Leongatha Rail Line

Reintroduction of Passenger Train Services

Review Summary & Transport Options
Assessment Report

Final Report
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1 EXECUTIVE SUMMARY

1.1 Objectives

In May 2001 the Department of Infrastructure released a Feasibility Study on the re-introduction of passenger rail services to South Gippsland. Only preliminary assessments had been undertaken prior to that time as outlined in 2.3 Source Documents.

Since releasing the Feasibility Study in May 2001 there have been extensive assessments and feasibility studies undertaken to ensure the full extent of work and the associated cost of returning passenger train services to Leongatha is understood.

The assessments and feasibility studies undertaken since 2001 on the Leongatha line include:

- Ecological Assessment;
- Cultural Heritage Study;
- Passenger Market Survey;
- Freight Opportunities Assessment;
- Engineering Assessment:
  - Track;
  - Bridges & Culverts;
  - Level Crossings; and
  - Stations; and
- Train Radio Assessment.

In May 2005, the State Budget allocated $3m to enable detailed feasibility investigations, including scope, cost-benefits and ecological, to be undertaken on the potential restoration of Leongatha passenger train services. This Report has been commissioned by the Department of Infrastructure to draw together the findings of the detailed feasibility investigations undertaken since the preliminary feasibility study was released in 2001, as outlined in 2.3 Source Documents.

1.2 Background

The Cranbourne to Leongatha railway line was part of the South Gippsland regional rail network which included extensions to Wonthaggi (from Nyora) and beyond Leongatha to Yarram. These lines operated both freight and passenger train services.

Due to declining traffic, passenger train services to Yarram and Leongatha were withdrawn in June 1981 and April 1981 respectively, and were replaced by road coaches. In August 1981 a fully co-ordinated road coach services replaced the temporary road coach service between Melbourne and Yarram.

Passenger train services to Leongatha were introduced on 9th December 1984 and in 1986 road coach services were introduced to supplement the rail services. In 1993 the Government withdrew the passenger train services and replaced them with road coaches.

In total there are 160 coach services currently operating on the corridor between Leongatha/Yarram/Inverloch/Cowes and Melbourne each week. The journey time for express coach services ranges from 2 hours to 2 hours 25 minutes and for stopping services it ranges from 2 hours to 2 hours 37 minutes.

1.3 Detailed Investigation Findings

1.3.1. Passenger Market

The major findings of the Passenger Market studies are outlined in Table 1-1 below:

Table 1-1: Comparison of Passenger Market Studies

Survey Item	2000 Passenger Market Study	2005 Passenger Market Studies
Study methodology	Phone survey, passenger surveys, data modelling, Market research	Telephone surveys, data modelling, Census and V/Line rail catchment data modelling,
People surveyed	Not provided	824
Proposed weekly passenger train services in survey	13 return services	21 return services
Estimated % patronage increase	22%	25% to 45%
Estimated patronage increase	Growth of 16,000 to 87,000 boarding per annum (Leongatha line only)	Growth of 28,000 to 138,000 boarding per annum (includes Leongatha, Cowes, Inverloch & Yarram)
Those surveyed that rated the reintroduction of a passenger train service as their main priority	17%	20%
Those surveyed that were more interested in better service frequency, more direct services, more weekend services and shorter travel times	83%	80%

1.3.2. Freight Market

The major findings of the Freight Market studies are outlined in Table 1-2 below:

Table 1-2: Comparison of Rail Freight Tonne Estimates

Commodity	Estimated tonnes (2000)	Potential to capture to rail	Estimated tonnes (2005)	Potential to capture to rail
Construction sand	2,000,000	Yes	2,050,000	No
Export Dairy	150,000	No	220,000	No
Grain	150,000	Yes	Nil	No
Forestry	200,000	No	Nil	No
Total	**2,500,000**		**2,270,000**	

The 2005 Freight Market Assessments[1] identified potential rail freight tonnage for the Leongatha Line but it is considered that the suppliers would be unlikely to switch to rail because:

- It is unclear who would fund the capital cost for the freight terminals and sidings to load and unload the freight;

[1] Sinclair Knight Merz, 2005, *South Gippsland Rail Line Freight Opportunities*, SKM, Melbourne.

- All the existing freight traffic is currently on road and there would need to be some financial incentive, such as a reduction in freight rates (of approximately 10%), to switch to rail;
- It will be difficult to provide competitive rail freight haulage rates compared with road haulage rates because of:
    - The additional capital cost required to reinstate/construct sidings and loading and unloading facilities that will have to be included in the rail freight rates; and
    - Road being more cost effective over shorter haulage distances like that between Leongatha and Melbourne, particularly where B-doubles are deployed.
- There are a number of other interrelated issues that would need to be resolved to get suppliers to shift from road to rail i.e. train paths in the metropolitan network, terminal lease conditions, etc.

Therefore conversion of freight tonnage from road to rail on the Leongatha line is unlikely.

1.3.3. Engineering Costs

The engineering assessment undertaken in 2000[2] determined that the cost to reinstate passenger rail services between Cranbourne and Leongatha was $5.6 million[3], plus a further $19.65 million of maintenance works on the line over the first 10 years of passenger train operation. The 2000 assessment was a scoping study and was not done to the same level of detail as the subsequent engineering assessments. Consequence the cost estimate did not fully consider the extent of work required to reinstate the rail line to an appropriate standard for passenger trains.

In 2005 and 2006 independent consultants Asia Pacific Rail and George Deutsch Consulting were engaged by the Department of Infrastructure to undertake more detailed engineering assessments to reinstate passenger rail services between Cranbourne and Leongatha. These engineering assessments covered track, bridges and culverts, level crossings, signals, stations and train radio.

The track between Cranbourne and Nyora has had no maintenance for 10 years and no major maintenance cycle for 17 years. The track between Nyora and Leongatha has been under minimal maintenance for 13 years and since 1994 has received approximately 3,000 sleepers (10% insertion rate) to make it “fit for purpose” to operate South Gippsland Tourist Railway tourist trains over the line.

Key assumptions used in the detailed cost estimate are:

- Sleeper replacement rate of 70% of all existing sleepers;
- There are approximately 1,600 sleepers per kilometre along the line;
- Ballast depth of 100 mm is required to restore the track formation base;
- Additional ballast would be required to rectify numerous formation subsidence’s and failures along the line;
- Replacement platforms or platform rehabilitation would be required at most locations;
- A minimum of 50% of bridge timbers would need to be replaced on bridges between Cranbourne and Nyora;
- The majority of culverts will need to be cleared, cleaned and restored; and
- All level crossings would need to upgraded or rehabilitated.

[2] Asia Pacific Rail, (2000), Leongatha and Mildura Rail Infrastructure Assessment – Leongatha Final Report, Asia Pacific Rail, Melbourne.
[3] Department of Infrastructure, 2001, *Feasibility study on the re-introduction of passenger rail services to South Gippsland,* Department of Infrastructure, Melbourne

The estimated cost to restore the Leongatha line for the reintroduction of passenger rail services is outlined below:

Table 1-3: Estimated Total Asset Upgrade Costs

Task/Asset Upgrade	Estimated Upgrade Cost $M
Vegetation & Clearance	1.0
Bridges & Culverts	11.2
Track	43.0
Level Crossings	10.0
Stations & Platforms	3.8
Train Radio	2.7
Total	**71.7**

In addition to the $71.7 million upgrade costs there would be a further $1.8 million each year in safeworking and train operating costs to reinstate passenger train services on the Leongatha line.

The Cost Benefit Analysis, which compared the existing Leongatha Road Coach services (the Base Case) against the restoration of rail infrastructure and the reintroduction of passenger services (the Rail Option), concluded that:

- The most likely Rail Option outcome (i.e. 3 return services per day with the AM and PM Peak services connecting with suburban trains at Dandenong) has a Net Present Value (NPV) of negative $102 Million, indicating it is not an economically viable option in comparison to the Base Case coach option.
- Other cases examined in the sensitivity test process improved the performance of the Rail Option but even under the most optimistic and unlikely outcomes the NPV remains negative and is not an economically viable option.

2 INTRODUCTION

2.1 Purpose

The purpose of this report is to present the findings of various assessments undertaken by the Department of Infrastructure (DOI) on re-introducing passenger rail services to Leongatha. This report includes a Cost Benefit Analysis (CBA) to assess the costs and benefits of restoration of rail infrastructure and reintroducing passenger rail services compared with the existing coach services between Leongatha and Melbourne.

2.2 Study Approach

TransNet Logistics Pty Ltd (TransNet) has been engaged by DOI to:

- Review the past assessments and studies on reinstating passenger train services to the Leongatha Rail Line;
- Assist in assessing the transport options for the Line; and
- Prepare this report to summarise the findings of those assessments and reviews.

Arup has also been engaged by DOI to assist with the assessment of transport options associated with the potential return of passenger services to the Leongatha Rail Line. In particular, Arup has prepared an economic evaluation to assist with the overall assessment of options.

Arup has worked with TransNet to:

- Review past investigations conducted for the corridor, including patronage forecasts and costs involved in reinstating and operating services.
- Develop and define options for assessment
- Prepare inputs for and undertake economic assessment of the identified options.

The economic evaluation has considered two main options:

- Continuation of existing coach based services – the Base Case
- Restoration of rail infrastructure and the reintroduction of passenger services – the Rail Option

The Cost Benefit Analysis findings have also been included in this report.

2.3 Source Documents

There have been a number of assessments into the reintroduction of passenger train services on the Leongatha line. The preliminary assessments undertaken prior to the May 2001 Feasibility Study released by the Department of Infrastructure, included:

1. Hardcastle & Richards, (2000), *Cranbourne to Leongatha – Track and Bridge Rectification Works for Freight and Passenger Operations*, Hardcastle and Richards, Melbourne (not reviewed).
2. Asia Pacific Rail, (2000), Leongatha Railway Line – Service Restoration & Feasibility Assessment Asia Pacific Rail, Melbourne (not reviewed).
3. Asia Pacific Rail, (2000), Leongatha and Mildura Rail Infrastructure Assessment – Leongatha Final Report, Asia Pacific Rail, Melbourne.

