI to deliver on the initiatives to improve planning.

Actual compared with planned expenditure and activities

At June 2006, the maintenance and renewal spending since the start of the lease was within 1.2 per cent of the planned expenditure of $166 million.

For most assets, the number of completed renewals at June 2006, equalled and in some cases exceeded the number planned. However, for pedestrian level crossings and assets within electrical sub-stations, the actual number of renewals had fallen behind the number planned.

The main reasons for these shortfalls were delays in:

- creating an approved standard for accessible pedestrian crossings
- renewing assets within electrical substations because these had to first be made safe by removing the asbestos used to construct them.

For many of these renewal activities, the infrastructure manager had purchased equipment and will be ready to install replacements once these delays have been resolved. DoI has followed-up these variations with the infrastructure manager to understand why they have happened and how they will be resolved. The shortfalls will be carried over into the current lease year and DoI is confident that the infrastructure manager will make good any shortfalls over the course of the lease.

We also noted some shortfalls in terms of routine inspections and maintenance. These preventive activities are important in detecting and resolving issues before the need for more costly remedial work. DoI has asked the infrastructure manager for detailed explanations for the shortfall in these activities.

Field inspections for renewals

DoI engineers inspect a random sample of the completed renewals to verify that they have been completed as intended. Since the start of the lease in April 2004 until February 2006, DoI had inspected works covering 43 per cent of completed renewals. We reviewed DoI's inspection reports and found that they confirmed that these renewals had been completed as intended.

At the time of our review, the inspections had focused primarily on asset renewals. DoI acknowledged that this needed to be widened in order to verify the infrastructure manager's routine and reactive maintenance activities. To this end, DoI will introduce a structured program to verify these activities.

Progress on key actions and programs

In section 3.3.3 (Initiatives to improve planning) we identified several initiatives that should lead to the delivery of improved maintenance and renewal by the infrastructure manager. In this section, we look at DoI's progress on these initiatives.

Developing an electronic asset management system

The lease sets out in Annexure 3 the activities, milestone dates and the payment schedule for a series of information technology projects, including the development of this system.

Although DoI did not provide a detailed specification for the asset management system, Connex has made progress on the system and we saw improvements in fault reporting and analysis as a result of this. However, the completion of this system for all rail assets is more than a year behind schedule.

PASS Assets database

To assist in managing Victoria's rail infrastructure, DoI has developed a spatial (map-based and visual) database. The database already includes information on the state's rail assets and DoI expects the transfer of other information to the database to be complete by September 2007. PASS Assets will include:

- a description of the state's rail assets
- data on aspects of track condition and performance which can be captured automatically
- linkages to the infrastructure manager's asset management system.

PASS Assets complements the infrastructure manager's day-to-day asset management system by providing a window to view a range of information on the state's rail assets. The timescales for linking information from the infrastructure manager's asset management system to PASS Assets are less certain because the infrastructure manager's system is behind schedule.

DoI is responsible for creating an interface with the infrastructure manager's system and did not use a detailed specification to control the scope of this interface. DoI noted the complexity of this interface and always envisaged the need for close cooperation with the infrastructure manager to deliver this. While this complexity had led to some delays, Connex and DoI had worked closely to overcome any problems.

Creating consistent rail standards

Victoria's infrastructure managers are responsible for rail standards for the infrastructure under their control. Victoria currently has a workable set of rail standards under each lease arrangement. However, DoI saw the potential to improve and, in some cases, harmonise these standards. DoI has identified a list of essential standards and is working with the infrastructure managers to review and improve these standards.

Conclusion

DoI has closely monitored the implementation of the infrastructure manager's plans by comparing actual and planned expenditure and activities and through on-site inspections of infrastructure renewals. To date, it has yet to verify routine maintenance and inspection activities in the same way. However, DoI plans to introduce a program to do this.

Plans have largely been implemented as intended by the infrastructure manager.

While the development of the PASS Assets database is progressing according to plan, the infrastructure manager's asset management system is behind schedule.

3.3.5 Monitoring and continuous improvement

Performance measures provide feedback and should be available to those responsible for driving improved maintenance practices. Measuring performance across a wide range of assets presents a significant challenge.

Asset condition can be directly and objectively measured for some asset groups where a change in the chosen measurement is correlated with the probability of an asset failing. The thickness of the overhead contact wire and the extent of wear on the surface of rails are examples of these types of measurements. For other asset types, such as railway signals, it is difficult to directly measure asset condition and correlate this with the probability of failure. In this case, failure rates and changes in these rates and other measures of performance are indirect indicators of asset condition.

Below we describe DoI's approach, and whether the monitoring arrangements have proved adequate and led to the improved maintenance of the infrastructure.

DoI's approach

DoI monitors performance:

- by requiring the infrastructure manager to report KPIs on a quarterly basis
- by holding monthly meetings of the MRRG
- through a range of other monitoring activities, including the review of daily incident reports, regular infrastructure inspections and day-to-day communications with the infrastructure manager following-up these reports and observations.

Have the monitoring arrangements proved adequate?

The quarterly KPIs are extensive and include information which helps DoI understand how the infrastructure has performed and how effectively poor performance has been addressed. The KPIs include measures for:

- service outcomes in terms of: the number of infrastructure-related incidents which caused train delays, and their impact on passenger delays
- asset condition where asset failure can be predicted from an objective measurement of condition
- some of the reasons why the infrastructure failed, for example the number of signal points or power failures which led to train delays.

We describe below some ways in which the KPIs could be further improved.

Currently, the KPIs provide a partial breakdown of the reasons for infrastructure incidents accounting for about 20 per cent of the total infrastructure-related delays. We analysed the 2005 incident data and found that faulty track circuits were the most important infrastructure-related reasons for passenger delays. These were not separately reported in the quarterly KPIs.

DoI was aware of the importance of these types of failures from its routine monitoring of daily incident reports and its regular meetings with the infrastructure manager. However, the KPIs should include a comprehensive breakdown of the infrastructure failures which caused a delay to services and their contribution to the total delay.

There are other sources of information which might improve DoI's understanding in this area. For example, developing early warning ("leading") performance indicators, such as modelling electrical system overloads (DoI modelled electrical system overloads in preparation for the Commonwealth Games and is continuing this work as part of its planning for new rolling stock).

DoI in the early to middle part of 2006 reviewed the KPIs with the infrastructure manager to understand the reasons for adverse trends and the actions underway or planned to address these trends. These discussions evolved to consider how the existing KPIs could be improved to provide better "leading" indicators of infrastructure asset performance. In October 2006, DoI wrote to the infrastructure manager under clause 22.3 of the lease to formally start a review of the KPIs.

DoI's monitoring of the arrangements has been adequate. DoI has recognised the potential to further improve its monitoring and has initiated a process to do this.

Have the arrangements encouraged improvement?

We observed several examples of collaboration between DoI and the infrastructure manager to introduce improvements, such as:

- A trial was run in which timber sleepers were replaced by more durable and reliable concrete sleepers. The maintenance and renewal plans were subsequently amended to include a program for the replacement of some timber sleepers with concrete sleepers.
- Connex has trialled rail grinding at a limited number of locations on the network. The rail grinding process involves a large track machine with electronically controlled grinding wheels that removes surface defects in the head of the rail and shapes the head of the rail to optimise contact with the train wheels. The trials successfully addressed noise problems caused by the rail head becoming mis-shapen or damaged.
- The infrastructure manager formulated a strategy to improve the performance of track circuits which were a major source of infrastructure-related delays. In May 2006, DoI had funded $12 million of supplementary works, including $2.1 million to replace track circuits and related components targeting the 6 most critical junctions in the network.

DoI's response to the (Scott Wilson) infrastructure review

DoI commissioned the Scott Wilson Group to review the condition of the infrastructure in 2004 and it presented its final report in 2005.

The review concluded that the rail infrastructure "generally remains fit for purpose for the current level of operation (i.e. current traffic volumes, train speeds and axle weights)"[10]. It found that:

- there was "a good degree of commitment from the infrastructure manager to undertake maintenance to a high standard"
- the maintenance gaps or concerns it had identified were generally issues which had not previously been given a high priority[11].

The review recommended that DoI develop a long-term infrastructure strategy for the network which could then drive individual asset maintenance and renewal policies[12]. It should also take action to:

- remedy any immediate deficiencies in asset condition and prioritise those actions by probability and criticality of failure
- maintain the long-term condition of the asset[13].

We found that DoI was initially slow to respond to these issues and its documented response in April 2006[14] did not address a number of the report's conclusions and recommendations. DoI has since updated its response and, together with the infrastructure manager, is now systematically addressing the issues raised by the review through the MRRG.

Conclusion

The monitoring arrangements have proved adequate in managing performance and providing the focus for action to address poor performance.

3.3.6 Overall conclusions and recommendations

DoI set out objectives for the maintenance and renewal arrangements for the metropolitan rail assets which were consistent with the government's *Sustaining our Assets* policy principles. The arrangements adequately defined service levels that were consistent with government objectives,

The current maintenance and renewal plans were based on an analysis of what was needed in the longer-term to keep assets performing adequately as required by the lease. The maintenance and renewal plans will continue to achieve current service levels beyond the lease period. The basis for choosing specific, long-term renewal options could have been better documented. This would have made it easier to understand why these choices represented good value-for-money.

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[10] Department of Infrastructure 2005, *Melbourne Metropolitan Rail (Train) Infrastructure Review – Final Report,* prepared by the Scott Wilson Group, Melbourne, p. 8.

[11] op.cit.

[12] op.cit.

[13] Ibid, p. 7.

[14] Department of Infrastructure 11 April 2006, *Memo from Acting General Manager Infrastructure and Asset Management to Director for Public Transport.*

The maintenance and renewal plans could better explain the reasons for the prioritisation of specific assets. However, DoI's processes provide it with assurance that maintenance and renewals priorities include the most poorly performing assets. While the infrastructure manager's maintenance and renewal plans were clear in their aim of achieving acceptable levels of service delivery, they did not explain how these priorities had been determined.

DoI carefully checks the infrastructure manager's actual spending achievement against its maintenance and renewal plans. The infrastructure manager's performance in this respect has improved over the first 2 years of the lease. DoI's approach to on-site verification of the infrastructure manager's renewal activities has been comprehensive and satisfactory. DoI has recognised the need to expand its on-site monitoring to encompass routine maintenance and inspections.

The existing KPIs are a good starting point for monitoring infrastructure condition, performance, and the effectiveness of maintenance and renewals. We found evidence that DoI reviews the KPI trends to understand the infrastructure manager's performance and to drive further improvement. The arrangements have led to several examples of innovation and improved performance

The KPI measures could be further improved. DoI has recognised the potential for further improvement and has activated a lease provision to work with the infrastructure manager to review the KPIs.

Recommendations

3.1 That DoI documents a long-term asset management strategy detailing its rationale for the maintenance and renewal of rail assets.

3.2 That DoI ensures that future plans document the infrastructure manager's methodology for prioritising maintenance and renewals.

3.3 That DoI completes its current review of the KPIs and implements improvements so that they better describe:

- infrastructure condition
- infrastructure performance
- the effectiveness of maintenance and renewal activities.

3.4 Is the infrastructure performing well?

To determine whether the infrastructure was delivering the required levels of service and whether it was likely to continue doing this, we examined:

- the condition of the infrastructure and whether it was "fit-for-purpose" as required by the lease; that is, suitable to fulfil its intended function
- service delivery trends, to enable us to understand the connection between maintenance and renewal practices and service outcomes.

3.4.1 Infrastructure condition

Under the infrastructure lease, the infrastructure manager is responsible for maintaining the assets in a condition that enables train services to operate safely and reliably[15].

To understand the condition of the infrastructure, we:

- completed our own inspections of the rail infrastructure[16] and took account of the infrastructure review[17] commissioned by DoI in reaching our conclusions
- reviewed the audits and investigations completed by Public Transport Safety Victoria (PTSV)[18] in 2004 and 2005.

Field inspections and review of asset condition data

We engaged 3 rail specialists each with over 30 years experience in track and structures, signalling and power systems to:

- review the maintenance and renewal plans
- review the available information on infrastructure condition, including the infrastructure review report
- inspect a sample of the infrastructure
- document their conclusions on the condition of the infrastructure and the likelihood of future deterioration.

Our specialists spent 2 days accompanied by a senior foreman examining track and structures, electrical and signalling equipment for locations on the Frankston line (day 1) and the Hurstbridge, Upfield and Broadmeadows lines (day 2). Our electrical specialist spent a further day inspecting 4 substations and our signalling specialist spent a further 2 days inspecting assets at a further 5 locations.

We sampled fewer assets than those sampled during the infrastructure review. For example the review examined:

- 11 substations compared with our inspections of 4 substations
- signalling equipment at 21 sites compared with our inspections at 14 sites.

The results of our examination are described below.

Track and structures

Our examination confirmed that the condition of the track was generally fit-for-purpose, which agreed with the infrastructure review's assessment based on a larger sample of assets.

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[15] Department of Infrastructure 2004, *Infrastructure lease – train*, The Director of Public Transport, Melbourne Transport Enterprises Pty. Ltd., Victorian Rail Track, Melbourne, p. 55.

[16] These were led by rail infrastructure specialists from consultants Interfleet Technology.

[17] Department of Infrastructure 2005, *Melbourne Metropolitan Rail (Train) Infrastructure Review – Final Report,* prepared by the Scott Wilson Group, Melbourne.