4. Sinclair Knight Merz, (2001), *Reintroduction of Country Passenger Rail Services to Regional Victoria – Desktop Study: Flora and Fauna Assessment*, Sinclair Knight Merz , Melbourne (not reviewed).
5. Sinclair Knight Merz, (2001), *Reintroduction of Country Passenger Rail Services – Environmental Impact Plan*, Sinclair Knight Merz , Melbourne (not reviewed).
6. Booz Allen Hamilton, (2000), South Gippsland Rail Review - Passenger Service Demand Assessment for the Department of Infrastructure, Booz Allen Hamilton, Melbourne.
7. Booz Allen Hamilton, (2001), South Gippsland Rail Freight Market Feasibility Assessment for the Department of Infrastructure, Booz Allen Hamilton, Melbourne.

Since the May 2001 Feasibility Study release there has been considerable detailed assessments into the feasibility of reintroducing passenger train services on the Leongatha line, namely:

1. Maunsell Australia Pty Ltd, (2002), *Re-introducting Country Passenger Rail Services - South Gippsland Line, Part E Draft Scope of Works for Track, Bridges, Stations, Right of Way and Civil Works*, Maunsell Australia, Melbourne (not reviewed).
2. Maunsell Australia Pty Ltd, (2002), *Re-introducting Country Passenger Rail Services - South Gippsland Line, Part G Draft Technical Specification for Track, Bridges, Stations, Right of Way and Civil Works*, Maunsell Australia, Melbourne (not reviewed).
3. Maunsell Australia Pty Ltd, (2002), *Re-introducting Country Passenger Rail Services - South Gippsland Line, Draft Scope of Works for Level Crossings, Signalling and Communications*, Maunsell Australia, Melbourne (not reviewed).
4. Maunsell Australia Pty Ltd, (2002), *Re-introducting Country Passenger Rail Services - South Gippsland Line, Draft Technical Specification for Level Crossings, Signalling and Communications*, Maunsell Australia, Melbourne (not reviewed).
5. Maunsell Australia Pty Ltd, (2002), *Re-introducting Country Passenger Rail Services, Draft Leongatha Corridor Position Paper*, Maunsell Australia, Melbourne (not reviewed).
6. Costello, C., & Gilmore, D. (Biosis Research),(2002), *Preliminary ecological assessment of proposed passenger rail upgrades, South Gippsland Rail Line*, Report prepared for the Department of Infrastructure, Victoria.
7. Costello, C., & Gilmore, D. (Biosis Research),(2002), *Preliminary ecological assessment of proposed passenger rail upgrades, South Gippsland Rail Line*, Report prepared for the Department of Infrastructure, Victoria.
8. McCloskey, D., (2005), *Leongatha Final Report - Estimation of demand for rail services for South Gippsland Line - Report for V/Line,* Pathfinder Solutions (Aust) Pty Ltd, Melbourne.
9. Maddern, C., and Metaxas, C., (2005), *Reintroduction of Rail Services on the South Gippsland Line - Demand Survey 2005*, Market Solutions Pty Ltd, Melbourne.
10. Asia Pacific Rail, (2007), South Gippsland Passenger Train Service Project – Train Radio Coverage – Interim Report, Asia Pacific Rail, Melbourne.
11. Helms, D., Schmeder, N., Hewitt, G., Stanin, Z., & Whitehead, R. K. (Context Pty Ltd), (2006), *South Gippsland Passenger Train Project, Cultural Heritage Study*, Report prepared for the Department of Infrastructure, Victoria.
12. Asia Pacific Rail, 2006, *Preliminary Scope and Estimate Report, Cranbourne – Leongatha Corridor Track and Signal Assets*, Asia Pacific Rail, Melbourne.
13. George Deutsch Consulting, 2005, *Re-opening Cranbourne – Leongatha Line Peer Review of APR Report*, George Deutsch Consulting Pty Ltd, Melbourne.

These documents have been used as the source for preparing this report and the cost benefit analysis on the rail and coach options.

2.4 Report Limitations

This report is limited to the information provided by the DOI and contained within the reports reviewed by TransNet and Arup. Some assessment reports and reviews of the Leongatha line that were undertaken prior to 2001 were not provided for our review. However, it is considered that the assessments undertaken on the Leongatha line since 2001 have been completed in more detailed and we do not believe that the earlier reports would provide any further information than the information already obtained from our review.

3 BACKGROUND

3.1 Line History

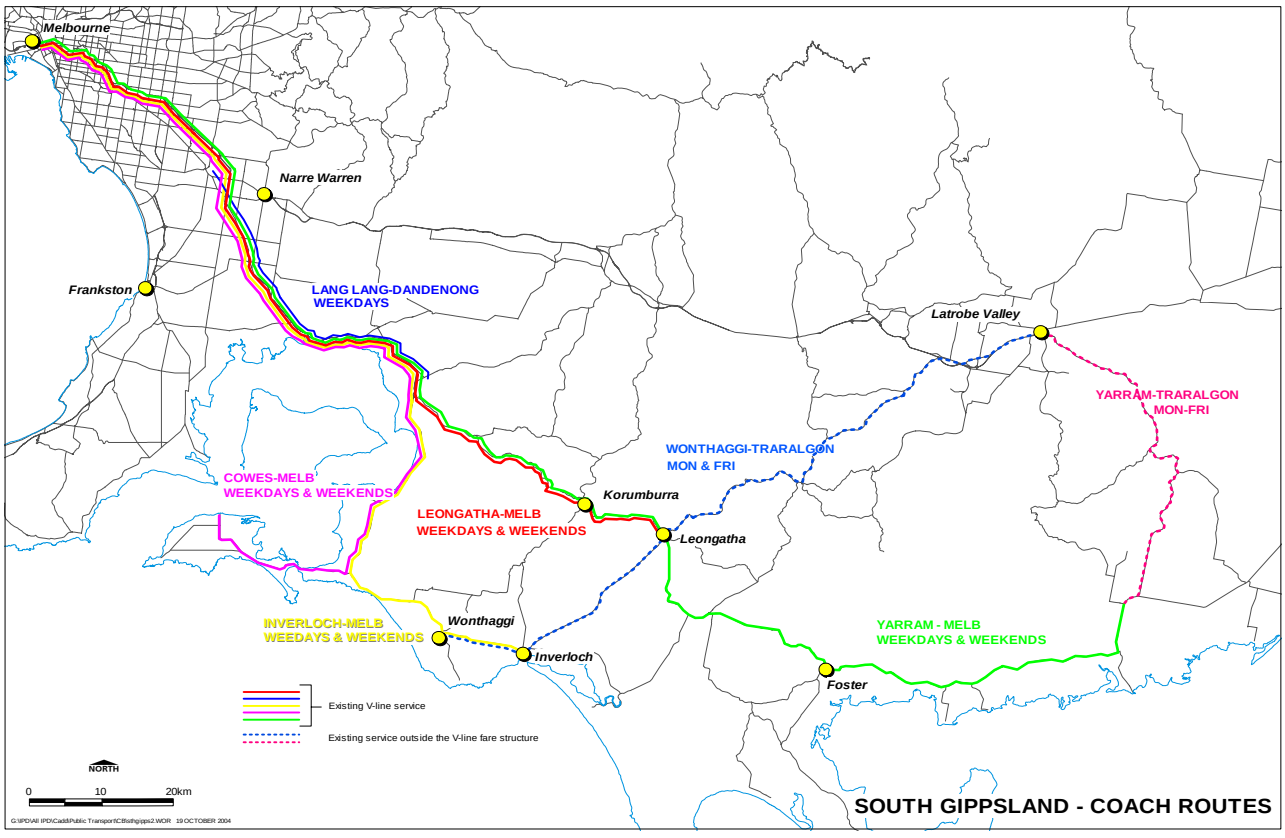
The Cranbourne to Leongatha railway line was part of the South Gippsland regional rail network which included an extension to Wonthaggi (from Nyora) and beyond Leongatha to Yarram. These lines operated both freight and passenger train services. Due to declining traffic, passenger train services to Yarram and Leongatha were withdrawn in June and April 1981 respectively and were replaced by road coaches.

Fully co-ordinated road coach services were introduced between Melbourne and Yarram in August 1981 to replace the temporary road coaches which had been operating since passenger train services were withdrawn.

The government reintroduced passenger train services to Leongatha on 9th December 1984 and in 1986 road coach services were introduced to supplement the rail service.

The viability of the passenger rail service was again reviewed in late 1992 and in early 1993, the Government called tenders for a public transport solution for the Leongatha corridor. Tender submissions indicated that the best financial solution was to replace the passenger train services with road coaches. As a result, the passenger train services to Leongatha were replaced by road coach services on 2nd July 1993.

Figure 3-1: South Gippsland Road Coach Routes



Prior to withdrawing the passenger train services there were a total of 13 return rail services operating each week between Leongatha and Melbourne[4].

No major changes have been made to the road coach services since it was introduced in July 1993.

Since the withdrawal of passenger train services, a number of major changes have occurred on the South Gippsland corridor. The more significant of these changes being:

- Removing the disused rail line beyond Leongatha which was completed in December 1994.
- In December 1994, the South Gippsland Tourist Railway (SGTR) signed a Community Lease for the Nyora – Leongatha section of the line to run a limited number of tourist train services over this section.
- Electrified suburban services were extended from Dandenong to Cranbourne in March 1995.
- In January 1998 the sand train from Lang Lang (Koala Siding) was withdrawn. No freight trains have operated beyond Lyndhurst (located between Dandenong and Cranbourne) since the withdrawal of the sand train. The line between Cranbourne and Nyora has not had any track maintenance since the sand train was withdrawn and was no longer available for rail traffic from late 1999.
- On 17th July 2000, the Pilkington ACI siding on the outskirts of Dandenong (one of two rail destinations for Lang Lang sand) was abolished.

The land reserve east of Leongatha to the end of the line at Yarram and between Nyora and Wonthaggi is under State Government ownership and is managed by the Department of Natural Resources and Environment (DNRE).

A summary table of the current Leongatha / Yarram Road Coach service and rail infrastructure between Cranbourne and Leongatha is set out below:

Table 3-1: Details of the Leongatha Line

Description	Number	Comment
Coach Services	77 services[#]	66 weekday, 7 Saturday & 4 Sunday
Track distance	127 kilometres	Southern Cross to Cranbourne - 45 kms (leased to Connex), Cranbourne to Nyora – 46 kms (leased to V/Line) & Nyora to Leongatha – 36 kms (leased to South Gippsland Tourist Railway
Bridges & culverts	42	26 bridges (18 with timber piles & 8 with concrete piles) & 16 culverts of various construction.
Level crossings	26	Only 10 equipped with flashing lights
Passengers	61,000 per annum	This is down from 106,000 prior to the train service being withdrawn in 1993.

[#] Includes 10 Lang Lang weekday services.

[4] Two services in each direction from Monday to Saturday & one service in each direction on Sundays.

4 Government Policy Context

4.1 Policy Context

As part of its 1999 election platform, the current Government indicated that it would investigate the feasibility of restoring rail passenger services that had been withdrawn in 1993/94 – in particular the Ararat, Bairnsdale, Mildura and South Gippsland (Leongatha) services.

In 1999, the Government launched its *Linking Victoria* program in which a number of new transport infrastructure projects would be delivered, including upgrades to Victoria's ports, roads, and rail network.

In May 2001, the Premier announced at Ararat that funding had been allocated to restore passenger rail services to Ararat, Bairnsdale, Mildura and South Gippsland (Leongatha).

In 2000/01, the Government launched its *Growing Victoria Together* strategy, in which it was mentioned that funding had been allocated to restore passenger rail services to Leongatha.

Over the past 6 years, the Government has made significant progress in developing a transport network that responds to Victoria's current and future needs. The Government is committed to reintroducing passenger rail services to country areas and has already returned services to Ararat and Bairnsdale in July 2004 and May 2004 respectively. The Government has allocated $73 million to upgrading the Mildura line for freight purposes. This is the first major step towards the re-introduction of passenger services.

Since announcing the reintroduction of passenger services in May 2001 there have been extensive assessments and feasibility studies undertaken to ensure the full extent of work and the associated cost of returning passenger train services to Leongatha is understood.

The assessments and feasibility studies undertaken since 2001 on the Leongatha line include:

- Ecological Assessment;
- Cultural Heritage Study;
- Passenger Market Survey;
- Freight Opportunities Assessment;
- Engineering Assessment:
  - Track;
  - Bridges & Culverts;
  - Level Crossings; and
  - Stations; and
- Train Radio Assessment.

The findings of these reports have been summarised in this report.

5 Ecological Assessment

5.1 Ecological Assessment Overview

In 2002 and 2005 Biosis Research were commissioned by DOI to undertake Ecological Assessments for the rail corridor between Cranbourne and Leongatha and to advise on the implications for biodiversity of re-opening the line for passenger services. The 2002 study was largely based on a desktop assessment and an assessment of habitat values for threatened species in the vicinity of level crossings and bridges requiring and upgrade. A detailed survey was not undertaken in the 2002 assessment and in the 2005 assessment there were fewer sites inspected.

The ecological study objectives included:

- To assess the flora and fauna characteristics of the existing rail reserve;
- To consult with authorities or interested parties as necessary;
- To provide recommendations for design and management of ecological issues related to the reintroduction of rail passenger services on the South Gippsland (Leongatha) rail line; and
- To ensure that relevant regulatory and advisory standards for flora and fauna protection and management are satisfied.

The tasks undertaken for the ecological assessment were to:

- Review any flora and fauna reports or surveys;
- Review the flora and fauna features, values and significance of the sites presented in existing reports, including recommendations for protection and management of any features of significance and matters of statutory compliance;
- Identify any areas of potential risk and how they may be mitigated;
- Undertake a site inspection between Cranbourne and Leongatha;
- Advise on whether clearance of vegetation would impose a risk of sufficient impact on any Environment Protection and Biodiversity Conservation and Flora and Fauna Guarantee matter and would such works require permission under these Acts;
- Recommend where further investigations may be required; and
- Prepare a report on the ecological aspects of the line, including information from biological databases, planning schemes, and information from Government agencies.

5.2 Findings

The rail corridor between Cranbourne and Leongatha was found to contains highly significant examples of vegetation communities, flora and fauna species that are threatened at both National and State levels. The nationally threatened species are protected by the Commonwealth *Environment and Biodiversity Conservation Act 1999.*

The Victorian *Flora and Fauna Guarantee Act 1988* applies to 'protected flora' species within the rail corridor which include all members of threatened listed ecological communities. Permits will be required from the Department of Sustainability and Environment (DSE) for incidental removal of protected flora during both initial clearing and rail upgrade works.

DSE has defined Biosites as areas of biological significance. Much of the rail reserve is contained within biosites ranging from National to Regional significance. Particular care will be required for all works within biosites and DSE should be consulted about any such proposals.

Figure 5-1: Vegetation on track

Removal of native vegetation within the track formation (rails and ballast) may require a planning permit under Clause 52.17 as trains have not operated over the line for greater than 10 years. Between Loch and Leongatha much of the line is covered by Environmental Significance Overlay (ESO 5) under the South Gippsland Planning Scheme, in which all vegetation removal requires a planning permit except for certain exemptions which do not appear to apply to the rail works.

Clearing of vegetation (both native and exotic) that has established along the tracks and ballast easement between Clyde and Koo Wee Rup could have an impact on the EPBC-listed Southern Brown Bandicoot. To minimise impacts to this threatened species, clearing along this section of the rail line would have to be the absolute minimum required for safe access of inspection vehicles.

Clearing required for level crossing upgrades before re-opening of the rail line is expected to be minor in extent and ecological impact. In contrast, clearing that may occur within a prescribed distance from the rail tracks for the full distance may create significant disturbance and impacts on threatened species and communities. In addition, ongoing maintenance of the rail corridor, including activities such as vehicle access and fire prevention works or installation of services along the corridor has the potential to cause significant impacts.

All works undertaken as part of the rail upgrade should be subject to an Environmental Management Plan, with provision for a regular and independent audit[5].

5.3 Implications of Ecological Assessment

It was imperative that a detailed ecological assessment be undertaken since the South Gippsland Feasibility Study[6] was released. The ecological study undertaken by Biosis Research (2005) was limited to a desktop exercise, with some in-field inspections. Given this, it is reasonable to expect that the ecological aspects on the Leongatha line could:

- Have more significant implications than has been assessed at a desktop level (e.g. have ecological significance that could attract the protection of relevant Acts) because of the length of time without maintenance and since rail services operated over the line and the significant vegetation growth evident along the line, particularly between Cranbourne and Nyora which may include significant vegetation communities, flora and fauna species;
- Potentially delay implementing passenger rail services on the line; and
- Marginally increase the cost to implement the project.

[5] Costello, C., & Gilmore, D. (Biosis Research),(2005), *Preliminary ecological assessment of proposed passenger rail upgrades, South Gippsland Rail Line*, Report prepared for the Department of Infrastructure, Victoria.

[6] Department of Infrastructure, 2001, *Feasibility study on the re-introduction of passenger rail services to South Gippsland,* Department of Infrastructure, Melbourne

6 Cultural Heritage Assessment

6.1 Cultural Heritage Assessment Overview

DOI is aware of the historic nature of the Leongatha line and as part of its detailed assessment it was necessary to identify any historically significant features of the line. Context Pty Ltd (Context) was engaged by DOI in 2005 to:

- Assess the cultural heritage (non-indigenous) characteristics of the existing rail corridor;
- Provide recommendations for design and management for the reintroduction of passenger rail services on the South Gippsland (Leongatha) rail line; and
- Ensure that relevant regulatory and advisory standards for cultural heritage protection and management are satisfied.

The study area used by Context included the South Gippsland rail corridor between Cranbourne and Leongatha stations, including places and features within the land as defined by the rail and station reserves. The Cultural Heritage Study report prepared by Context has been used in preparing this section of the report.

The principal objectives of the Cultural Heritage Study prepared by Context were to:

- Provide a broader catalogue and assessment of the extant and visible remains, and
- Identify the extent of the potential archaeological resource within the scope of the present study.

The tasks undertaken by Context were:

- Through archival and primary research identify and catalogue each possible heritage place, detailing its chronological development, and provide a comparative historical and social framework for the heritage places that were identified, where possible.
- Establish the state of preservation of any archaeological or historical remains.
- Determine the likely significance of features.
- Make recommendations for future management of heritage places and to propose actions and strategies for mitigation of potential damage during rehabilitation of the railway.

The study was conceived and commissioned essentially as a desk-top activity and has therefore relied upon a comprehensive review of documentary sources followed by a necessarily brief field survey. The identification and assessment of places of heritage significance by Context generally follows the principles and procedures set out in *The Burra Charter*: *The Australia ICOMOS Charter for Places of Cultural Significance* (1999).

A number of constraints were identified by Context in completing the study, these included:

- They were not able to inspect the majority of the culverts, minor level crossings and bridges on the line because of the number of them and because access to the line between stations was very difficult.
- A number of drainage pits, privies, cess-pits and similar buried features could not be precisely located and were not inspected.
- Some features could have been overlooked due to poor visibility mainly at unattended station, which have not been maintained since the passenger train was withdrawn.

- Access to the railway reserve was restricted, particularly between Cranbourne and Nyora, which is heavily overgrown[7].

6.2 Findings

The research undertaken by Context in its 2005 study confirms that the whole of the South Gippsland rail line is historically significant at least at the local and regional level, and may be of potential significance at the State level. This is based upon its historical associations with the development of Victorian Railways in the late nineteenth century (particularly as one of the most notorious of the 'Octopus Act' lines), and for the critical role it played in the settlement and development of Gippsland. Features associated with the railway including station complexes, bridges, cuttings and embankments are also important elements within townships, and as part of the cultural landscapes within the area.