[18] Public Transport Safety Victoria is the Victorian rail and bus safety regulator.

Electrical infrastructure

In a similar way we found the condition of electrical infrastructure[19] was generally fit-for-purpose and again this was consistent with the infrastructure review's assessment.

Signalling infrastructure

Signal systems are designed to provide safe passage for trains on the railway by ensuring that they remain separate from each other and from road traffic at level crossings. Most modern signal equipment is designed and maintained to be "fail safe". This means that, when the equipment fails, the signal reverts to a stop sign - a "right side" failure - rather than giving a false "go" signal to a train, called a "wrong side" failure.

Our examination confirmed that the condition of the signalling infrastructure was generally fit-for-purpose. However, the infrastructure review and our own inspections identified some equipment needing improved maintenance. We describe below our findings in relation to:

- the condition of the cable trunking
- unterminated signal communication cables
- equipment installation practices
- the reliability of track circuits
- the design of system renewals.

Condition of the cable trunking[20]

The cable route is the pathway for signalling communications and power cables. These are housed in metal cable trunking to protect them from damage by the elements, vermin and vandals. If the insulation around the live cable core is damaged, this poses a potential threat to the integrity and safety of the signal system. Damage could lead to failure of the signalling system through the loss of power or communications.

The infrastructure review found several instances of seriously damaged, decayed or incomplete cable trunking (where the lids were missing). In the summary of site visits, the poor condition of the cable route was identified for 9 of the 21 sites visited[21]. The review reported that "the outstanding (signalling) item that needs addressing is the cable route: it is in very poor condition and requires a long-term maintenance and renewal strategy"[22].

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[19] Electrical assets include overhead wiring, substations, power control systems, tie and switching stations, transmission lines, electrolysis and DC feeders.

[20] Trunking is the metal casing carrying the signalling, power, and communication wires along the side of the track.

[21] Department of Infrastructure 2005, *Melbourne Metropolitan Rail (Train) Infrastructure Review - Final Report*, prepared by the Scott Wilson Group, Melbourne, section 5.2, pp.26-35.

[22] Ibid, p. 38.

Our inspection of the infrastructure identified several examples of decayed and damaged cable trunking which exposed cables to potential damage. These examples are the result of the absence of a systematic program of maintenance and renewal for these assets from before the start of the current lease.

The current lease introduced a systematic rehabilitation program and this was a major, positive improvement in the management of these assets. This program is scheduled to cover the entire network in a 5-year period and we observed the positive impact of this program on the condition of the Frankston corridor assets during the audit. However, this program could have been more effective by prioritising the sections of trunking most needing to be repaired.

DoI and the infrastructure manager have agreed to review the scope of the current activities relating to these assets to ensure that the emphasis is on critical locations rather than completing a given quantity of renewals.

Unterminated signal communication cables

The infrastructure review observed several locations where the loose ends of wires associated with signalling equipment had not been properly insulated. We found no examples of unterminated wires during our less extensive examination of the infrastructure.

The review report recommended an immediate program to address this issue. We agree with this recommendation. DoI has advised us that the infrastructure manager has terminated all the unterminated wires identified by the infrastructure review.

DoI has agreed that the infrastructure manager should investigate this issue at high risk locations and take remedial action where required. In the longer-term, the inspections needed to produce in-service equipment diagrams of the signalling system will identify any lower risk locations with this problem.

Equipment installation practices

The infrastructure review identified some examples where signalling equipment had been poorly installed. This included cables entering signal posts with no protection to stop the metal edge of the post damaging the cable insulation and exposing the live core. The report also found examples where domestic appliance cable had been used in signalling circuits. This does not conform to the standards for signalling wire in Victoria. Our infrastructure inspections confirmed the review report findings.

The infrastructure manager has agreed with DoI to investigate and address this issue at locations where there is the greatest potential risk to train services. In the longer-term, field inspections required for the production of in-service-drawings will identify where further improvement is needed.

Reliability of track circuits

These are electrical circuits designed to detect the presence of a train on a section of the railway when the train wheels complete an electrical circuit on contacting the rails.

Our examination confirmed that the way the circuits are installed and set up could be improved to achieve greater reliability. The trackside connections in many cases were vulnerable to damage and often had no backup connection should the primary one fail. DoI noted that current and past design standards prescribed, in many cases, both primary and backup connectors but that the theft of copper conductors and damage had led to situations where only a single connector remained. The infrastructure manager addressed these situations when found during the course of routine maintenance and has started using aluminium connectors instead of the more valuable copper connectors.

From its review of the fault statistics, the infrastructure review confirmed that track circuit failures were a significant cause of incidents and delays[23]. We confirmed this finding from our analysis of the incidents causing train delays in 2005.

DoI agreed to a $12 million package of supplementary infrastructure works in May 2006. This included $2.1 million to address track circuit problems at the 6 worst locations on the network and to replace signal control equipment that threatened service reliability. The infrastructure manager formulated this bid in response to DoI's offer to fund additional works to improve the reliability of critical infrastructure components, including track circuits.

The infrastructure review recommended a replacement program for older and less reliable track circuits, given the impact of failures on service reliability. DoI needs to review and document its long-term approach to the level of renewals for these assets.

Design of system renewals

The infrastructure review and our own inspections found examples of renewals to the signalling system that were poorly designed. In 2 cases, at Dandenong and Camberwell, the interface between old and new equipment led to problems and many passenger delays.

All the examples we identified were designed before the current lease arrangements took effect and the infrastructure manager has addressed these problems. Both DoI and the infrastructure manager were aware of these issues and were confident that incentives and processes were in place to prevent their repetition.

Conclusion

The infrastructure review completed by the Scott Wilson Group concluded that the track, electrical and signalling infrastructure was fit-for-purpose for the current level of operation. The review also noted the commitment of the infrastructure manager to complete maintenance to a high standard. We agree with this overall assessment.

There were, however, areas which could be improved, particularly with respect to the maintenance of the signalling equipment.

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[23] ibid., p. 37.

These issues arose from past practices dating from before the current infrastructure lease. DoI has now put in place a process and set of actions to address these concerns and must ensure that these actions are implemented to good effect.

3.4.2 Service levels

In this section of the report, we examine the connection between infrastructure maintenance and the achievement of acceptable train service levels. We examined the overall performance of the metropolitan system, and the role and causes of infrastructure delays. Finally, we examine the extent of temporary speed restrictions on the network as an indicator of infrastructure performance.

Overall performance

According to its customer charter, the infrastructure manager aims to:

- deliver at least 98 per cent of services within 6 minutes of their scheduled, arrival times at the end of their journey
- cancel less than 14 (0.75 per cent) of the 1 867 weekday services.

Since July 2003, the percentage of trains arriving on time has been below the 98 per cent target. It was about 96 per cent between July and September 2003 and fell to under 93 per cent by March 2006. By September 2006 on-time running had improved to 94 per cent.

Between September 2003 and March 2006 cancellations exceeded the 0.75 per cent target rising to a peak of nearly 2 per cent by June 2004. Since then, there has been a downward trend and the infrastructure manager achieved the cancellations target between April 2006 and September 2006.

Role and causes of infrastructure-related delays

Between 2003 and 2005 there were, on average, a total of 2 000 incidents per month leading to unplanned passenger delays. This includes infrastructure-related and other, non-infrastructure incidents. While the number of incidents per month remained about the same, the passenger time lost increased by 47 per cent from 17 million to 25 million passenger minutes per month[24]. Train defects and passenger-related issues led to about 70 per cent of these delays.

Infrastructure-related incidents made up about 10 per cent of the total incidents and 13 per cent of the total passenger delays per month. Between 2003 and 2005, infrastructure-related incidents per month fell by 10 per cent (from 207 to 185). In contrast, infrastructure-related delays increased by 37 per cent (from 2.3 million to 3.1 million passenger minutes).

[24] Victorian Auditor-General's Office analysis from data provided by the Public Transport Safety Victoria, Department of Infrastructure, Melbourne, 2005.

DoI was of the view that the increase in the delays per incident was caused by major project works at both Southern Cross and Flinders Street Stations. These works limited the infrastructure manager's capacity to respond to incidents in the vicinity of these stations and so mitigate the impact on other train services. There were examples where a train had become defective while at one of these stations and had delayed incoming trains because no other platforms were available. We do not have information to measure the size of these impacts.

The remainder of this section focuses on the infrastructure-related delays and the potential for reducing these through improved maintenance and renewal.

Reasons for infrastructure-related incidents and delays

In 2005, between January and November, there were 2 030 infrastructure-related incidents and passenger delays totalling 39.2 million minutes.

Figure 3E describes the reasons for these incidents as described by the infrastructure manager.

Figure 3E
Major causes of Infrastructure incidents 2005 (per cent)

Incident reason	Incidents	Delays
Track circuit failure: problems with track and signalling infrastructure, including track circuits, points, signals, track and signalling power	72.0	72.4
Overhead fault: problems related to the overhead power system	9.5	11.3
Track maintenance: incidents caused during maintenance work	4.7	4.1
SPOT infrastructure: problems with the monitors which provide vision of platforms to train drivers	4.3	2.2
Vandalism: problems caused by vandalism	3.3	1.3
Other incidents not classified by a reason	6.2	8.7

Source: Victorian Auditor-General's Office analysis from data provided by Public Transport Safety Victoria, Department of Infrastructure, Melbourne, 2005.

Problems with the signal system labelled, "track circuit failure" accounted for 72.4 per cent of all infrastructure-related delays. Problems with the overhead power system accounted for a further 11.3 per cent of delays and none of the other remaining reasons caused more than 10 per cent of these delays.

"Track circuit failure" included a much wider range of specific, signal-related faults. We analysed the information to breakdown the 72 per cent of incidents in this category into these specific faults as shown in Figure 3F.

Figure 3F
Breakdown of "track circuit failure" incidents (per cent)

Reason taken from the text description of the incident	Incidents	Delays
Faulty track circuit: where given as the root cause, e.g."T.C.F. affect signals"	38.4	31.5
Faulty points: incidents where reasons included "faulty points", "failed reverse points" or "failed normal points"	15.0	27.2
Faulty signals: 80 per cent of these incidents were described as "faulty signal". The remainder were incidents where signals had "reverted to stop" or had given rise to a "route setting failure"	31.9	17.1
Loss of power: power losses or disruptions related to the signal system; e.g. "loss of signal power" or "power surge affects signals"	2.5	9.5
Damage during maintenance: e.g."sig maint caused TCF"	1.6	3.1
Remaining reasons: includes incidents which could be placed in other categories and other examples which could not	10.5	11.6

Source: Victorian Auditor-General's Office analysis from data provided by Public Transport Safety Victoria, Department of Infrastructure, Melbourne, 2005.

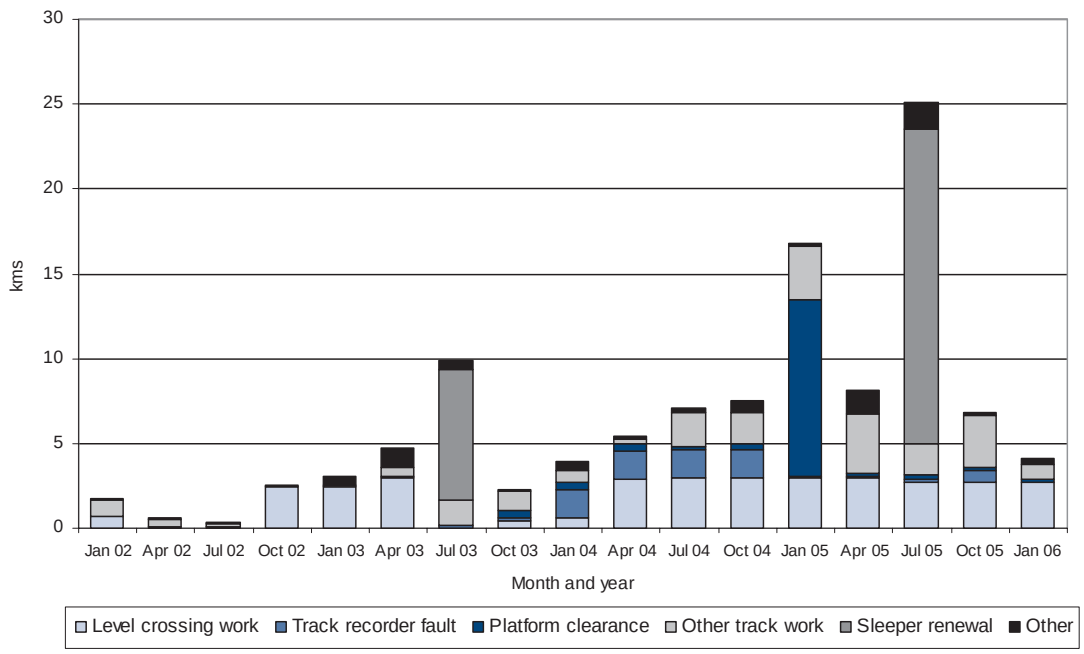
In terms of signalling-related delays "faulty track circuits" were still most significant (31.5 per cent) but "faulty points" (27.2 per cent) and "faulty signals" (17.1 per cent) and the "loss of (signalling) power" were also significant.