Subject to the study constraints above Context concludes that with appropriate care in the works to reopen the Leongatha railway line there is little that would impede this project. They found no evidence of any historic feature that would prevent or restrict the replacement of sleepers, rectification of ballast and tracks on the existing formation. This is provided that appropriate materials and methods are used where repair is required to timber bridges and culverts. Context considers that a permit or consent from the Heritage Council may be required for works to places listed on the Victorian Heritage Register (VHR) and Victorian Heritage Inventory (VHI) (see tables below).

Table 6-1: Victorian Heritage Register Places

Place Name	Locality	Municipality	Significance	Register – Ref. No
Korumburra Railway Station Complex	Station Street Korumburra	South Gippsland Shire	State	VHR – H1571

Table 6-2: Victorian Heritage Inventory Places

Place Name	Locality	Municipality	Significance	Register – Ref. No
Koo Wee Rup – Strezlecki Railway reserve	Koo Wee Rup Station	Caredinia and Baw Baw Shire	Local/regional significance	H8021-0012
Former Main South Road Gatehouse	1.5 kilometres east of Bena, Main South Road	South Gippsland Shire	Local significance	H8021-0017
Former Whitelaw Railway Station	Located on Main South Road, across from H8021-0017	South Gippsland Shire	Local/regional significance	H8021-0015

Heritage Victoria would prefer for the line restoration works to be designed so that they do not involve any impact on the heritage values (or potential heritage values) of the places identified in the heritage study.

Works within the area of land of places of significance may require a permit or consent from the Heritage Council depending on the nature of work. These locations include:

[7] Helms, D., Schmeder, N., Hewitt, G., Stanin, Z., & Whitehead, R. K. (Context Pty Ltd), (2006), *South Gippsland Passenger Train Project, Cultural Heritage Study*, Report prepared for the Department of Infrastructure, Victoria.

- The part of the rail reserve on the down side of Koo Wee Rup station (within the VHI H8021-001) and should be avoided wherever possible.
- The entire former station reserve at Whitelaw should be considered as being included within VHI H8021-0015.
- The former railway gatehouse site on the rail reserve at Whitelaw should be considered as being included within VHI H8021-0017.
- The majority of the Korumburra Station reserves is included within VHR H1571. Any trackwork beyond the lateral extent or depth of the present ballast should be avoided in this location.
- The seven railway bridges identified by the National Trust at Koo Wee Rup and over the Lang Lang River, the Adams Creek culvert and Nyora station precinct should be recommended for inclusion on the Victorian Heritage.
- Korumburra Railway Station (H1571) to have the citation reviewed by the Heritage Council having particular regard to the extent of registration.

Figure 6-1: Korumburra Station

In regard to the works required to reopen the Leongatha line for passenger trains, Context made a number of recommendations, including:

- Heritage inventory site record cards should be prepared for all historical archaeological sites identified during the study, which had not previously been included in the VHI.
- A heritage places protocol should be developed by DOI in association with Heritage Victoria, which should form part of any contract for this project.
- A Conservation Policy should be adopted for the project works[8].
- Action is required to ensure that the heritage values of a number of places that are currently under threat from damage or disturbance are not adversely affected.

6.3 Implications of the Cultural Heritage Study

The study was essentially as a desk-top activity and has relied upon a comprehensive review of documentary sources followed by a necessarily brief field survey. It is noted that the in-field survey conducted by Context was constrained due to poor access, inability to precisely locate many features along the line and poor visibility.

Given the limitations of the cultural heritage study it is reasonable to expect that some heritage issues could:

- Potentially delay implementing passenger rail services on the line; and
- Marginally increase the project cost to understand and preserve features of cultural and historical significance.

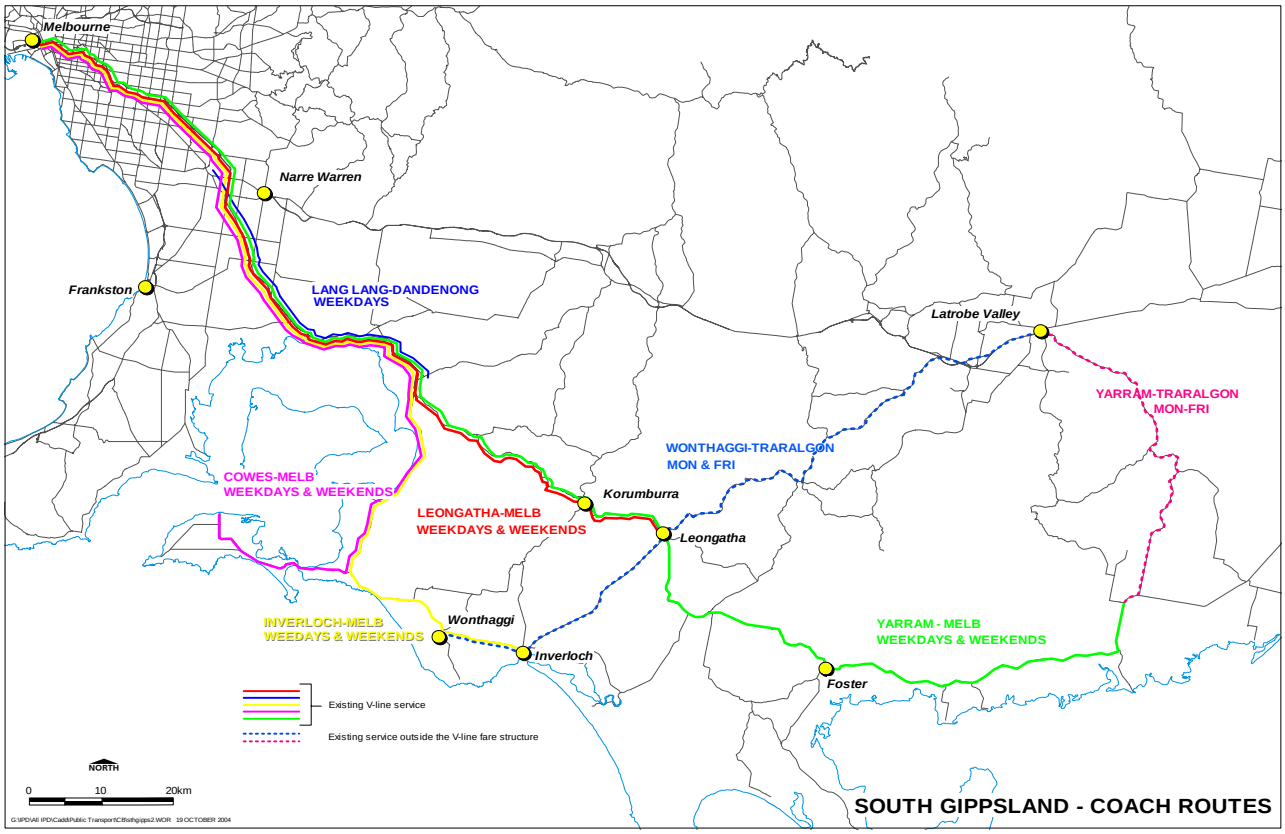
[8] Helms, D., Schmeder, N., Hewitt, G., Stanin, Z., & Whitehead, R. K. (Context Pty Ltd), (2006), *South Gippsland Passenger Train Project, Cultural Heritage Study*, Report prepared for the Department of Infrastructure, Victoria.

7 Passenger Market Survey

7.1 Introduction

Prior to the line closing in 1993, two return passenger train services ran between Leongatha and Melbourne on weekdays and Saturdays, with one return service ran on Sundays. The rail service was complemented by additional coach services throughout the corridor.

Figure 7-1: South Gippsland Coach Routes



There are two major service groups in South Gippsland:

- The Leongatha Corridor – coach services operating along the old rail service alignment between Yarram, Leongatha, Korrumburra, Lang Lang and Melbourne; and
- The Bass Coast Group – covering coach services from Phillip Island and Inverloch, but running adjacent to the old Leongatha rail line from Lang Lang to Melbourne.

The Leongatha Corridor Group includes the following coach services:

- Yarram to Melbourne via Leongatha;
- Leongatha to Melbourne; and
- Lang Lang to Melbourne.

The Bass Coast group includes the following coach services:

- Cowes to Dandenong/Melbourne; and
- Inverloch to Dandenong/Melbourne.

In total there are160 coach services operated on the corridor each week:

Table 7-1: Summary of South Gippsland Coach Services

SERVICE	Mon to Fri	Sat	Sun	Total
Leongatha - Melbourne	45	5	2	52
Yarram – Leongatha – Melbourne	11	2	2	15
Lang Lang – Dandenong	10			10
Inverloch – Dandenong	11	4	2	17
Inverloch – Melbourne	21			21
Cowes - Anderson	10			10
Cowes - Melbourne	16			16
Cowes - Dandenong	15	2	2	19
Total	**139**	**13**	**8**	**160**

Current travel times to Melbourne are:

From Lang Lang (via Dandenong) 1 hour 46 minutes
From Leongatha (Express) 2 hours to 2 hours 25 minutes
From Leongatha (Stopping) 2 hours to 2 hours 37 minutes

In 1993, prior to closing the rail line, the combined train and coach patronage for Leongatha services was 127,000 passengers. Approximately 37,000 of these trips were made from Cranbourne, which is now part of the metropolitan rail system. Therefore the patronage along the line was 90,000 passengers per annum (excluding Cranbourne passengers).

In 1994, after the train services were withdrawn, patronage fell to 78,000 per annum and is now around 61,000 passengers per annum, a loss of approximately 29,000 passengers since the train was withdrawn. Some passengers continue to commute by driving to Pakenahm, Warragul or Cranbourne.

7.2 Service Options

There were four service options considered in 2000 for re-opening the South Gippsland line, as outlined below:

Table 7-2: Options for Restoration of Rail Services in 2000

OPTION	FREIGHT SERVICES		PASSENGER SERVICES		
	Fit for Purpose (Class 5)	Standard (Class 3	South Gippsland Tourist Railway	Regular Services[1]	Upgraded Services[2]
1. Freight Only , minimum service	✓	X	✓	X	X
2. Freight Only	✓	✓	✓	X	X
3. Restore Passenger Services	✓	✓	✓	✓	X
4. Upgrade Passenger Services	✓	✓	✓	✓	✓

Note 1 – Regular Services would operate at 100 km/h on class 3 track.
Note 2 – Upgraded services would operate at up to 130 km/h on class 2 track between Cranbourne & Nyora and at 100 km/h between Nyora & Leongatha on class 3 track.

At the time there were two preferred options for restoring rail services on the line, which included opening the line in two stages. Stage 1 was to adopt Option 1 to open the line for freight services from Nyora to Melbourne and to allow SGTR to operate some services to Melbourne if required. Stage 2 was to adopt Option 4 to allow full operation of passenger train services between Leongatha and Melbourne. These two options were based on the freight and passenger market assessment at the time.

Option 4 was based on providing two weekday return services between Melbourne and Leongatha which would be timed to arrive before 9 am and depart from Melbourne after 6 pm. One off peak service was also proposed to arrive late morning and depart early/late afternoon. Essentially only those coach services duplicating the train services were to be removed. All other coach services would remain in operation. Whilst Option 4 proposed to operate passenger trains at up to 100 km/h between Nyora and Leongatha the severity of curves and gradients in this section of track would make it difficult to achieve train speeds any greater than 80 km/h.

A further assessment of these options has revealed that there is no capacity to operate an additional country train through the suburban network between 7 am and 9 am from Cranbourne to Southern Cross Station and from Southern Cross to Cranbourne between 4 pm and 6 pm on weekdays. A revised passenger train option has been developed around these constraints to cater for commuter and discretionary passengers along the Leongatha line, as outlined below.

Table 7-3: Conceptual Timetable (Monday to Friday)

Monday to Friday									
				Yarram					
Leongatha dep	**5:35 AM**	**6:25 AM**	**8:33 AM**	**8:33 AM**	**8:33 AM**	**9:45 AM**	**12:45 PM**	**3:05 PM**	**4:45 PM**
Dandenong arr	**7:00 AM**	**-**	**-**	**10:17 AM**	**10:18 AM**	**11:10 AM**	**2:30 PM**	**4:43 PM**	**6:10 PM**
Dandenong dep	7:12 AM	**-**	**-**	**10:20 AM**	10:36 AM	**11:11 AM**	**2:33 PM**	**4:45 PM**	6:21 PM
Melbourne	7:55 AM	**8:50 AM**	**10:50 AM**	**11:10 AM**	11:23 AM	**12:00 PM**	**3:20 PM**	**5:35 PM**	7:21 PM
Journey time	*2:20*	*2:25*	*2:17*	*2:37*	*2:50*	*2:15*	*2:35*	*2:30*	*2:36*
									FO
Melbourne	6:46 AM	**9:25 AM**	**12:00 PM**	**2:00 PM**	**4:10 PM**	**4:30 PM**	5:36 PM	**6:10 PM**	**6:40 PM**
Dandenong arr	7:37 AM	**10:02 AM**	**12:47 PM**	**2:49 PM**	**4:53 PM**	**-**	6:26 PM	**7:00 PM**	**-**
Dandenong dep	**7:45 AM**	**10:05 AM**	**12:50 PM**	**2:50 PM**	**4:55 PM**	**-**	**6:35 PM**	**7:03 PM**	**-**
Leongatha arr	**9:10 AM**	**11:38 AM**	**2:31 PM**	**4:15 PM**	**6:30 PM**	**6:35 PM**	**8:00 PM**	**8:30 PM**	**8:30 PM**
Journey time	*2:24*	*2:13*	*2:31*	*2:15*	*2:20*	*2:05*	*2:24*	*2:20*	*1:50*
						Yarram			Yarram

Black times - electric train Dandenong - Melbourne **Blue times - Proposed Leongatha train service**
Red times - Coach services FO - Friday only service Yarram - services to/from Yarram
Note: Train timetable is indicative only

Table 7-4: Conceptual Timetable (Saturday)

Saturday							
			Yarram				
Leongatha dep	**6:50 AM**	**8:25 AM**	**8:33 AM**	**11:25 AM**	**3:00 PM**	**3:40 PM**	
Dandenong arr	**-**	**9:50 AM**	**10:18 AM**	**12:50 PM**	**4:25 PM**	**-**	
Dandenong dep	**-**	**9:51 AM**	**10:20 AM**	**12:51 PM**	**4:26 PM**	**-**	
Melbourne	**8:50 AM**	**10:30 AM**	**11:05 AM**	**1:30 PM**	**5:00 PM**	**5:45 PM**	
Journey time	*2:00*	*2:05*	*2:32*	*2:05*	*2:00*	*2:05*	
Melbourne	**8:55 AM**	**10:05 AM**	**11:55 AM**	12:40 PM	**1:00 PM**	**5:30 PM**	**6:50 PM**
Dandenong arr	**9:34 AM**	**10:38 AM**	**12:34 PM**	1:32 PM	**1:39 PM**	**6:04 PM**	**7:33 PM**
Dandenong dep	**9:35 AM**	**10:40 AM**	**12:35 PM**	**1:41 PM**	**1:41 PM**	**6:05 PM**	**7:35 PM**
Leongatha arr	**11:00 AM**	**12:10 PM**	**2:00 PM**	**3:15 PM**	**3:15 PM**	**7:30 PM**	**9:01 PM**
Journey time	*2:05*	*2:05*	*2:05*	*2:35*	*2:15*	*2:00*	*2:11*
							Yarram

Black times - electric train Dandenong - Melbourne Yarram - services to/from Yarram
Red times - Coach services **Blue times - Proposed Leongatha train service**
Note: Train timetable is indicative only

Table 7-5: Conceptual Timetable (Sunday)

Sunday					
					Yarram
Leongatha dep	**8:25 AM**	**11:25 AM**	**3:00 PM**	**3:55 PM**	**4:05 PM**
Dandenong arr	**9:50 AM**	**12:50 PM**	**4:25 PM**	**5:40 PM**	**-**
Dandenong dep	**9:51 AM**	**12:51 PM**	**4:26 PM**	5:54 PM	**-**
Melbourne	**10:30 AM**	**1:30 PM**	**5:00 PM**	6:40 PM	**6:05 PM**
Journey time	*2:05*	*2:05*	*2:00*	*2:45*	*2:00*
Melbourne	**8:55 AM**	**11:55 AM**	**5:30 PM**	5:40 PM	**7:00 PM**
Dandenong arr	**9:34 AM**	**12:34 PM**	**6:04 PM**	6:32 PM	**7:38 PM**
Dandenong dep	**9:35 AM**	**12:35 PM**	**6:05 PM**	**6:40 PM**	**7:40 PM**
Leongatha arr	**11:00 AM**	**2:00 PM**	**7:30 PM**	**8:10 PM**	**9:00 PM**
Journey time	*2:05*	*2:05*	*2:00*	*2:30*	*2:00*
				Yarram	

Black times - electric train Dandenong - Melbourne Yarram - services to/from Yarram

Red times - Coach services **Blue times - Proposed Leongatha train service**

Note: Train timetable is indicative only

The passenger train services proposed to operate on the Leongatha Line are shown in blue in the conceptual timetables above.

A comparison of average journey times is shown below:

Table 7-6: Average Journey Times by Travel Option

Average Journey Times Weekdays			
Coach	Coach/train	Train/train	Country train
2:20	**2:50**	**2:26**	**2:15**
Average Journey Times Weekends			
Coach	Coach/train	Train/train	Country train
2:08	**2:26**	**-**	**2:03**

This indicates that the revised conceptual train timetable journey times are marginally less than the alternative Coach and Coach/train, however the Train/train service options in the AM and PM peak is marginally greater than the Coach option.

7.3 Market Assessment Overview

The Passenger Market Assessment undertaken in 2000, which was based on a base patronage of 71,000 at the time, indicated that for existing passengers:

- The majority (83%) of those surveyed were more concerned with fares, service frequency and travel time than with the re-introduction of a rail service;
- 17% of those surveyed identified re-introduction of a passenger rail service as their main priority for service improvement, which would result in an 8% increase in patronage;
- 21% of those surveyed indicated that a shorter journey time was their No.1 priority, which would result in approximately 2% growth in patronage.

A telephone survey was also conducted of non-users in 2000 which indicated that:

- 90% of all travel was by car and 67% of those surveyed would never use V/Line services because car is essential to their travel;
- 9% they would use rail if re-introduced; and
- If a rail service was re-introduced it would result in a 15% increase in patronage.

The original concept timetable could not be provided because there are no additional country train paths through the suburban network during the AM and PM peaks. Therefore, a revised concept

timetable for Leongatha was developed within the suburban network constraints. As a result, additional Passenger Market Research was conducted in December 2005 by Market Solutions Pty Ltd to assess the response from existing and potential passengers on the revised concept timetable. The research was undertaken for towns along the Leongatha corridor and town located on feeder service routes.