Temporary speed restrictions

Infrastructure managers are responsible for declaring temporary speed restrictions where the condition of the infrastructure or the completion of essential maintenance work requires the imposition of reduced speeds. The restrictions are issued in a weekly report identifying the location, the speed restriction and the reason for applying it. We examined a sample of 16 of these reports for the months of January, April, July and October for the years 2002 through to the first quarter of 2006.

We calculated the amount of track affected by speed restrictions. Our aim was to determine whether poor infrastructure condition had been significant in limiting train speeds. Figure 3G shows the reasons for temporary speed restrictions.

Figure 3G
Reasons for temporary speed restrictions



Source: Victorian Auditor-General's Office analysis of temporary speed restriction notices.

Figure 3G shows that speed restrictions were not a significant issue. For the most part these restrictions affected between one and 10 kilometres of the 760 route kilometres of the metropolitan rail network. These restrictions are relatively small and almost exclusively related to the planned maintenance and renewal of level crossings, track and sleepers. In 2 months, the restrictions exceeded 10 kilometres of the network and were associated with work on platforms in relation to new rolling stock and a more extensive period of sleeper replacement.

Conclusion

On-time reliability currently falls short of the target set out in the infrastructure manager's customer charter and has done so for several years. Cancellations have improved to the point where between April and September 2006 they achieved the customer charter target for the first time in several years.

Infrastructure failures account for a relatively small proportion (about 10 per cent) of the delays experienced by passengers in 2005 and most of these delays were due to signalling equipment failures. These delays have risen by 37 per cent between 2003 and 2005 and this is less than the 47 per cent increase in total delays (including non-infrastructure incidents). The specific reasons for failure were not well identified by the labels attached to signalling incidents and this could be improved.

Further Improvements in infrastructure-related performance are likely to come from a focused program to improve the performance of the signalling system.

3.4.3 Overall conclusions and recommendations

The condition of the track, electrical and signalling infrastructure was observed to be fit-for-purpose.

Both the infrastructure review and our inspections found that the condition of parts of the signalling infrastructure require improved maintenance. DoI has agreed on a plan and specific actions with Connex to address these issues.

Infrastructure-related incidents were responsible for around 10 per cent of all passenger delays in 2005. Most infrastructure-related incidents were caused by signal asset failures. A focused program of preventative maintenance and renewals would improve performance in this area. Connex has secured $2.1 million in additional funding from DoI to improve the performance of the signalling system at some critical locations across the rail network. These works include the renewal of track circuits and the replacement of signal control equipment at Epping, Dandenong and Caulfield.

Taken together with our findings on asset condition, we conclude that the infrastructure has performed well but that there is scope for further improvement. Specifically, there is room to improve the performance of the signalling system through better maintenance and further, targeted renewals.

Recommendation

3.4 That DoI ensures that the infrastructure manager addresses the recommendations of the infrastructure review by implementing the agreed action plan.

4 How effectively is the intrastate infrastructure maintained and reviewed?

At a glance

Background

We examined how well the regional, intrastate rail infrastructure had been maintained and renewed by reviewing the lease arrangements and the performance of the infrastructure.

Key findings

- The arrangements established in 1999 did not provide for the adequate maintenance and renewal of the infrastructure.
- This situation was not substantially changed when the lease was transferred to Pacific National in 2004.
- Since 2004, the actions of the Department of Infrastructure (DoI) and the infrastructure manager, together with the finalisation of new access arrangements for the regional freight network, have made some improvements to the maintenance and renewal regime. Further changes are needed if the arrangements are to conform to the government's better practice asset management principles**.**
- The condition of the infrastructure has deteriorated since the lease was signed in 1999.
- The existing condition monitoring arrangements are inadequate and need to be improved.
- The government's decision to buy back the lease provides the opportunity for DoI to put in place improved arrangements that address these issues**.**

Key recommendations

4.1 That DoI takes the opportunity afforded by the buyback of the infrastructure lease to implement the government's better practice asset management principles and to improve the monitoring of infrastructure condition and performance.

4.1 Introduction

In this part of the report we examine the effectiveness of the arrangements guiding maintenance and renewal for the intrastate rail infrastructure serving regional Victoria.

Part 4.2 summarises the 1999 arrangements and describes how these have changed over time. In Part 4.3 we assess the adequacy of these arrangements using the same criteria applied to the metropolitan arrangements in Part 3. In part 4.4, we examine the condition of the rail infrastructure and service delivery trends.

4.2 Maintenance and renewal arrangements

4.2.1 The 1999 arrangements

In 1999 Rail America, through its Victorian subsidiary Freight Victoria Limited (FVL), became both the infrastructure manager and operator of freight rail services on the intrastate track.

FVL signed an initial 15-year lease with options for 2 further 2-year lease term extensions. FVL subsequently took on the business name of Freight Australia Limited (FAL) and this name is used throughout the report.

In addition to the lease, FAL agreed to separate agreements to provide access to:

- V/Line Passenger for the operation of passenger services
- other freight operators if they applied to use the infrastructure.

The lease

Unless covered by an access agreement, FAL had to return the infrastructure at least in the “minimum condition” defined by the lease.

“Minimum condition” meant that the infrastructure:

- should allow for the operation of services at least to the same standard as the infrastructure had been used immediately before the surrender of the lease
- must be able to accommodate freight rail traffic at a minimum speed of 20 km/h with 19-tonne axle loads.

To retain rail freight traffic on the intrastate network requires service levels above these minimum speeds and loads. However for FAL, lowering service levels on some, lower volume lines might have been an attractive proposition because of the savings in maintenance and renewal costs. Minimum maintenance leads to the deterioration of the infrastructure over time and subsequently raising service levels becomes very expensive.

The lease did not require FAL to plan for maintenance and renewal until the last 5 years of the lease.

V/Line Passenger access agreement

This stated that "the Access Provider must maintain the Network and exercise Operational Control so as to allow the Operator to provide its Services safely"[1].

The agreement required FAL to maintain the infrastructure as "fit-for-purpose" to operate the scheduled services up to the maximum speeds set out in the Country Network Services Plan.

The agreement required FAL to:

- document annually one-year and 4-year asset management plans and provide relevant extracts of this to the passenger operators as a basis for consultation
- within a reasonable time frame, repair problems which forced the infrastructure manager to temporarily limit train speeds
- pay compensation to V/Line if passenger trains were delayed because of infrastructure failures
- arrange for the completion of track ride quality tests on a regular basis and to give the results to the Director of Public Transport and the passenger operator
- within a reasonable time frame, repair any serious faults uncovered by the ride quality tests and carry out repairs if average measures of ride quality fell below agreed levels.

Access arrangements for other freight operators

The government introduced a negotiate-arbitrate access regime for the intrastate freight rail network on 1 July 2001 as a continuation of the rail privatisation process started by the former government.

Under this framework, any company that wanted access to the freight network had to negotiate conditions and prices with FAL. The state regulator, the Essential Services Commission (ESC), would arbitrate if negotiations fell through.

Funding maintenance and renewal

The infrastructure manager funded the maintenance and renewal of non-passenger lines from the revenue it received from customers for operating their freight services. Under the agreement, the government was not required to contribute to the funding of the maintenance and renewal of lines used only for freight after 1999.

The maintenance and renewal of passenger lines was funded by access payments, from passenger operators.

After the private passenger operator (National Express) withdrew, the government took direct control of V/Line and continued to supplement the farebox revenue to cover its costs. The access payments flowing to the infrastructure manager, therefore, include a substantial government subsidy.

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[1] Access Agreement between Freight Victoria and V/Line Passenger, 1999, section 3.6, p. 15.

Problems with arrangements under Freight Australia Limited

DoI and other stakeholders raised a number of concerns about the arrangements with FAL:

- After a series of 7 derailments on the FAL network between January and July 2004, there was widespread concern about the ability of infrastructure to safely carry freight traffic.
- V/Line Passenger complained about the maintenance and condition of the infrastructure used by passenger services.
- DoI found it difficult to obtain any meaningful information about the condition of the infrastructure from FAL.
- DoI took the view that the infrastructure manager was not spending enough to properly maintain the infrastructure and prevent its further deterioration.
- In 1999, the government developed policies and projects to expand the role of rail in the carriage of passengers and freight. There were major delays in progressing projects, such as Regional Fast Rail, because DoI experienced difficulties gaining access to the infrastructure and reaching agreement on design changes with FAL.
- The Australian Competition and Consumer Commission (ACCC) and DoI were concerned that the access arrangements designed to allow other rail operators to compete with FAL had not worked.

4.2.2 Transfer of lease to Pacific National in 2004

In 2003, FAL's parent company, Rail America, decided to sell FVL and transfer the remaining years of the lease.

In 2004, the Director of Public Transport consented to the lease transfer and the sale of FVL to Pacific National (PN) and negotiated the following changes with PN as part of the transfer consent:

- safety provisions were strengthened by ensuring that the PN officer responsible for rail safety reported directly to the Chief Executive Officer and board, and that any shortfalls in funding the lease obligations (including the maintenance and renewal of the infrastructure) were covered by a parent company guarantee
- an additional "new works" clause was inserted in the lease to make it easier for the government to complete major rail upgrade projects. DoI has since used this clause as a mechanism for PN to complete priority renewal works critical to the safe and effective operation of passenger services
- a Masterplan was to be developed enabling PN and the government to invest cooperatively in the modernisation of the freight network
- both parties stated their intention to review the existing maintenance and renewal arrangements.

The basis for funding maintenance and renewals remained unchanged, with no expectation at the time of the transfer that government would provide additional funding.

After PN took over the lease, it reviewed the business and separated the infrastructure management business from the provision of freight rail services. It advised DoI that it was no longer able to maintain the infrastructure at current service levels. In fact, past under-investment meant that the network had accumulated a significant maintenance debt that needed to be addressed. Without additional resources, PN would have to impose additional temporary speed restrictions on some passenger and freight lines.

PN developed a whole-of-life cost model for maintenance and renewal to show that current revenue streams were inadequate to sustain existing service levels.

DoI reviewed the infrastructure manager's cost estimates for the maintenance and renewal of regional passenger lines. DoI subsequently agreed to provide $59 million in 2005-06 to fund urgent renewals for passenger lines through a series of project agreements.

DoI also considered the implications of the infrastructure manager's cost modelling for future freight service levels. At that time, the ESC was nearing the end of the process to set up new access arrangements for intrastate freight services. DoI, therefore, delayed a full consideration of any changes to the funding of the freight network until the regulatory process had been completed.

The ESC's access arrangements were determined in late June 2006 and we describe their implications in the next part of the report.

4.2.3 Further developments

Three factors are likely to influence the future maintenance and renewal of the intrastate rail infrastructure:

- reforms to Victorian Rail Access Regime (VRAR) and the access arrangements for the intrastate rail infrastructure made by the ESC
- the revision of the V/Line access agreement
- the government's commitment to buy-back the lease.

We describe the status and implications of each of these below.

Reform of the Victorian rail access regime - Freight

The regime introduced in 2001 allowed other freight operators to negotiate with FAL to use the rail infrastructure. The ACCC in assessing PN's acquisition of FAL acknowledged the difficulties in accessing the Victorian rail infrastructure[2]. Under this regime, no operator had managed to negotiate an access arrangement with FAL.

[2] ACCC, *Pacific National's proposed acquisition of Freight Australia*, 1 July 2004, re rail haulage and freight, p. 3.

The government recognised this and set about reviewing and improving the access regime for the regional freight network in 2004. In May 2005 the government amended the *Rail Corporations Act 1996* to establish the legal framework to revise the access arrangements. It required the ESC to develop and oversee an access regime in line with the pricing principles set out in the Rail Network Pricing Order of October 2005.

The final access arrangements included:

- setting the levels of service across the network (including train speeds and axle loads)
- calculating the efficient costs of providing these service levels
- setting prices to recover these costs taking account of the forecast demand for freight services.

PN submitted its final, proposed access arrangements on 3 May 2006. The ESC rejected this proposal and, in line with the legislation, set alternative access arrangements to apply from 29 June 2006.

While the ESC accepted the service levels proposed by PN it rejected the proposal because it disagreed with PN's

- estimate of the efficient costs of operation (they were too high)
- price differential between grain and general freight
- assumption that government would meet an annual gap between revenue and costs of $31 million (government had made no commitment to do this)[3].

The ESC was concerned about the ability of the market to pay the prices required to fund the service levels in its final decision. It estimated that, if prices were to be kept at a level the market could bear, the government would have to contribute $9 million to $19 million to sustain the service levels set by the agreement[4]. PN initiated a legal challenge to the final decision but withdrew this challenge while entering negotiations with DoI over the future funding of infrastructure maintenance and renewal.

Revised V/Line Passenger access agreement

The previous access agreement between V/Line Passenger and the infrastructure manager was extended beyond June 2005 until the completion of the Regional Fast Rail project and expired on 30 June 2006. Under this agreement, V/Line Passenger paid the infrastructure manager to access the infrastructure to run passenger services. V/Line Passenger and DoI agreed a new agreement starting from 1 July 2006 and due to end on 1 July 2008. However, this agreement terminated on 4 May 2007 when V/Line Passenger took over the management of the infrastructure on behalf of the state.

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[3] Essential Services Commission May 2006, *Pacific National Rail Access Arrangement - Final Decision*, Essential Services Commission, Melbourne.

[4] *Essential Services Commission sets Victorian rail access arrangements*, media release, Melbourne, 29 June 2006.