The major findings from the 2005 Market Research were:

- The majority (80%) of those surveyed were more concerned with service frequency, travel time, direct services and more weekend services than with the re-introduction of a rail service;
- Interest in using the passenger train service was very high:

Survey Group	Survey Area	Very Interested	Somewhat interested
Current Users	Corridor Towns	70%	19%
	Feeder Towns	59%	23%
Potential users	Corridor Towns	55%	35%
	Feeder Towns	30%	63%

- This was estimated to result in between 8,200 to 13,100 individual users of the re-introduced train services.
- There was a clear preference for train service between Leongatha and Melbourne:

Survey Group	Survey Area	Preference for a Train	Preference for a Coach
Current Users	Corridor Towns	65.9%	19.2%
	Feeder Towns	71.6%	7%
Potential users	Corridor Towns	78.5%	6.4%
	Feeder Towns	71.3%	4.9%

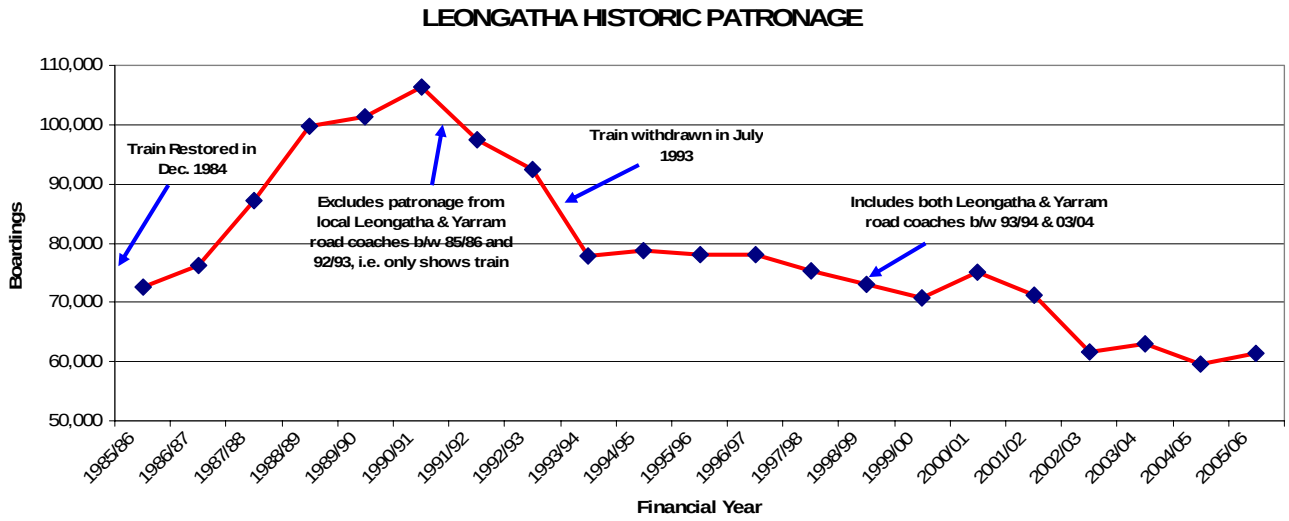
- There was a high tolerance to connecting services at Dandenong with 80% of Corridor Town users and 72% of Feeder Town users saying they would not stop using the train if a connection was required.
- There were 44% of users who indicated they would increase their usage to at least once a month if the train service was re-introduced.

Additional Passenger Market research by Pathfinder Solutions (Aust) Pty Ltd was undertaken in 2005 to obtain demand estimates of commuter and discretionary travel, using population data for 2005, 2010 and 2020. This was done using the 2001 Census of Population and Housing, proprietary projections of the population counts for Census Collection Districts developed by Pathfinder Solutions, Journey to work travel data (obtained through customised processing by the Australian Bureau of Statistics), and patronage, ticket and market demographics data for V/Line rail catchments in Victoria, other than South Gippsland. Three estimates were developed using a range of passenger usage and trip data. The patronage estimate findings from the 2005 Market Solutions and Pathfinder research are shown in section 7.4 below.

7.4 Patronage Estimate

In 1992, prior to the rail line closure, the combined train/coach service to Leongatha carried 127,000 passengers, with 106,000 of these passengers carried by the rail service. Leongatha rail patronage dropped to 78,000 passengers after the train service was withdrawn in 1993. Leongatha patronage has been in gradual decline ever since and is currently around 61,000 passengers per annum.

Outlined below is the annual Leongatha patronage on the line (source DOI):



In 2001 patronage estimates were undertaken using four separate approaches[9]. The results of this research are outlined below:

Table 7-7: Summary of Patronage Forecast Assessments (2000)

Research Methodology Approach	Forecast	
	Growth percentage from existing Leongatha Coach Boardings	Number of Additional Boardings (1999/2000) per annum
Before and After Rail Closure Assessment	22%	16,000
Market Stated Intentions	25%	18,000
Demand Modelling	11%	8,000
Tourist Potential	7%	5,000

It was concluded that there would be around 22% growth in patronage from 71,000 boardings per annum (Leongatha line only) to 87,000 boarding per annum.

The Market Solutions passenger market research used a targeted questionnaire and telephone survey of current and potential passengers along the corridor. The questionnaire responses were then analysed using cross tab data analysis.

The Market Solutions research, in addition to assessing the revised train timetable, was designed to estimate demand from existing and potential passengers for a train service on the Leongatha corridor. Pathfinder Solutions market research was undertaken to obtain demand estimates for 2005, 2010 and 2020, using 2001 Census of Population and Housing data. The demand estimates developed from these research approaches are shown in Table 7-8:

[9] Department of Infrastructure, 2001, *Feasibility study on the re-introduction of passenger rail services to South Gippsland,* Department of Infrastructure, Melbourne

Table 7-8: Estimated Patronage Demand (Trips Per Annum)

Demand Estimate Scenario	Market Solutions 2005 Study Findings	Pathfinder Solutions 2005 Study Findings		
	2005	2005	2010	2020
Base	160,000	137,959	152,318	183,660
% growth	45%	25%	38%	66%
High	263,000	213,075	237,892	289,990
% growth	139%	93%	116%	163%

Note: These estimates are based on Leongatha, Inverloch & Cowes patronage. Growth is based comparison of 2005 figures

The current Leongatha, Inverloch and Cowes patronage is approximately 110,000 boardings per annum. The patronage estimates developed by Market Solutions and Pathfinder in 2005 would represent a significant increase in patronage as a result of the Leongatha train service being reinstated. Similar or slightly greater patronage growth of approximately 30% could be expected for the Leongatha/Yarram boarding which would represent 18,000 additional boardings per annum.

7.5 What's Changed?

Since the Passenger Market Assessment in 2000 the only changes that have occurred are:

- The proposed train timetable has been revised to better reflect passenger service needs along the line:

Table 7-9: Comparison of Timetable Options 2000 & 2005

Day of Service	2000 Proposed Timetable (Return train services per day)	2005 Proposed Timetable (Return train services per day)
Weekdays	2	3*
Saturday	2	3
Sunday	1	3
Total Per Week	13	21

* Early and late trains connect with Suburban trains at Dandenong.

- Demand for Public Transport has increased across Victoria due to the rise in the cost of fuel.

The revision to the proposed 2000 timetable was undertaken to better reflect the needs of passengers along the line.

7.6 Passenger Market Assessment Differences

The Passenger Market Assessment in 2000 identified the potential growth in passenger boardings between 8,000 and 23,000 per annum or 11% to 32% growth based on the Leongatha boardings of 72,000 per annum. This estimate does not consider the potential "referential" patronage growth that may occur to the Cowes and Inverloch coach services as a result of reintroducing the train service to Leongatha. Whilst not considered to be significant it would have some impact on the patronage of these coach services.

The Passenger Market Assessment in 2005 assessed a revised timetable with current and potential passengers. The Market Solutions assessment indicates that there is a strong preference for a train services and despite having to change services in the morning and evening at Dandenong it would not stop the majority of those surveyed from using the train service. Both Market Solutions and Pathfinder's assessments indicate the growth in passenger boardings of 38,000 to 153,000 or growth of 25% to 139%. It should be noted that South Gippsland already has an extensive road coach

service, with comparable travel times to the proposed train service. Whilst there is a clear preference of those surveyed for a train service over a coach service, it is unrealistic to believe that the higher patronage growth estimates could be achieved by reintroducing a train service. Experience on other lines (namely Ararat and Bairnsdale) shows that patronage growth would be in the order of 29% to 34%. The 2005 Base patronage growth estimate developed by Pathfinder is considered to be more realistic estimate of patronage growth from introducing a train service to Leongatha. Assuming a similar or slightly greater patronage growth (30%) on the current Leongatha/Yarram boardings of 61,000 would result in patronage growth of approximately 18,000.

In 2000 it should be noted that 83% of passengers surveyed were more concerned with fares, service frequency and travel time than with the re-introduction of a rail service and that 17% of those surveyed identified re-introduction of a passenger rail service as their main priority for service improvement. In 2005, despite the strong preference for a train, only 20% rated the reintroduction of a passenger train service as their main priority. This would indicate that only 12,000 passengers considered that the reintroduction of a train services was more important than better service frequency, more direct services, more weekend services and shorter travel times. These findings are consistent with market research on other country rail lines.

8 Freight Market Assessment

8.1 Introduction

Prior to 2001 DOI, in conjunction with South Gippsland Shire Council and Freight Australia[10], identified five potential freight market segments:

- Sand reserves;
- The dairy industry;
- Forestry and timber products;
- Some grain; and
- Fertiliser.

Independent consultants (Booz Allen & Hamilton) were appointed in 2000 to conduct a Freight Market Feasibility Assessment which looked at the feasibility of rail freight and the feasibility for establishing a bulk terminal to handle available freight traffic. This work was conducted in consultation with Freight Australia (who had leased the country rail track from the Victorian Government), South Gippsland Shire Council and local industries.

In 2005 it became necessary to revisit the freight market potential and independent consultants (SKM) was engaged to research and assess the freight opportunities available to rail on the South Gippsland line, and to report on specific actions which would be required to achieve modal shift in identified commodities.

8.2 Market Assessments Overview

The initial market assessment estimated 2.5 million tonnes of rail freight traffic[11] as outlined below:

Table 8-1: Initial Estimate of Potential Rail Freight (2000)

Commodity	Estimated tonnes
Construction sand	2,000,000
Export Dairy	150,000
Grain	150,000
Forestry	200,000
Total	**2,500,000**

Booz Allen & Hamilton (BAH) identified that sand (2 million tonne) and agricultural (150,000 tonne grain) freight[12] traffics were the only potential markets available to rail. Grain traffic was currently on rail into Sunshine then distributed to farms as stock feed in the Leongatha area by road.