Government's buyback of the infrastructure lease

In November 2006, the government negotiated an in-principle agreement to buy back the lease from PN for $133.8 million[5]. PN completed the handover of the network to V/Line in early May 2007.

4.2.4 Conclusion

The May 1999 arrangements established by the previous government provided neither: sufficient information to enable DoI to understand the condition of the infrastructure; nor the contractual means for addressing any problems with the management of the assets. The arrangements for providing access to competing rail freight operators did not work well, with no other operator managing to negotiate an access agreement.

When the lease was transferred in August 2004, the Director of Public Transport secured some amendments that were designed to make it easier for DoI to complete major rail improvement projects, and to strengthen the rail safety arrangements by encouraging the infrastructure manager to focus on maintenance and renewal. However, the changes did not address the inadequacies of the arrangements for the maintenance and renewal of the infrastructure.

The ESC's decision in 2006, clearly defined the service levels for intrastate freight lines that had not been defined in the infrastructure lease. It also required the infrastructure manager to provide performance measures for infrastructure performance.

The ESC's decision confirmed that maintaining the current intrastate freight network at reasonable levels of service is unsustainable without government support[6]. The government intends to consult with stakeholders, including the infrastructure manager, to determine what funding, if any, should be provided.

Although government is funding additional renewals for the passenger rail network, DoI should seek to strengthen the current arrangements so that it provides clear assurance that the infrastructure is being adequately maintained and renewed.

DoI has been constrained in the past by the terms of the lease. The government's buyback of the lease provides the opportunity to revise the current arrangements.

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[5] Australian Labor Party, *Bracks to buy back country rail*, Media release, Melbourne, 1 November 2006.

[6] Essential Services Commission, *ESC sets Victorian rail access arrangements*, Media release, Melbourne, 29 June 2006.

4.3 Have the maintenance and renewal arrangements proved adequate?

4.3.1 Audit criteria

To assess the adequacy of the arrangements, we asked the following questions, based on criteria drawn from the government's best practice advice in *Sustaining our Assets*[7]:

- Were infrastructure service levels clearly defined and consistent with government objectives?
- Were maintenance and renewal decisions based on well-informed plans?
- Were plans implemented as intended?
- Were plans monitored and continuously improved?

4.3.2 Clearly defined service levels

The government has been clear about its commitment to grow the market for passenger and freight rail services in regional Victoria. To attract more people and goods requires levels of service that are consistent with this aim.

Passenger lines

The arrangements (the Passenger Access Agreement) set out infrastructure service levels in the following ways:

- they list the train services that the infrastructure must support in a Master Timetable and the maximum speeds on each section of the tracks in a Country Network Services Plan
- they require the train operator to set performance targets for on-time running and the maximum allowable number of train cancellations.
- they establish a performance regime that fines the train operator for delays and cancellations, and fines the infrastructure manager for those caused by infrastructure failure
- they gave the infrastructure manager responsibility for maintaining the infrastructure in a condition that allows it to safely and reliably run timetabled services.

[7] Department of Treasury and Finance 2000, *Sustaining our Assets – government asset management policy statement,* Victorian Government, Melbourne.

The performance regime proved less effective than the one used for the metropolitan system where Connex both manages the infrastructure and operates trains. For regional passengers, FAL and then PN maintained the infrastructure and V/Line Passenger operated the services. In many cases it proved difficult to unambiguously attribute delays to infrastructure faults. And even when the infrastructure manager accepted liability, the penalties were capped at a much lower level than the metropolitan fines. V/Line and PN had agreed to this cap in the second half of 2005 because of the resources consumed in proving or defending lability for the delays related to the major state works on the regional network.

Freight lines

The 1999 primary infrastructure lease did not adequately define service levels for the intrastate freight rail network. Rather, it defined a minimum condition which, if followed, would lead to traffic leaving rail for alternative road travel. Decisions on service levels were left in the hands of FAL which was free to tailor maintenance and renewal activities consistent with its decisions. Service levels were no better defined when the lease was transferred from FAL to PN in 2004.

The ESC's June 2006 access arrangements improved on this situation by better defining service levels. The ESC stipulated the average operating speeds which the infrastructure should allow on different sections of the freight network. The ESC acknowledged that these service levels were unlikely to be achieved without a government subsidy.

Conclusion

Infrastructure service levels for regional passenger services have been clearly defined under the current arrangements.

Rail freight service levels were not defined under the primary infrastructure lease and this remains the case today. However, the ESC access arrangements filled this vacuum by setting average freight speeds across the network.

4.3.3 Decisions based on well-informed plans

We examined the activities described in the infrastructure manager's plans and asked 2 questions:

- Were they consistent with a whole-of-life approach?
- Were they prioritised to target assets in the most urgent need of repair representing the greatest risks to service delivery?

Maintenance and renewal plans under Freight Australia Limited

The infrastructure manager did not provide DoI with any information on its maintenance and renewal plans because the lease did not require it until 5 years before the lease expired or was surrendered.

The access agreement with V/Line Passenger required the infrastructure manager to document a one-year and a 4-year plan, and to provide extracts to V/Line as a basis for consultation on the plan. We have found no evidence that this information was provided to DoI.

DoI, therefore, had no information on the infrastructure manager's plans for the maintenance and renewal of the intrastate rail infrastructure; nor did it have the means to compel the infrastructure manager to provide evidence of adequate planning.

Maintenance and renewal plans under Pacific National

After the transfer of the lease in September 2004, PN developed:

- a whole-of-life plan to determine what was needed to maintain assets as fit-for-purpose over the long-term
- a shorter-term, 5-year asset management plan consistent with the whole-of-life approach.

Based on its modelling, PN advised DoI that:

- past under-investment meant that there was an urgent need for additional funding to ensure the continued operation of the passenger and freight networks at current service levels
- if there was no additional funding, there would be a significant rise in the length of track placed under temporary speed restrictions
- once these immediate problems had been addressed, the ongoing costs of maintaining these service levels were likely to exceed the revenue received from the passenger and freight operators.

Passenger lines

DoI worked with PN to develop an Annual Works Plan to address the immediate threats to performance over the coming 12 months.

The result was additional funding of $59 million to complete urgent renewals within 2005-06. These projects were administered under the new clause 5 of the Primary Infrastructure Lease as "lessee sponsored rail projects". DoI made payment contingent on a number of conditions and checks to ensure that the works were delivered as intended.

DoI is now renegotiating the access agreement between the infrastructure manager and V/Line Passenger. This presents an opportunity to improve the maintenance and renewal planning provisions.

Freight-only lines

The infrastructure manager also estimated the additional funding needed to maintain service levels on the freight network. DoI considered it needed better information to verify the infrastructure manager's estimate of costs and its case for additional funding. In addition, the ESC was nearing the end of the process to define revised access arrangements. DoI needed to review the outcomes of this process before advising the government on this issue.

The ESC has now reported. It independently reviewed the infrastructure manager's cost estimates and came up with a cost of operation that was about 25 per cent below the infrastructure manager's estimates. DoI is currently consulting with stakeholders, so that it can advise the government on a response to the ESC's decision.

Conclusion

Prior to 2004, the lease arrangements did not provide a basis for DoI to obtain any information on maintenance and renewal planning. It had no evidence available to it that maintenance and renewal activities had been adequately planned and prioritised.

Since 2004, the infrastructure manager has committed resources to whole-of-life planning for maintenance and renewals. If this approach is developed in cooperation with DoI, it should form a solid basis for long-term planning and establishing shorter-term priorities.

The infrastructure manager developed and provided plans to DoI in support of its case for additional funding. However, the lease obligations in relation to the provision of maintenance and renewal plans to DoI remain inadequate. DoI needs to work towards the strengthening of this requirement in the lease.

4.3.4 Implementing actions as planned

The arrangements do not provide DoI with information to demonstrate how well the infrastructure manager has implemented its plans.

The lease has always contained provisions that allowed DoI to access:

- the infrastructure, to make reasonable investigations (s. 15.1)
- the infrastructure manager's records of the maintenance costs on freight and passenger lines (s. 9.10 b).

We sighted evidence that DoI had tried to exercise these rights but FAL had resisted repeated requests for this information. DoI also advised us that FAL had refused to provide access to the infrastructure.

The arrangements were not amended to improve this situation when the lease was transferred in 2004. However, DoI has been able to introduce improved verification processes for the additional passenger network renewals completed as "state-sponsored rail projects". The state funds these projects and DoI carries out an on-site inspection before making the final payment.

Conclusion

DoI could not confirm from the information provided by FAL and PN whether its plans for maintenance and renewals had been implemented as intended. The exception to this was where DoI had funded PN to complete additional renewals under a clause modified when the lease was transferred. The renewals funded under this modified process were subject to an adequate verification process.

DoI could not confirm from the information provided by FAL and PN whether the Infrastructure Manager's plans had been implemented as intended. The exception is where it has funded PN to complete additional renewals under a clause modified when the lease was transferred. It is now able to check invoices and inspect completed works. This clause has been used to fund renewals in 2005-06.

4.3.5 Monitoring and continuous improvement

Monitoring and continuous improvement under Freight Australia Limited

FAL provided the following performance information under the arrangements:

- quarterly measures of track-ride quality and details of incidents which led to train delays as part of the access agreement with V/Line Passenger. The track-ride quality measures were averages recorded over long sections of the track and were of limited use
- a record of safety-related incidents provided to the safety regulator (Director of Public Transport Safety) as part of the infrastructure manager's legal obligations, but these reports were not made available to DoI
- details of the length of the network subject to temporary speed restrictions published on a weekly basis.

DoI did not receive enough information to understand how well FAL was maintaining the infrastructure. FAL resisted attempts by DoI to obtain more information or to inspect the infrastructure. There was little DoI could do under the lease to address its concerns about the upkeep of the infrastructure.

Monitoring and continuous improvement under Pacific National

DoI and PN did not agree any changes to the performance measures when the lease was transferred to PN. However, PN did voluntarily provide more information on performance, including detailed track-ride quality outputs.

The ESC's access arrangements set up some additional performance measures for the intrastate freight network. These required the infrastructure manager to publicly report the average maximum operating speeds across the network as well as a small number of other measures - the number of sleepers replaced, for example - to enable the ESC to assess the adequacy of maintenance and renewal.

Conclusion

Although the access agreement with V/Line Passenger and the ESC's access arrangements build in some additional performance measures, the lease provisions for performance reporting remain inadequate. They fall short of providing the range and depth of information needed to understand performance in relation to maintenance and renewal.

In buying back the lease, the government now has the opportunity to put in place a regime to measure the effectiveness of maintenance and renewals.

4.3.6 Overall conclusions and recommendation

Infrastructure service levels for the maintenance and renewal of the regional passenger infrastructure have been clearly defined under the access arrangements, and are consistent with government objectives and customer expectations.

The definition of freight rail infrastructure service levels was, until recently, determined by the commercial imperatives of the infrastructure manager. Therefore, there was no guarantee whether these were consistent with government objectives and customer expectations. The ESC has set minimum acceptable infrastructure service standards that focus on train speeds.

Most other aspects of the maintenance and renewal arrangements - the documentation of plans, implementing these plans and monitoring and improving performance - require improvement. The lease severely constrained DoI's ability to make these changes. The government decision to buy back the lease releases this constraint and DoI should now introduce these improvements.

Recommendation

4.1 That DoI takes the opportunity afforded by the buyback of the infrastructure lease to implement the government's better practice asset management principles and to improve the monitoring of infrastructure condition and performance.

4.4 Is the infrastructure performing well?

To determine whether the infrastructure is delivering the required levels of service and whether it will continue to achieve these, we examined:

- the condition of the infrastructure, to ascertain whether DoI could be confident that it was fit-for-purpose and in a condition no worse than the minimum condition defined in the lease
- service delivery trends, in order to understand the connection between maintenance and renewal practices and service outcomes.

4.4.1 Infrastructure condition

To understand the condition of the infrastructure and how this had changed since the start of the lease, we:

- reviewed DoI material on trends in maintenance and renewal spending
- completed our own inspections of the infrastructure
- reviewed evidence and reports from Public Transport Safety Victoria (PTSV).

DoI internal review of maintenance and renewal spending

DoI prepared an internal document, *Track Maintenance under Freight Australia's Primary Infrastructure Lease* comparing maintenance and renewal levels with the amount required to keep the intrastate rail network in a "steady state" condition.

DoI took as an example the replacement of the sleepers which support and align rail tracks; because sleeper replacement is the key maintenance and renewal activity for ensuring the healthy functioning of the track. Up to 50 per cent of maintenance and renewal costs are associated with sleeper renewal.

DoI estimated the number of new sleepers required to maintain the network in a steady state, and compared this with actual sleeper replacements in the 3 years from the start of the lease to June 2002.

Figure 4A shows that 210 000 new sleepers had to be installed each year to keep the track performing at 1999 service levels. Between July 1999 and June 2002 only 49 000 sleepers were installed on both the passenger and freight networks.

Figure 4A
Annual sleeper renewals

Service	Required at start of lease	Renewals completed: July 1999 to June 2002
Passenger	85 000	32 000
Freight	125 000	17 000
Total	**210 000**	**49 000**

Source: Department of Infrastructure, *Track Maintenance under Freight Australia's Primary Infrastructure Lease*.

Early in 2003, DoI estimated that it would cost approximately $125 million over 4-5 years to return the sleepers to a sustainable, steady state footing, taking into account the impact of the government's major rail upgrade projects.

Findings from our field inspections

To help us carry out our field inspections, we engaged 2 rail specialists with over 30 years experience in track and structures and signalling to:

- review the infrastructure manager's maintenance and renewal plans
- review the available information on infrastructure condition
- inspect a sample of the infrastructure

- document their conclusions on the condition of the infrastructure and the likelihood of future deterioration.

The results of our field inspections are detailed below.

Tracks and structures

The condition of the track and structures on passenger lines that we inspected was generally fit-for-purpose.

For the freight-only lines, some sections of the track were in quite poor condition. Our engineering specialist found that, unless additional remedial work was carried out, further speed restrictions would need to be introduced on some sections for safety reasons (see section 4.4.2 where we discuss temporary speed restrictions).

On the freight lines inspected, we found considerable variation in track condition, with generally poor ballast condition and examples of poor and ineffective sleepers and track geometry. On the poorest sections, our engineering specialist noted that:

- parts of the track between Dunolly and Inglewood may not be fit-for-purpose and may require the imposition of speed restrictions for safe use because of poor ballast condition and poor track geometry
- for most of the track inspected, there were locations which needed careful monitoring to ensure safe operations. This was particularly so for parts of the track between Ballarat and Maryborough, and between Bendigo and Echuca.

Signalling

Our inspection confirmed that the signal system was generally in reasonable condition and fit-for-purpose. We were, however, concerned about:

- the lack of protection for track circuit leads and the absence of any redundancy should this connection fail
- meeting the need for more skilled signalling technicians.

We observed that it was common practice to use single, unprotected track connections as part of the track circuit which detects the presence of a train - at level crossings, for example. These connections are exposed to damage and the lack of duplication means that their failure will stop train operations. Duplicating the connections and terminating the leads in a trackside disconnection box would improve reliability and reduce the cost of repairs.

Most of the track circuits we observed were in reasonable working condition, but we noted some problem areas:

- At the Weerona Avenue level crossing in Bendigo, the single track connection lead was buried in mud and not easy to inspect for damage. The insulated rail joint also needed repair and the ballast condition was poor, which could affect track circuit reliability, particularly in wet weather.
- At the Eaglehawk level crossing on the same line, poor ballast condition could also affect the track circuit reliability, especially in wet weather.

The commissioning of the Regional Fast Rail project has increased the signal maintenance and renewal workload. There is a worldwide shortage of technicians with these skills. We understand that the infrastructure manager is planning to address the increased need for these skills on the intrastate rail network.

Public Transport Safety Victoria views on the condition of the rail infrastructure

The Director of Public Transport Safety was aware of a number of safety concerns and was keeping a close scrutiny on various risk controls associated with the infrastructure. Following an increase in the number of derailments and identified weaknesses in FAL's safety management system, the director and DoI agreed that the condition monitoring arrangements required improvement.

Conclusion

The condition of the intrastate rail infrastructure has deteriorated since 1999. Investment in maintenance and renewal since 1999 has not maintained a "steady state", as evidenced by sleeper replacement levels. If maintenance and renewal continue at these levels, then an escalation of temporary speed restrictions to manage the safety risks can be expected.

PTSV was of the view that sections of the network needed immediate review and repair, and identified weaknesses in the infrastructure manager's safety management systems.

DoI's verification process concluded that condition monitoring arrangements were inadequate and needed to be improved. We agree.

We endorse the recommendation that DoI should better monitor infrastructure condition, but consider that the objectives of monitoring condition should go beyond providing assurance about the safety of the infrastructure. Monitoring should also provide assurance that the infrastructure is being maintained in a way that:

- will continue to deliver planned service frequencies and journey times reliably
- minimises the cost of achieving these outcomes over the long-term by ensuring that an infrastructure manager does not under-invest in the infrastructure.

The government's buyback of the infrastructure lease provides the opportunity to address the performance monitoring deficiencies.

4.4.2 Service delivery and safety

In this section we examine the connection between maintenance and renewal, and the achievement of acceptable levels of service. We review the available information on performance with respect to service levels — that is, to safety, travel times and reliability. The information includes the extent of temporary speed restrictions, data on train delays, PTSV's data on safety incidents, and the findings of the accreditation audits of the infrastructure manager.

Temporary speed restrictions

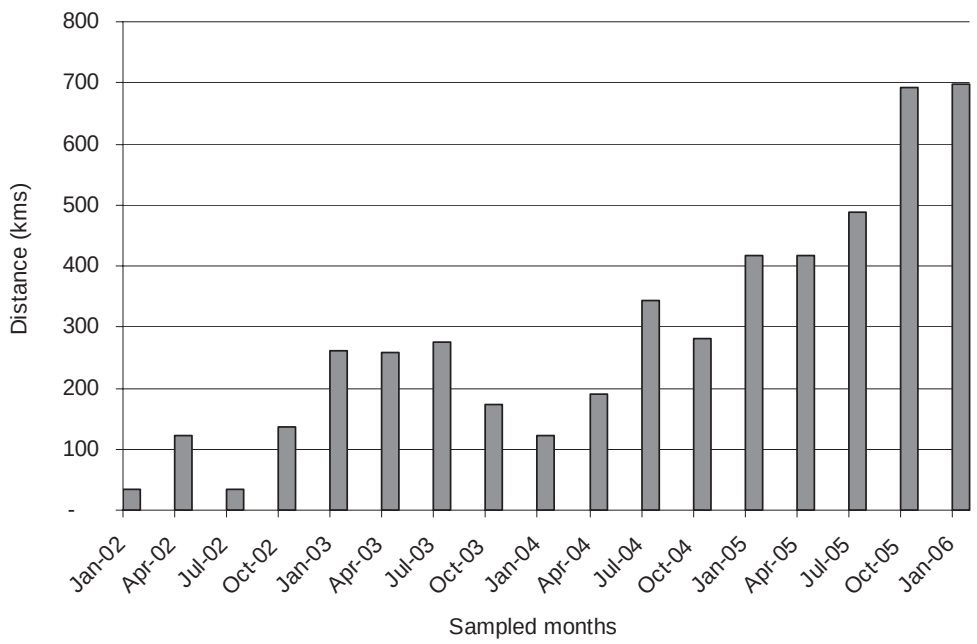
Temporary speed restrictions are an indication of infrastructure performance. Some speed restrictions are essential to allow the infrastructure manager to complete major maintenance tasks, but an escalation beyond this level indicates that the infrastructure manager is not maintaining condition to allow the maximum running speeds defined for the infrastructure. These restrictions may affect performance where freight customers expect journey times based on speeds exceeding the temporary restrictions

Imposing temporary speed restrictions may reflect the need for urgent, catch up maintenance or may be a deliberate strategy on the part of the infrastructure manager to use the available maintenance resources in the most cost-effective way. For example, where a low harvest leads to lower than normal rail traffic on seasonal rail lines, a prudent infrastructure manager may decide to restrict speeds and defer maintenance expenditure to improve net revenue.

We calculated the percentage of the network under temporary speed restrictions between January 2002 and January 2006 from a sample of weekly notices. Figure 4B shows how the length of these restrictions has changed over time.

How effectively is the intrastate infrastructure maintained and reviewed?

Figure 4B
Length of intrastate network covered by temporary speed restrictions



Source: Department of Infrastructure.

Up until April 2004, between 20 and 250 kilometres of the intrastate rail network was subject to temporary speed restrictions. Since April 2004, this figure has steadily risen, reaching 700 kilometres (or 17.5 per cent) of the network in January 2006. Of the January 2006 total, about 100 kilometres of restrictions were caused by the occupation of the line for remedial works, and the remainder by poor track condition and poor geometry.

Information on passenger train delays

V/Line Passenger collects information on the reasons for delays to passenger services. Over the last 2 years, the incidence of delays has increased because of government-sponsored projects, including Regional Fast Rail and the development of the Southern Cross station; as a result, the information does not provide a reliable indication of service performance. For this reason we did not include it in this section.

Information on safety incidents

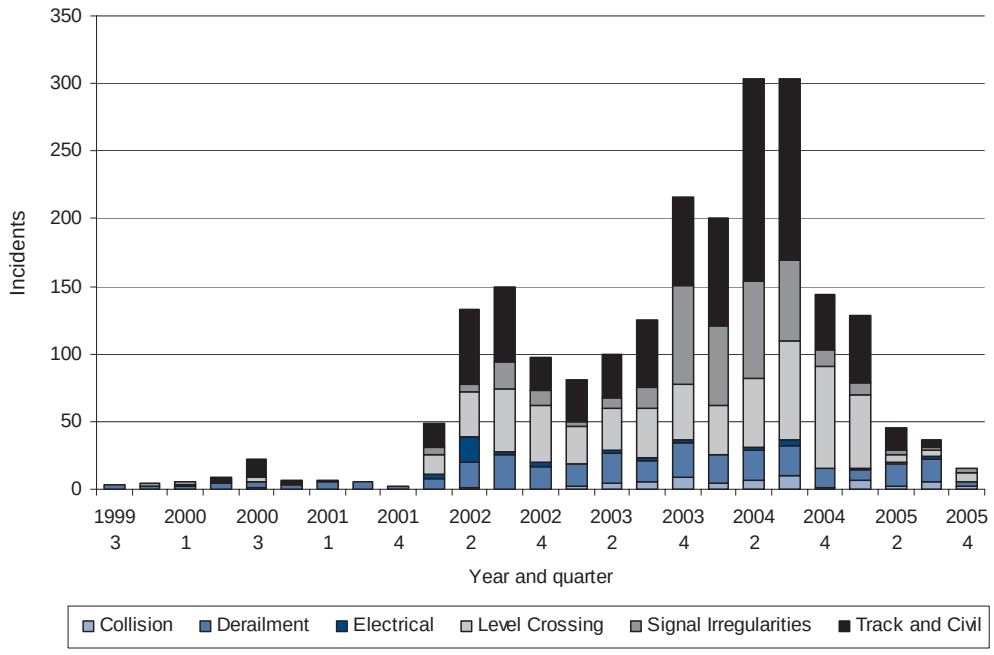
As part of accreditation requirements, the infrastructure manager must notify DoI within 72 hours of the occurrence of any deaths, incapacitating injuries, derailments, collisions involving a train and any fires or explosions on the railway[8].

[8] Transport (Rail Safety) Regulations 1998, Regulation 7.

The infrastructure manager must also provide a monthly report of "notifiable occurrences"[9]. These include the incidents listed above plus any other incidents which had the potential to result in death, injury or damage, such as defects or failure of the infrastructure, and procedural failures or breaches.

PTSV provided us with an extract of this information up until November 2005. Figure 4C reports the number of incidents and their cause by calendar year and quarter.

Figure 4C
Number of infrastructure-related safety incidents



Source: Department of Infrastructure.

What is immediately noticeable is the marked increase in reported incidents at the start of 2002. This happened because PTSV changed its reporting requirements around that time. Before this change, infrastructure managers reported only the most serious incidents causing death, injury and damage.

There was a further sharp rise in the number of incidents in the fourth quarter of 2003 and another rise in the second quarter of 2004. These increases were driven by a significant increase in reported signal irregularities and incidents related to the condition of the track.

In late 2004, there was an immediate halving of the number of incidents — from 300 per quarter to 150 — and this downward trend continued until the end of 2005. It is likely that this was achieved by:

- imposing speed restrictions to reduce the risk of track-related incidents

[9] Ibid., Regulation 8.

- targeting works to reduce signal irregularities and level crossing incidents.

Public transport regulator audits

PTSV conducts annual compliance audits and inspections on rail operators as part of its safety accreditation process. We reviewed this material and have reported the findings in section 4.2.1 on infrastructure condition. We specifically reviewed the findings from audits completed between May 2003 and April 2004.

This material supported the view that the infrastructure condition had deteriorated. This had led to an increase in the number of safety-related incidents and more recently to the escalation of the length of the network affected by temporary speed restrictions.

Conclusion

The intrastate network has been subject to increasing temporary speed restrictions and these may explain the reduction in the number of incidents. The results of the PTSV inquiries support the need for DoI to improve its capacity to monitor the infrastructure manager's maintenance and renewal activities.

4.4.3 Overall conclusions and recommendation

We found that the condition of the intrastate rail infrastructure had deteriorated since the lease was signed with FAL in 1999. The level of maintenance and renewal activity was insufficient to sustain the levels of service found in 1999. Increasing numbers of infrastructure-related safety incidents and, more recently, temporary speed restrictions support this conclusion.

We found that the existing condition monitoring arrangements were inadequate and needed to be improved. This conclusion was supported by DoI's work.

Government actions to address these issues have been constrained by the terms of the primary infrastructure lease. The government's buyback of the lease releases these constraints. DoI needs to design a maintenance and renewal regime that delivers infrastructure condition and performance in line with the government's service targets (covered under recommendation 4.1 in section 4.3.6).

5 How effectively is the interstate infrastructure maintained and renewed?

At a glance

Background

We examined how well the Victorian interstate rail infrastructure had been maintained and renewed by reviewing the lease arrangements and the performance of the infrastructure.

Key findings

- While the maintenance and renewal arrangements were adequate, we identified areas where the Department of Infrastructure (DoI) should work with the Australian Rail Track Corporation (ARTC) to improve or better apply the arrangements
- The national, interstate infrastructure in Victoria is fit-for-purpose at the current level of operation. However, the current condition monitoring arrangements are inadequate and need to be improved.