[10] Freight Australia had purchased the V/Line freight business from the Victorian Government and had entered into a 45 year lease of the Victorian country broad gauge rail network, and was responsible for the Leongatha line between Cranbourne and Nyora.
[11] Table 5.4: Potential Rail Freight Traffic, page 45, Review of Country Passenger Rail Services – South Gippsland.
[12] Booz Allen & Hamilton, (2000), South Gippsland Rail Freight Market Feasibility Assessment, Final Report – Market Scoping and Terminal Assessment, Report prepare for DOI, Victoria.

A number of sites were assessed for a multi user intermodal terminal; however no recommendations were made by the independent consultants.

The 2000 Freight Market Feasibility Assessment only identified the "potential" rail freight tonnage. To secure this freight tonnage to rail would require a more detailed investigation and analysis before binding commitments could be obtained from all stakeholders.

In 2005 DOI engage Sinclair Knight Merz (SKM) to research and assess the freight opportunities available to rail freight on the South Gippsland line, and to report on specific actions which would be required to achieve modal shift in identified commodities. This involved a review of previous studies into the freight opportunities in the South Gippsland region and to undertake a targeted market research to obtain information on current freight movements, contestability of rail, probability of rail capturing freight task, under what circumstances could this be achieved and the probable high level rail freight task. SKM held discussion on the potential freight market with:

- Murray Goulburn Co-operative Company
- IncitecPivot
- Frank Vella Sand Supplies
- Hanson Construction Materials (previously Pioneer)
- Readymix
- O-I (formerly ACI)
- Origin Energy
- South Gippsland Shire Council

SKM identified only two areas where the potential to convert freight to rail ranged from "Some - with contingencies" to "very low". These traffic segments included:

Table 8-2: Rail Freight Opportunity (2005)

Commodity	Estimated tonnes
Sand – Construction & Glass	2,050,000
Export Dairy	220,000
Total	**2,270,000**

As part of their assessment SKM concluded that to obtain the Sand traffic to rail:

- There would need to be a rail connection to either the origin or the destination locations (or both);
- The despatch facility would need to be capable of handling 300,000 t/pa (which indicates the likely volume of sand contemplated);
- One supplier would need a 2 kilometre overland conveyor from the mine site to the loading site; and
- An agreement between the suppliers would be required if both suppliers were to use the same rail loading facilities and siding.

SKM also stated that full private sector investment funding for such rail connections appears unlikely and that in order to achieving rail rates competitive with road alternatives funding support for the traffic is likely to be required in some form. This indicates there are a number of contingent issues that need to be resolved before sand traffic would return to rail.

SKM concluded that for dairy products to return to rail:

- A rail connection will be required into the Murray Goulburn plant at Leongatha; and
- A rail connection will be required into Murray Goulburn's Laverton facility.

SKM concluded that both these rail connections would be difficult due to terrain, drainage, land acquisition and land corridor reserve issues. They indicate that no further action should be taken until Murray Goulburn's Laverton North Distribution Centre is rail connected.

8.3 Freight Market Study Differences

In reviewing the study done in 2000 it should be recognised that this was purely a scoping study to identify conceptual freight tonnage available to rail and in real terms this freight tonnage would be on the higher end of expectation. Also, there were (and still are) many contingent issues that would need to be resolved before industry could give binding commitments to transporting their freight by rail. Some of the major issues were:

- Agreement from stakeholders on the construction of a multi user terminal;
- Who would provide capital funding for the terminal and the siding;
- Who would run the terminal;
- Agreement on an unloading site in Melbourne;
- Obtaining a lease of the appropriate site in Melbourne; and
- Who would provide the capital to upgrade/construct the unloading facility and siding in Melbourne.

In the 2005 study SKM did not consider grain as a rail option, possibly because this traffic is transport in small quantities to local farms (door to door) and given the smaller quantities and the relatively short haul distance rail would not be able to provide a better transport price or option. Forestry was not considered by SKM in the 2005 study as this was not considered to be a viable traffic by BAH in the 2000 Freight Study and nothing had changed since that time to warrant further investigation of this traffic.

SKM concluded that the sand traffic from the two main suppliers in South Gippsland was still subject to the same set of issues identified in 2000.

8.4 Implications of the Freight Market Assessment

Whilst the Freight Market Assessments identified potential rail freight tonnage for the Leongatha Line it is considered that these suppliers would be unlikely to switch to rail because:

- It is unclear who would fund the capital cost for the freight terminals and sidings;
- All the existing traffic is currently on road and there would need to be some financial incentive, such as a. reduction in freight rates to switch to rail (of approximately 10%);
- It will be difficult to provide competitive rail freight haulage rates compared with road rates because of:
    - The additional capital cost required to reinstate/construct sidings and loading and unloading facilities that will have to be included in the rail freight rates; and
    - Road being more cost effective over shorter haulage distances like that between Leongatha and Melbourne where road is more competitive, particularly where B-doubles are deployed; and
- There are a number of other interrelated issues that would need to be resolves to get suppliers to shift from road to rail i.e. train paths in the metropolitan network.

Including 300,000 tonne of rail freight in the economic analysis produces, with the high (and unlikely) patronage produces a positive NPV of $2.27 million and a BCR of 1.03 this does not provide a true economic case for the rail freight option. Previous economic analysis of the Leongatha rail extension have included the benefits of transferring some of the freight volumes from road to rail, using intermodal shipping containers and reach stackers to lift the containers between road and rail. However, the feasibility of several of these options and cost to private industry has not been

assessed. It was not recommended to include the benefit of freight transport without a detailed feasibility study that compared the difference in cost between road and rail and whether there is enough incentive for the private industry to invest.

9 Engineering Assessment

9.1 Introduction

The railway was initially built between 1888 and 1891 to serve the development of mining and agriculture in South Gippsland. Passenger train services to Leongatha ceased operating in 1993 and prior to closing the track it was maintained to Class 3 standard and had a mix of mechanical and electrical signals. The maximum line speed between Leongatha and Cranbourne was 95 km/h prior to closing.

From Cranbourne Station the line passes across the Koo-Wee-Rup swamps and flood plains of the Bunyip River and the Lang Lang River. The line in this section is mostly flat, with straight sections of track. Beyond Lang Lang the gradients and curves increase as the line climbs from an elevation of 16 metres at Lang Lang to 120 metres at Nyora and 227 metres at Korumburra, and then descends to an elevation of 83 metres at Leongatha. The track curves and gradients between Lang Lang and Leongatha made it difficult to sustain train speeds much over 80 km/h.

In 2000 there were five options considered for the line, these included:

Table 9-1: Options for Restoration of Rail Services in 2000

Scenario	Description	Passenger Services	Freight Services	Tourist Services
Do Nothing	Between Cranbourne and Nyora remains closed. Between Nyora and Leongatha is maintained by SGTR.	X	X	✓
Option 1 – Freight Only – Minimal Services	Between Cranbourne and Nyora would be class 5 track (Max. speed 50 km/h) for freight trains	X	✓	✓
Option 2 – Freight Only, Class 4 Track	Between Cranbourne and Nyora would be class 4 track (Max. speed 65 km/h) for freight trains	X	✓	✓
Option 3 – Restore Passenger Services, Class 3 Track	Between Cranbourne and Leongatha would be class 3 track which would allow freight trains to operate at 85 km/h and passenger trains to operate at 100 km/h.	✓	✓	✓
Option 4 – Upgrade Passenger Services, Class 2 & 3 Track	Between Cranbourne and Nyora would be class 2 track which would allow passenger trains to operate between 115 km/h & 130 km/h, and freight trains to operate at 80 km/h. Between Nyora and Leongatha upgrade to class 3 allowing passenger trains to operate at 100 km/h and freight trains to operate at 85 km/h.	✓	✓	✓

Two options were preferred (Options 1 and 4) in 2000 to restore rail services on the line, which included opening the line in two stages. Stage 1 was to adopt Option 1 to open the line for freight services from Nyora to Melbourne and to allow SGTR to operate some services to Melbourne if required. Stage 2 was to adopt Option 4 to allow full operation of passenger train services between

Leongatha and Melbourne. These two options were based on the freight and passenger market assessments at the time.

The engineering assessment undertaken in 2000[13] determined that the cost to reinstate passenger rail services between Cranbourne and Leongatha was $5.6 million[14], plus a further $19.7 million of maintenance works on the line over the first 10 years of passenger train operation.

Table 9-2: Estimated Total Asset Upgrade Costs (2000 Estimate)

Task/Asset Upgrade	2000 Estimated Upgrade Cost $M	2000 Estimated 10 year Recurrent Cost $M
Vegetation & Clearance	$0.00	$0.00
Bridges & Culverts	$1.26	$4.37
Track	$2.97	$13.00
Level Crossings	$0.78	$0.86
Stations & Platforms	$0.45	$1.29
Train Radio	$0.11	$0.14
Total	**$5.58**	**$19.65**

Source: Department of Infrastructure

The 2000 assessment was a scoping study and was not done to the same level of detail as the subsequent engineering assessments. Consequently the cost estimate did not fully consider the extent of work required to reinstate the rail line to an appropriate standard for passenger trains. Therefore the 2000 engineering assessments have not been included in this section of the report.

Figure 9-1: Bunyip River Bridge

In 2005 independent consultants Asia Pacific Rail (APR) were engaged by DOI to undertake a preliminary Scope and Estimate of the Track and Signal Assets to reinstate passenger rail services between Cranbourne and Leongatha[15]. APR's review included a review of previous track and infrastructure assessment reports and included in-field inspections along the line. APR was again engaged by DOI in 2006 to undertake a separate assessment of the Train Radio Coverage for the Leongatha line. In September 2005 independent consultants George Deutsch Consulting (GDC) was engaged by DOI to conduct a Peer Review[16] of APR's assessment on the Track and Signal Assets. The GDC review included a desktop review of APR's report and estimates and a three day field inspection along the line. These engineering assessments of track,

[13] Asia Pacific Rail, (2000), Leongatha and Mildura Rail Infrastructure Assessment – Leongatha Final Report, Asia Pacific Rail, Melbourne.
[14] Department of Infrastructure, 2001, *Feasibility study on the re-introduction of passenger rail services to South Gippsland,* Department of Infrastructure, Melbourne.
[15] Asia Pacific Rail, 2006, *Preliminary Scope and Estimate Report, Cranbourne – Leongatha Corridor Track and Signal Assets*, Asia Pacific Rail, Melbourne.
[16] George Deutsch Consulting, 2005, *Re-opening Cranbourne – Leongatha Line Peer Review of APR Report*, George Deutsch Consulting Pty Ltd, Melbourne.

bridges and culverts, level crossings, signals, stations and train radio that were undertaken in 2005 and 2006 are discussed in further detail below.