Key recommendations

5.1 That DoI works with the infrastructure manager to ensure that Asset Management and Annual Works Plans are provided by the infrastructure manager which:

- describe fully the methodology used for estimating maintenance and renewal works consistent with managing these assets across their life cycles.
- demonstrate how these works will ensure that the maintenance and renewal obligations of the lease are met.

5.2 That DoI works with the infrastructure manager to develop clear protocols to verify that the infrastructure manager has completed maintenance and renewal activities according to its plans.

5.3 That DoI works with the infrastructure manager to develop Key performance indicators (KPIs) which measure the effectiveness of infrastructure maintenance and renewal, including the improved monitoring of infrastructure condition.

5.4 That DoI works with the infrastructure manager to provide formal mechanisms through which it and the infrastructure manager can review performance and implement agreed improvements.

5.1 Introduction

In this part of the report we examine the effectiveness of the arrangements guiding maintenance and renewal for the interstate rail infrastructure. Below we describe the maintenance renewal arrangements (section 5.2), assess their adequacy (section 5.3) and examine the outcomes in terms of infrastructure condition and service performance (section 5.4).

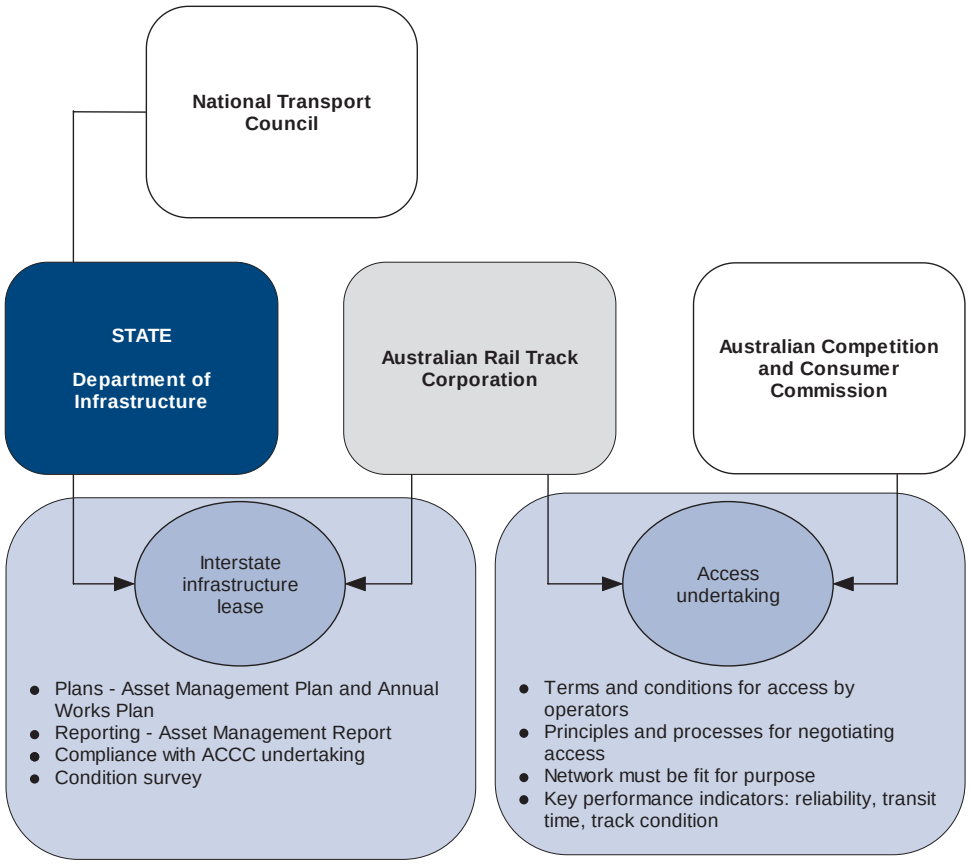
5.2 Maintenance and renewal arrangements

The Victorian sections of the national, interstate rail network connect Wodonga on the New South Wales border with Serviceton near the South Australian border via Melbourne. In Part 2 of this report, Figure 2A mapped out these connections.

The management of the interstate, standard gauge rail infrastructure in Victoria was set up by the National Transport Commission (NTC). It includes both a national agreement with the Australian Competition and Consumer Commission (ACCC) and a state agreement to lease the infrastructure. Figure 5A summarises the national and state arrangements.

How effectively is the interstate infrastructure maintained and renewed?

Figure 5A
Arrangements for Victoria's interstate rail network



Source: Victorian Auditor-General's Office.

5.2.1 National arrangements

In 1998, the Commonwealth Government established the ARTC to manage the national rail infrastructure and provide access to the network for interstate rail operators. The ARTC is responsible for:

- operating on commercially sound principles
- providing seamless and efficient access to users of the interstate rail network
- pursuing a growth strategy for interstate rail through improved efficiency and competitiveness
- improving interstate rail infrastructure through better management and coordination of capital investment
- encouraging uniformity in access, technical, operating and safeworking procedures[1].

[1] Australian Transport Council (ATC), Communiqué 14/11/1997, Australian Transport Council website, accessed 23-6-2006,< http://www.atcouncil.gov.au/communique/atc5.aspx>.

The national agreement also set short (to 2004) and longer-term service level targets for the national rail network.

The national agreement requires the ARTC to define the terms and conditions, service standards and the price charged for accessing the network through an access undertaking to the ACCC.

The ARTC must maintain the infrastructure in a condition that is consistent with its defined service standards. It must also publish performance measures on reliability, the impact of temporary restrictions on train speeds and infrastructure condition.

5.2.2 State arrangements

As part of the national agreement, Victoria agreed to lease its interstate infrastructure to the ARTC for 5 years starting from 1 July 1999. This was subsequently extended to a 15-year lease. The infrastructure manager leases the 2 mainline interstate corridors between Melbourne and Wolseley on the South Australian border, and between Melbourne and Albury on the New South Wales border.

The Victorian Government does not contribute funding towards maintenance and renewal. The ARTC funds these activities from access charges collected from freight operators and pays DoI an annual fee to lease the infrastructure and for a share of the profit derived from operations on the Victorian network.

Lease objective: Maintaining infrastructure condition

Under the lease, the infrastructure manager is required to “maintain, replace, repair and keep the whole of the Land in all respects in a condition which is no worse than the condition of the Land at the Commencement Date”[2]. The “Land” referred to in the lease includes what we have defined as the rail infrastructure.

This objective is designed to ensure that:

- the infrastructure will perform at least as well as it did when the lease started
- there are no parts of the infrastructure where the infrastructure manager accumulates a maintenance debt; that is, fails properly to resource maintenance and renewal, with the result that the infrastructure deteriorates and will require increased investment in the future to maintain service levels.

Section 10 of the lease sets out the infrastructure condition requirements. In terms of a “condition score”[3], DoI determines compliance with these requirements through a series of condition surveys carried out at the start of the lease and then every 4 years by an independent expert.

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[2] The Director of Public Transport and Australian Rail Track Corporation 2000, *Interstate Infrastructure Lease*, Schedules 6 and 7, Victorian Government, Melbourne, section 8.1a.

[3] The lease requires the completion of condition surveys at the start and at regular intervals throughout the lease term. The surveys sample a small percentage of the assets and give them a score between 0 (very poor condition) and 100 (as new). This information is combined into a single score for each of 9 asset groups.

Plans required under the lease

To provide further assurance about the proper maintenance and renewal of the infrastructure, the lease requires the ARTC to provide:

- an Asset Management Plan setting out the infrastructure manager's approach to maintenance and renewal and the works needed over a 20-year period
- an Annual Works Plan describing in more detail the works planned for the next year.

The lease sets what these plans should include.

Relation to national arrangements

The lease incorporates the ARTC's national objectives by requiring it to "comply with the terms and conditions of the access undertaking"[4]. This undertaking covers rail safety and defines service levels in relation to transit times and journey time reliability.

5.2.3 Conclusion

Together, the state and national arrangements clearly assign responsibility to the ARTC for maintaining, renewing and further developing Victoria's interstate rail infrastructure. The state arrangements focus on the requirement that the condition of the infrastructure does not deteriorate. The national arrangements go further and include the improvement of service delivery to expand the role of rail in the national rail freight task. Service levels relevant to the maintenance and renewal of the Victorian infrastructure have been clearly defined under these arrangements.

The state arrangements also require the infrastructure manager to produce plans which document maintenance and renewal activities and explain how these activities will address the lease requirements.

5.3 Have the maintenance and renewal arrangements proved adequate?

5.3.1 Audit criteria

To assess the adequacy of the arrangements, we asked the following questions, based on criteria drawn from the government's best practice advice in *Sustaining our Assets*[5]:

- Were infrastructure service levels clearly defined and consistent with government objectives?
- Were maintenance and renewal decisions based on well-informed plans?
- Were plans implemented as intended?

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[4] The Director of Public Transport and Australian Rail Track Corporation, 2000, *op. Cit.,* p. 40.

[5] Department of Treasury and Finance 2000, *Sustaining our Assets – government asset management policy statement, Victorian Government, Melbourne.*

- Were plans monitored and continuously improved?

5.3.2 Clearly defined service levels

Both the Commonwealth and Victorian governments have policies to encourage the growth of rail freight and reducing the percentage of freight carried on road. Good maintenance is important in achieving service outcomes such as travel time reliability.

The ARTC clearly defines infrastructure service levels through its access undertaking with the ACCC by specifying:

- maximum train speeds on each section of the network
- the percentage of trains leaving its network on time (having also entered the network on time)
- maximum axle loads (weight carried per rail car) and train lengths on each section of the network.

While the state infrastructure lease focuses on condition, it implicitly incorporates these service levels by requiring the ARTC to comply with its ACCC undertaking conditions.

In terms of future service levels, the ARTC plans to improve service levels on the Melbourne-Sydney-Brisbane corridor over the next 4 years. This $1.4 billion program will reduce journey times, increase capacity and lead to more traffic on the Victorian sections of the network.

Service levels defined through the national agreement are consistent with the Victorian Government's policy of encouraging the growth of rail's market share of the interstate freight travelling on the Victorian sections of the interstate rail network.

Conclusion

The service levels relevant to the maintenance and renewal of the Victorian infrastructure have been clearly defined under the current national and state arrangements, and are consistent with government objectives.

5.3.3 Decisions based on well-informed plans

We examined the activities described in the infrastructure manager's plans and asked 2 questions:

- Were they consistent with a whole-of-life approach?
- Were they prioritised to target assets in the most urgent need of repair representing the greatest risks to service delivery?

Consistency with a whole-of-life approach

Schedule 6 of the infrastructure lease states that the Asset Management Plan must:

- include a "full description of the methodology used for estimating maintenance and renewal works over the subsequent 20-year period, taking into account both the existing condition of assets and the obligations under this Lease in relation to asset condition"
- demonstrate "that the proposed program of maintenance and renewal works will ensure that the obligations of this Lease (especially in relation to asset condition) will be met"[6].

We examined the ARTC's 2005 Asset Management Plan with respect to these requirements and found that it could be further improved. The plan responded to these requirements with the following high level statements:

- In relation to the maintenance and renewal methodology: "ARTC collect data on the condition of all major components of the infrastructure, both track and signalling. This data, along with input from the section supervisors, railway consultants and ARTC Engineering and Operations representatives is used to develop the 20 year maintenance, MPM and Capital Works plan"[7].
- In relation to compliance with the lease: "ARTC will meet its requirements under the lease by continuing its business of servicing the needs of interstate rail operators. To achieve ARTC's corporate objectives (23 tonne axle loads, reliability, sustainability), ARTC must ensure that the infrastructure is "fit-for-purpose", which in turn will ensure that infrastructure assets are maintained in a condition which satisfies the lease requirements regarding asset condition"[8].

The lease also sets out the requirements for the Annual Works Plan[9]. We found that the 2005-06 Annual Works Plan omitted some of this information.

DoI was clear that it was under no obligation to review or check the plans. Indeed, the lease states that: "The Director is not bound to review or comment on any material provided to the Director by ARTC pursuant to this clause 11" [this clause covers the content of plans and reports] "or to check that material for errors, omissions or compliance with the terms of this Lease"[10].

DoI wrote to the ARTC in November 2005 about the asset management plans and reports. It noted that these were compliant with the lease but requested:

- additional information not included in the Annual Works Plan
- and for the future, a more detailed breakdown of some of the information required in the Asset Management Report.

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[6] The Director of Public Transport and Australian Rail Track Corporation, 2000, *op. cit.*, p. 78.

[7] Australian Rail Track Corporation, *Victorian Interstate Infrastructure Lease Asset Management Plan, 27 May 2005*, Australian Rail Track Corporation, Melbourne, 27-5-2005, pp.1-2.

[8] ibid., p. 2.

[9] The Director of Public Transport and Australian Rail Track Corporation, 2000, op. cit., p. 79.

[10] Ibid.,clause 11.6 p. 38.

The content of the ARTC's plans and Asset Management Report could be improved to more fully meet these requirements. DoI is working with the ARTC to do this for the Annual Works Plan and the Asset Management Report. The Annual Works Plan could be improved by better explaining the maintenance and renewal methodology and by more clearly relating its program activities to the condition of the infrastructure.

Setting clear priorities

The Asset Management and Annual Works Plans should clearly identify the type and location of maintenance and renewal works and to explain the basis for making these works the priority for the coming year. While the longer-term Asset Management Plan requires a description of the works by asset type and corridor, the Annual Works Plan should include a more detailed description of the works and their specific location as required by Schedule 7 of the lease.

The Annual Works Plan for 2005-06 lists renewal expenditure by task and corridor — for example, the Western line, North East line or Metro line, but it does not specify the location of these works within each corridor as required in the lease.

The plans do not include sufficient information to understand how the ARTC had prioritised its work program. DoI reviewed the annual works plan and requested further information on the location and timing of annual works for 2005-06 in November 2005.

Conclusion

The ARTC's Asset Management and Annual Works Plans omit some items listed in the lease and need more detail if DoI is to understand the method used to determine the program of works and priorities. We saw evidence that DoI had reviewed these plans in 2005 but there is room for DoI to further improve its monitoring of these plans.

5.3.4 Implementing plans as intended

To understand whether plans comply with the lease requirements and have been implemented we:

- reviewed the plans against the lease requirements
- examined how DoI ensured that the actions in these plans had been properly implemented.

Checking that plans have been properly implemented

We reviewed the available evidence to determine whether DoI was satisfied that the infrastructure manager's plans had been implemented as intended.

Schedule 8 of the infrastructure lease requires the infrastructure manager to provide DoI with an Annual Management Report. This reports progress in completing infrastructure improvement, maintenance and renewal works against the infrastructure manager's plans.

Actual compared with planned expenditure

We reviewed the Asset Management Reports for 3 financial years between 2002-03 and 2004-05. Figure 5B compares actual and planned expenditure by showing the absolute and percentage differences.

Figure 5B
Differences between planned and actual spending

	2002-03		2003-04		2004-05	
	($m)	(%)	($m)	(%)	($m)	(%)
Capital works	0.348	6	0.221	4	0.078	1
Renewals	0.730	20	2.944	146	-0.499	-20
Maintenance	0.727	12	1.803	15	0.158	2
Total	**1.805**	**12**	**4.967**	**26**	**-0.263**	**-1**

Source: Victorian Auditor-General's Office and the ARTC's Asset Management Reports 2000-01 to 2004-05.

We found that in 2002-03 and 2003-04, the infrastructure manager's actual spending exceeded planned expenditure by 12 per cent and 26 per cent, respectively. In 2004-05 the total spent was within one per cent of the planned amount, but this included a 20 per cent underspend on renewals.

We examined the 2004-05 Asset Management Report and compared the planned spending with the figures provided in the corresponding Annual Works Plan. Figure 5C compares total planned and actual spending drawn from these 2 sources.

Figure 5C
Infrastructure manager's planned and actual spending, 2004-05

	Annual Works Plan	Management Report			
	Planned	Planned	Actual	Surplus	
	($)	($)	($)	($)	(%)
Capital works	6.470	6.916	6.994	-0.078	-1
Renewals	3.152	2.490	1.991	0.499	20
Maintenance	8.683	8.300	8.458	-0.158	-2
Total	**18.305**	**17.706**	**17.443**	**0.263**	**1**

Note: We found that the management report planned and actual renewal totals of $1.721 million and $2.255 million were incorrectly calculated. We have replaced these with the correct figures.

Source: Victorian Auditor-General's Office and the ARTC Asset Works Plan and Asset Management Report 2004-05.

Figure 5C shows that the planned expenditure in the Annual Works Plan does not tally with the planned spending in the Annual Management Report. If the management report figures are used, actual spending fell short by about one per cent, including a 20 per cent shortfall for renewals. However, if the comparison is made with the Annual Works Plan figures, then the total spent fell short by 4.7 per cent, including a 37 per cent shortfall in spending on renewals.

The planned expenditure figures differed because the amounts against some items had changed and some items included in the Annual Works Plan were excluded from the Annual Management Report. There was no explanation for these changes.

Schedule 8 of the lease requires the infrastructure manager to provide a discussion on disparities between forecast and actual works[11]. The 2004-05 report includes short explanations for the differences documented, but it did not provide enough information for DoI to understand the implications of these variances for condition and performance.

The infrastructure manager has provided DoI with the reports and information required by the lease. The lease does not require DoI to review these reports. That, notwithstanding, it is important that DoI verifies that the ARTC is completing works as intended. Therefore, DoI's monitoring of the ARTC's planned and actual spending on maintenance and renewals should be improved.

On-site verification of maintenance and renewal works

Section 16 of the infrastructure lease gives the Director of Public Transport and his/her associates the right to access the "land" when and as often as reasonably required. The director may:

- view the state of repair and condition of the land
- investigate where there has been any breach of any of the terms, covenants or conditions expressed or implied in this lease [12].

The infrastructure manager must also provide the director access to its maintenance and renewal records.

DoI has taken the opportunity to inspect some of the ARTC's maintenance and renewal activities. These inspections have not been part of a planned and systematic sampling program as was the case for the metropolitan rail infrastructure.

Conclusion

DoI has reviewed the ARTC's plans and reports and carried out site inspections to understand whether plans have been implemented. There is room for improvement in terms of:

- understanding the reasons for differences between planned and actual spending

[11] The Director of Public Transport and Australian Rail Track Corporation, 2000, *op.cit.*, p. 80.

[12] ibid., p. 44.

- planning a systematic approach to verifying that works have been implemented on-site.

5.3.5 Monitoring and continuous improvement

The key requirement in the lease relates to the maintenance and return of assets in a condition consistent with their condition at the start of the lease. In this section, we examine whether DoI:

- adequately monitors the achievement of this objective
- makes sure that this information is used to drive further improvements in the maintenance and renewal of rail assets.

Have the monitoring arrangements proved adequate?

The lease provides 2 information sources relevant to maintenance and renewal outcomes: an annual Asset Management Report and a 4-yearly infrastructure condition survey.

Asset Management Reports

We described the content of the Asset Management Report in the previous section (Implementing plans as intended). It focuses on implementing planned works and does not provide information to show how these affect infrastructure condition.

Condition surveys

The condition surveys were intended to monitor asset condition in relation to the lease requirement. To date, DoI has commissioned 2 surveys: one in 2000 and the other in 2003. Below we examine the methodology of the survey and the results.

The condition survey divided the assets into 9 groups (for example track, points and crossings, signals etc.) and sampled 5 per cent of the assets in each group. Each asset inspected was then scored between 0 (life expired) and 100 (as new condition).

A statistical modelling technique was used to calculate a combined, single score for each asset group based on the sample results. It also calculated a range within which the combined score for all assets of this type, not just the sample chosen, was likely to lie.

An example illustrates how this worked. From the 2003 survey the score for “points and crossings” was 72, based on the inspection of a sample of these assets. The 90 per cent confidence range around this estimate was ± 3, giving a score range for all these assets of 69 to 75. This means that there is a 90 per cent probability that the combined score for all assets of this type will be between 69 and 75.

DoI had previously abandoned this method for measuring condition for the metropolitan infrastructure for the reasons set out in section 3.2.1 of this report. DoI concluded that "this method did not represent a reliable contractual basis for moving forward"[13].

We examine the criticisms of the rejected metropolitan method because this method has also been used for the interstate infrastructure.

One criticism of the method related to the level of uncertainty. For the metropolitan system the subjectivity of the assessment and the accuracy of the estimates (± 10 per cent) made it difficult to see if condition had changed.

This issue remains relevant for the interstate infrastructure. The surveys of 2000 and 2003 reported confidence ranges of between ± 3 per cent and ± 9 per cent when estimating scores for all assets of a particular type. For points and crossings when these ranges were applied, the score was somewhere between 71 and 82 in 2000, and lay somewhere between 69 and 75 in 2003. Although the 2003 score was lower, the range of likely scores overlapped. It was difficult to argue that condition had deteriorated.

In a meeting with DOI on 30 April 2004 the ARTC proposed that the condition survey method be replaced with the KPI's the ARTC reports to its board. DoI completed an initial review of this proposal and thought there was merit in trialing the application of KPIs. There were concerns that the ARTC KPIs:

- did not specifically report on the condition or performance of some asset types (for example points and crossings)
- were at too high a level and would need to be disaggregated to pick up specific local issues.

Does this framework lead to continuous improvement?

The existing performance framework based on the condition indices makes it difficult to judge whether the condition of the infrastructure has improved. The index scores are subject to some uncertainty and aggregated scores may hide localised and significant problems.

DoI does discuss performance with the ARTC and investigates issues raised by other parties, such as local councils, involving the ARTC infrastructure. Apart from the annual reports there were no formal, more frequent mechanisms for monitoring and improving performance.

Conclusion

The current monitoring arrangements could be improved by DoI and the ARTC putting in place an agreed set of KPIs relevant to the Victorian sections of the interstate infrastructure.

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13 Department of Infrastructure 2005, *Public Transport Partnerships: An overview of Passenger Rail Franchising in Victoria,* Public Transport Division, Department of Infrastructure, Melbourne, p. 66.

5.3.6 Overall conclusions and recommendations

Together, the state and national arrangements for Victoria's interstate infrastructure assign responsibility to the infrastructure manager for maintaining, renewing and further developing Victoria's interstate rail infrastructure. The state's arrangements focus on the maintenance and renewal of the infrastructure so its condition does not deteriorate. The national arrangements focus on improving service delivery to expand the role of rail in the national rail freight task.

Service levels relevant to the maintenance and renewal of the Victorian infrastructure have been clearly defined under these arrangements. These service levels are consistent with government objectives and customer expectations.

We found that there was room for DoI to work with the ARTC to:

- improve its review of the ARTC's Asset Management Plan, Annual Works Plan and Asset Management Report
- put in place a structured approach to monitoring the ARTC's maintenance and renewal activities
- agree a set of KPIs with the ARTC that would provide assurance that the ARTC was effectively maintaining and renewing the infrastructure.

Recommendations

5.1 That DoI works with the infrastructure manager to ensure that Asset Management and Annual Works Plans are provided by the infrastructure manager which:

- describe fully the methodology used for estimating maintenance and renewal works consistent with managing these assets across their life cycles.
- demonstrate how these works will ensure that the maintenance and renewal obligations of the lease are met.

5.2 That DoI works with the infrastructure manager to develop clear protocols to verify that the infrastructure manager has completed maintenance and renewal activities according to its plans.

5.3 That DoI works with the infrastructure manager to develop KPIs which measure the effectiveness of infrastructure maintenance and renewal, including the improved monitoring of infrastructure condition.

5.4 That DoI works with the infrastructure manager to provide formal mechanisms through which it and the infrastructure manager can review performance and implement agreed improvements.

5.4 Is the infrastructure performing well?

To determine whether the infrastructure is delivering the required levels of service and whether it would continue to achieve these, we examined:

- the condition of the infrastructure, to ascertain whether DoI could be confident that it was "fit-for-purpose" and in a condition no worse than the minimum condition defined in the lease
- service delivery trends, in order to understand the interrelationship between maintenance and renewal practices and service outcomes.

5.4.1 Infrastructure condition

The infrastructure manager is responsible for handing the assets back in a condition which is no worse than at the start of the lease and which never falls below a minimum condition throughout the term of the lease.

To understand the condition of the infrastructure and how this had changed since the start of the lease we:

- compared the results of the lease condition surveys from 2000 and 2003
- completed our own inspections of the infrastructure
- reviewed evidence and reports from Public Transport Safety Victoria (PTSV).

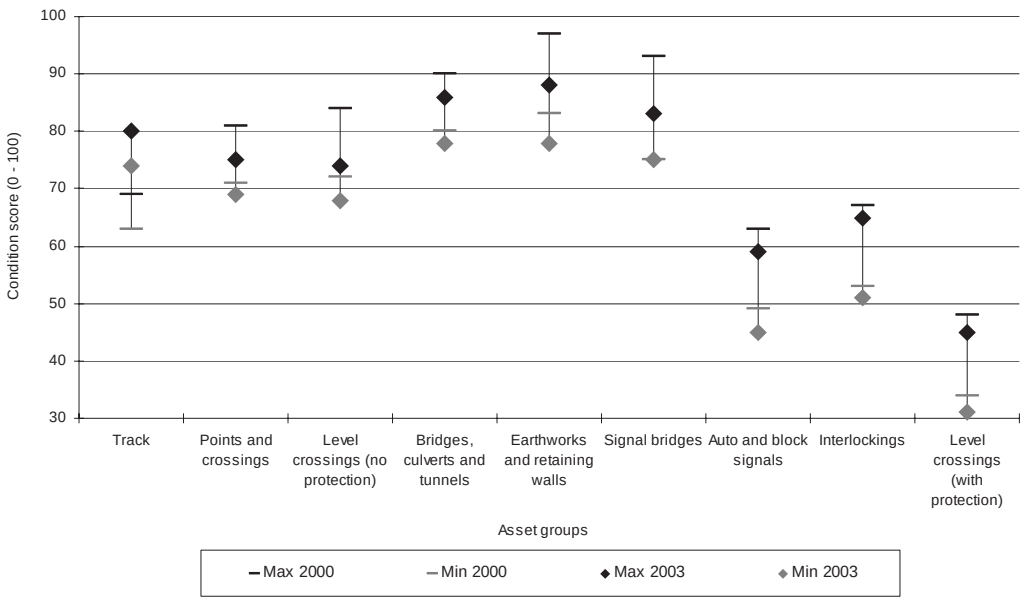
Comparison of lease condition survey results

In section 5.2.2, we explained how the lease defined the minimum acceptable condition for the infrastructure and measured compliance through regular condition surveys.

In section 5.3.5 (Monitoring arrangements) we described some of the problems with the survey approach used to monitor condition. Here we compare the results of the surveys in 2000 and 2003, and describe our findings on the implications for the effectiveness of the maintenance and renewal regime.

Figure 5D compares the ranges likely to contain the overall condition score for all assets of a given type. The lower and upper scores are shown by small lines for the 2000 survey and by diamonds for the 2003 survey.

Figure 5D
Comparison of condition survey scores 2000, and 2003



Source: Sinclair Knight Merz, sourced from Department of Infrastructure.

For the track assets (the first on the horizontal axis), there has been a clear improvement in the condition score. The lower end of the 2003 range of scores exceeds the top of the range from the 2000 survey. For the remaining assets, the ranges in 2003 were lower than those estimated in 2000. In all cases, there is some overlap between the 2 survey scores.

While the lease requires assets to be returned in a condition no worse than at the start of the lease, it allows some latitude for condition during the lease. Specifically, the condition score for any asset group is allowed to fall by 5 per cent below the comparable score at the start of the lease.

While there has been a decline in the condition scores as shown in the 2 surveys, the condition score would have to significantly fall for DoI to be sure that the condition had deteriorated to an extent that breached the lease. In addition, using a comparison of surveys to assess condition does not, in our view, guarantee that the infrastructure is “fit-for-purpose”. Combining scores for individual assets across an asset group may hide the deterioration in condition of critical assets. In this case, an unchanged score may be accompanied by an increased risk of asset failure.

In summary, the condition surveys are inconclusive about the deterioration or improvement of asset condition.

Findings from our field inspections

We engaged 2 rail specialists with over 30 years experience in track and structures and signalling to:

- review the infrastructure manager's maintenance and renewal plans
- review the available information on infrastructure condition
- inspect a sample of the infrastructure
- document their conclusions on the condition of the infrastructure and the likelihood of future deterioration.

The results of our inspections are described below.

Track and structures

Our examination confirmed that the condition of the track and structures was generally fit-for-purpose.

Signalling

Our examination confirmed that the signal system was generally fit-for-purpose. We were, however, concerned about:

- the challenges of adequately maintaining older signalling equipment
- the method used to form track circuits at turnouts (the pieces of rail that allow trains to move between tracks)
- the continued and widespread use of searchlight signal heads
- the condition of the signal cabling

Each of these is addressed below.

Maintaining older equipment

Maintaining older equipment becomes increasingly difficult because spares and replacement parts become more difficult to find, and the system may become less reliable over time and thus require more regular and intensive maintenance. This is particularly relevant for the north-east corridor between Melbourne and Wodonga, where most equipment is at least 45 years old.

The infrastructure manager's current approach is, for the most part, to retain and maintain the existing equipment. Although some components are no longer easy to source, it has found adequate substitutes and alternatives.

The north east corridor upgrade over the next 4 years will address this issue with the widespread renewal of signalling equipment between Melbourne and Wodonga.

Track circuits at turnouts

Track circuits are formed when a train entering a section of rail completes an electrical circuit with the rails. Where there are turnouts, the rails of the main line and the turnout are bonded (or connected) using a method called "parallel bonding".

When a train is sitting on the turnout and across one of the main lines connected by the turnout, the track circuit should set the signal to stop another train entering the section of track. With parallel bonding, it is possible for the circuit to fail in a way that leads to a false “go” signal when a train on the turnout is blocking the main track.

The condition of most of the parallel bonding observed was reasonable, but the bonding on the southern end turnout at Longwood (about half-way between Melbourne and Wodonga) appeared to be in a poor condition. DoI needs to ensure that the risks of parallel bonding are properly reflected in the infrastructure manager’s maintenance and renewal decisions.

Continued use of searchlight signal heads

The majority of signals in use were installed in the early 1960s and are the incandescent “searchlight” type. They are mounted on a single, painted, mild steel post or on gantries. These signals are less reliable than modern, LED tri-colour units and can fail so they display a false “go” signal. While there is a backup system to prevent this type of false indication, other railway systems have replaced these signals because they are more costly to maintain and less reliable.

Again, the north-east corridor upgrade will address this issue by renewing the signalling system between Melbourne and Wodonga.

Condition of signal cabling

The signal cabling we observed was, for the most part, in an adequate condition and was properly protected. However, we found the metal casing protecting the signal cables (cable trunking) at Wodonga station and the southern end of Wodonga loop was in poor condition, with cables exposed to the elements and at risk of being damaged.

This equipment is likely to be upgraded during the north-east corridor upgrade project.

Public Transport Safety Victoria’s views on the condition of the rail infrastructure

The Director of PTSV became aware in July 2004 of concerns about the condition of the infrastructure and the possible risks to public safety.

For the interstate infrastructure, these concerns included:

- an increase in the number of derailments on the non-metropolitan rail network in 2004, with 2 occurring on the interstate track at Alumatta and Benalla. For the Benalla derailment, the Australian Transport Safety Bureau (ATSB) investigation report concluded that “the train … derailed as a result of the deteriorated track condition” [14]

[14] Australian Transport Safety Bureau 2005, *Rail Safety Investigation Report 2004/005 – Derailment of Train 4VM9-V Benalla, Victoria, 23 September 2004*, Executive Summary, Australian Transport Safety Bureau, Canberra, p. vii.

- complaints by the Rail, Tram and Bus Union regarding the unsatisfactory condition of sections of the interstate track which had led to the union insisting on speed restrictions on these sections
- a number of specific interstate locations and one length of track where a combination of factors indicated the safety of train operations could be compromised unless a specific risk management regime was implemented immediately[15]
- between Ararat and Serviceton, the condition of the timber sleepers needed urgent repair and the geometry was found to be poor in some locations. The presence of clusters of consecutive, ineffective sleepers suggested that further speed restrictions might be needed
- the infrastructure between Donnybrook and Albury needed careful management to maintain this safety. Timber sleepers were found to be deteriorating at a rate that was likely to lead to significant problems in the near future
- shortcomings in the way condition-related safety problems were detected and managed.

While there is some debate over the implications of condition for rail safety, it is clear that DoI views the current monitoring of infrastructure condition as inadequate.

The lease provides DoI with rights of access to view the state of repair and condition of the Land[16]. Section 12.1 (b) also states that "ARTC must, on reasonable notice, make its records relating to its Victorian operations available for inspection by the Director"[17]. Although this is included under the section on financial information, the lease clearly defines "records" to include "all operating and maintenance plans, timetables, technical information, technical data, specifications, manuals, drawings, tracings, calculations, worksheets, computer programs, computer disks and report"[18].

Conclusion

The condition of the infrastructure we observed in our inspections was fit-for-purpose. However, we did have some concerns but these related to ageing signalling infrastructure on the north-east corridor which will be renewed over the next few years.

The results of the condition survey required by the lease were inconclusive about whether the infrastructure condition had deteriorated or improved.

The PTSV had a number of concerns over some isolated sections of the interstate network were in a condition that required urgent risk assessment and repair.

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[15] Australian Transport Safety Bureau 2005, *Rail Safety Investigation Report 2004/005 – Derailment of Train 4VM9-V Benalla, Victoria, 23 September 2004*, Australian Transport Safety Bureau, Canberra, p. 2.

[16] The Director of Public Transport and Australian Rail Track Corporation 2000, *Interstate Infrastructure Lease*, Section 16.1 (a), Melbourne, p. 44.

[17] ibid., Section 12.1 (a), p. 38.

[18] ibid., p. 10.

DoI's work to verify this position concluded that the current condition monitoring arrangements within the lease were inadequate and needed to be improved. We agree with this conclusion.

5.4.2 Service levels

In this section, we examine the connection between maintenance and renewal and the achievement of acceptable train service levels.

We reviewed the available information on service level performance; that is, safety, travel times and reliability. This includes the infrastructure manager's engineering performance and condition review, the extent of temporary speed restrictions and the findings of the accreditation audits of the infrastructure manager.

Engineering performance and condition review

As part of its undertaking with the ACCC, the infrastructure manager reports on a range of service-related KPIs at a national level. There is no requirement in the lease to provide this information for Victoria, but the infrastructure manager provided DoI with a review containing KPI trends for the Victorian sections of the interstate infrastructure.

The review included a range of useful measures on track-ride quality, rail defects, infrastructure-related delays, time lost through speed restrictions and signal and communication failures.

The information in this report is not sufficient to enable DoI to judge the performance of the interstate infrastructure. Track quality scores averaged for entire corridors are of limited use. These averages can hide significant problems at specific locations, and a reduction in the average score does not mean that the infrastructure condition and performance have improved.

The overall train delays and delay per train are of interest as a performance measure. But as the results for the Victorian and South Australian sections of the network have been combined, it is difficult to isolate the Victorian trend.

The trends on infrastructure related failures show that:

- the number of times a signal is passed while it was displaying a "stop" indicator doubled to 10 per month in March 2004 before returning to their long-term average of about 3 per month
- the number of signal failures has been on an upward trend since April 2003 and seem to have stabilised at this higher level since the end of 2004. Ageing infrastructure is an issue here and the north-east corridor upgrade will have a significant impact on these adverse trends as this equipment is replaced
- the number of communication failures has been on a downward trend over the last 6 months.

Temporary speed restrictions

Temporary speed restrictions are an indication of infrastructure performance. Some speed restrictions are essential to allow the infrastructure manager to complete major maintenance tasks, but an escalation beyond this level indicates that the track is not in a condition to safely allow normal running speeds. These restrictions affect performance by increasing rail journey times.

We calculated the percentage of the interstate network under temporary speed restrictions between January 2002 and January 2006 from a sample of weekly notices. In summary, temporary speed restrictions:

- affected less than one per cent of the network in February 2003
- increased to a maximum coverage of 6 per cent in March 2004
- fell significantly from this point to affect under 0.5 per cent of the network in late 2005.

Performance in this respect has clearly improved since the middle of 2004.

Safety accreditation audit findings

We examined the audit reports completed by PTSV in 2004 and 2005 as part of its safety accreditation responsibilities. We also reviewed the findings of PTSV's reports on specific, major safety incidents on the interstate rail network in Victoria. Our aim was to determine if the findings were relevant to our assessment of infrastructure condition and the adequacy of maintenance and renewal.

The PTSV reports raised several concerns not directly related to infrastructure condition:

- the inadequate specification of standards to contractors
- the failure on occasion to comply with inspection standards
- deficiencies in the documentation of changes to standards, infrastructure inspections and defect recording.

The only reference to infrastructure-related issues was to note a backlog in signal maintenance and an increasing trend in signal failures.

Conclusion

DoI does not have enough information to form a clear view about the way infrastructure performance affects service levels.

The recent downward trend in temporary speed restrictions and the fall in communication-related failures are positive developments suggesting improved performance. The increase in signal-related failures points to poorer performance and the continuing challenge of managing ageing signalling equipment in the future. The north-east corridor strategy upgrade should address this trend by replacing much of this older signalling equipment.

More detailed information is required on reliability and journey times specific to the Victorian sections of the network to better understand performance.

5.4.3 Overall conclusions and recommendations

The condition of the infrastructure in our limited observations was fit-for-purpose. The remaining evidence on the adequacy of the infrastructure condition suggests that there has been some improvement in the track condition since the middle of 2004.

PTSV, the safety regulator, had some infrastructure-related concerns, While PTSV considered most of the interstate infrastructure was fit for purpose, it expressed concern over the condition of some sections of the network.

DoI's work to follow-up these findings concluded that the current condition monitoring arrangements were inadequate and needed to be improved. We agree with this conclusion.

DoI does not currently have the information to understand trends in service levels and the root causes of these changes.

The recommendations flowing from these conclusions in relation to the improved monitoring of infrastructure condition and performance were included under section 5.3.6 of the report.

Appendix A. Audit approach

What did we do?

The audit examined whether the State's rail infrastructure assets were being effectively maintained and renewed. The audit focused on the maintenance and renewal of train not tram infrastructure.

The train infrastructure assets included in the audit were the track and its formation, structures such as bridges and earthworks and the signalling and power supply systems. The audit did not examine communications assets, buildings or rolling stock.

The audit examined the following key questions:

- Has DOI established clear requirements consistent with the long-term, cost effective maintenance of rail infrastructure assets?
- Do the arrangements in place assist DOI in meeting its long-term asset maintenance requirements?
- Is the rail infrastructure delivering the required levels of service and will it continue to do so in the future?

Method

We examined DoI's documentation and files and interviewed key staff about infrastructure maintenance and renewal.

We inspected samples of the metropolitan, intrastate and interstate rail infrastructure.

The audit was performed in accordance with the Australian auditing standards applicable to performance audits and accordingly included such tests and procedures considered necessary.

Assistance to the audit team

We consulted with a range of organisations to obtain information about the rail infrastructure including:

- Department of Infrastructure
- Pacific National
- Connex Melbourne Pty Ltd
- Australian Rail Track Corporation
- Victorian Rail Track Corporation
- Essential Services Commission
- Mainco
- V/Line Passenger Pty Ltd.

Audit assistance

Specialist support was provided by:

- Jim Kennedy, Director Asset Management Improvement, Rail Infrastructure Corporation (RailCorp) NSW who provided specialist advice as part of the audit reference committee
- Interfleet Technology Pty Ltd, which led our inspection of a sample of the rail infrastructure and reviewed the maintenance and renewal plans.

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