9.2 Track

9.2.1. Introduction

In order to understand the usage of the Leongatha rail line the following table shows the progression of changes over the last 15 years:

Table 9-3: Train Operating Changes

Date	Change to train operations on the Leongatha line
July 1993	The passenger rail services between Leongatha and Melbourne were withdrawn and replaced by road coaches.
December 1994	South Gippsland Tourist Railway (SGTR) signed a Community Lease for the Nyora – Leongatha railway line section to run tourist trains over this section.
March 1995	The suburban network was extended to Cranbourne.
January 1998	The last freight train carrying sand departed the Lang Lang Sand Siding (also known as Koala Siding) to Melbourne.

Figure 9-4: Km 70.7: Formation Failure

The track between Cranbourne and Nyora was the responsibility of Freight Australia, which is now owned by Pacific National. Prior to closuring this section of track it was place on minimum maintenance and there has been no maintenance of this track section since it closured in 1995. It is also probable that there was a period of time prior to the closure where there was reduced or no maintenance on the line.

The line between Nyora and Leongatha is under a community lease to SGTR and has had minimal maintenance undertaken by them and by VicTrack since taking over the lease.

One of the biggest costs in restoring rail track is the number of sleeper required to provide support and to hold track gauge. The cost of sleepers, particularly on track that has had minimal to no maintenance, represents a significant proportion of the overall cost to reinstate rail track and in this instance is approximately 56% to 65% of the track reinstatement cost.

9.2.2. Assessment Findings

Vegetation

Access to the track between Cranbourne and Nyora is not possible in many places as the access road along the track is completely overgrown and is blocked by fences and locked gates. The rail track has become infested with weeds, blackberries and small trees, with some up to 100 mm in diameter growing between the sleepers and along the track. The weeds and tree growth is so bad that the track is now impassable and could not be access by the Independent Consultants to make a detailed inspection.

The vegetation along the track between Nyora and Leongatha has been largely kept in check by SGTR, however there are several locations where vegetation is dense along the track immediately beside the track.

Figure 9-5: Vegetation Growth

Formation

The Cranbourne to Nyora section is not serviceable due to ballast collapse, abnormal alignment and general formation failures in a number of locations. In the Nyora to Leongatha section there a several formation failure that requires attention. There were numerous locations noted by GDC with significant track formation failure and subsidences. These would all require more ballast to restore the required formation standard.

Cuttings and Lineside Drainage

The majority of cess drains along the line are chocked with vegetation and require cleaning. The cuttings inspected were generally in good order, however all will require cleaning. Tree growth and loose rock surfaces in cutting along the line will need to be cleared and the surfaces dressed to maintain cutting face structure.

Ballast

Most locations checked along the line indicate the ballast is fouled and at a minimum depth beneath sleepers. The poor drainage and extensive growth along the line also indicate that the ballast is probably fouled. A minimum ballast lift of 50 mm is required before operating trains over the line, with a more significant lift required in location that have formation subsidence's and failures. The track is believed to require a further lift of 50 mm within 2 years of re-opening. Added to this will be the additional ballast required to restore the numerous track formation failures and subsidences along the line.

Rail and Fastenings

The rail is mainly in 75 metre lengths of 45 kg/m section (approximately 80 years old) with some 47 kg/m rail section and APR indicate that the 45 kg/m rail appears visually to be in a condition considered suitable for the proposed traffic. Before passenger service can operate the following would be required to restore the rail and fastenings:

- Ultrasonic checking of rail, fishplates and bolts;
- Installation of grade anchors to prevent rail creep in location with high grades;
- Rectification of rail joint defects and rail creep; and
- Rectification of rail head corrosion at track circuited locations.

Points and Crossings

The main line points and crossing were observed by APR to be in fair to poor condition. After some rationalisation of the passing and yard tracks along the line, the following work would be required:

- Rectification of drainage;
- Replacement of some timber bearer;
- Rectification of yard points;
- Removal of unused/redundant points and crossings; and
- Relocation of the points located in Roughead Street Leongatha to a location within the Leongatha yard.

Sleepers

Sleeper condition is extremely poor as there has been no maintenance cycle on the line since 1990. It is understood there have been approximately 3,000 sleepers replaced in the Nyora to Leongatha section since SGTR signed the community track lease for this section, however APR indicated there was no significant difference in the number of unserviceable sleepers in both the Cranbourne to Nyora section and the Nyora to Leongatha section, which means that a similar quantity of sleepers would need to be inserted in both sections of track.

The summary table below outlines the sleeper inspections undertaken by APR and GDC in 2005:

Table 9-6: Sleeper Replacement Recommendations - APR and GDC

Sprinter Speed (Km/h)	APR		GDC (not speed dependent)	
	Number of sleeper to be inserted per kilometre	Percentage of sleepers to be inserted	Number of sleeper to be inserted per kilometre	Percentage of sleepers to be inserted
80	540	33.8%	960 minimum 1120 Maximum	60% minimum 70% maximum
100	560	35%		
115	580	36.3%		
130	600	37.5%		

The above recommendations are based on there being approximately 1,600 sleepers per kilometre in the track between Cranbourne and Leongatha. The major differences in these estimates are:

- APR's recommendation assumes that 20% of sleepers would be inserted as part of annual maintenance every 5 to 6 years from reopening the line. GDC notes that this would not meet Pacific National's standard for operating passenger trains - that sleepers must have an average age of less than 10 years and a maintenance cycle will not be required within 5 years[17].
- GDC has also taken into account the period of reduced maintenance in the time leading up to closure and the number of sleepers that would have to be replaced during re-construction of the line which was considered to be significantly higher.

[17] The sleepers between Cranbourne and kilometre post 86.11 approximately 83% of the sleepers have less than 5 years remaining life and between kilometre post 86.11 and Leongatha approximately 53% of sleepers have less then 5 years remaining life (GDC page 5).

- The line from Nyora to Leongatha is steep and heavily curved with grades of 1 in 40[18] where 400 metre radius curves are common. Track in this type of terrain needs better sleeper condition than track on flat terrain. Thus, the number of new sleepers required is similar to the number of sleepers required in the closed section between Cranbourne and Nyora.

It is estimate that the cost to clear the existing vegetation and upgrade the track and sleepers would be approximately $44 million. This assumes that the higher sleeper insertion rate estimated by GDC is adopted for the line.

9.2.3. Implications from Track Assessments

The track between Cranbourne and Nyora has had no maintenance for 10 years and no major maintenance for 17 years. The track between Nyora and Leongatha has received minimal maintenance by SGTR since 1994 so this section of track was “fit for purpose” to operate their tourist trains and it is understood the approximately 3,000 sleepers (10% insertion rate) have been inserted over this time.

Clearly all aspects of the Leongatha line will require significant upgrade in order to safely operate passenger train services. The Independent Consultants APR and GDC have undertaken a detailed review of the track along the line. APR’s review of the track was based on an approach to undertake sufficient works so that passenger train services could be reintroduced on a fit for purpose track standard. Once the passenger train services were reinstated then further maintenance cycles would be undertaken over the 5 years following their reintroduction. These maintenance cycles would be in addition to regular maintenance inspections and any ad-hoc repairs on the line.

GDC has undertaken a Peer Review of the APR assessment and has taken a more conservative view of the work required to reinstate passenger train services on the line. This is based on undertaking sufficient track works prior to reintroducing train services so that a maintenance cycle is not required within the first 5 years of operation. It should be noted that Pacific National, who previously owned the country track lease (which is now under the Government’s control) has a policy in the interest of safety, that requires any line on which passenger trains operate should have sleepers with an average age of less than 10 years and a maintenance cycle should not be required for at least 5 years after the current maintenance cycle. GDC’s estimate conforms to this policy.

Given the length of time that the Leongatha line has been closed, with 36 kilometres under minimal maintenance for the last 13 years and the remaining 45.5 kilometres without a maintenance cycle for 17 years, the higher estimate for sleeper replacement made by GDC is considered to be a realistic assessment of the work required on the Leongatha line to reinstate passenger train services.

[18] A 1 in 40 grade means grades that increase in height 1 foot in every 40 feet.

9.3 Bridges & Culverts

9.3.1. Introduction

There are 42 rail bridges and culverts on the Line between Cranbourne and Leongatha.

Table 9-7: Leongatha Line – Description of Bridges & Culverts

Type	Number	Description
Culverts	16	8 multiple concrete box, 6 Armo corrugated multi-plate steel pipe, 1 Rail slab deck & 1 Brick arch
Bridges	26	12 Timber piles and rail decks 6 Timber decks, piles and beams 5 concrete piers with RSJ beams and timber decks 2 concrete piers with RSJ beams and concrete decks 1 concrete piers with RSJ beams and transom decks

It was noted by Independent Consultants Context that six of the bridges in the Koo Wee Rup area and the bridge over the Lang Lang river are of State historical significance.

9.3.2. Bridge & Culvert Assessment Overview

It should be noted that APR did not inspect culverts along the line, instead relied on previous reports. GDC made limited inspection along the line due to time and weather at the time of their assessment.

9.3.3. Assessment Findings

APR found that the bridges where in fair condition and the works required ranged from minor to total replacement to bring them back to serviceable condition. GDC considered that the bridges between Cranbourne and Nyora will confidently require a minimum of 50% renewal of timber, plus the replacement of two pile piers. Provision will also be required for “check rails” on open deck bridges.

Figure 9-2: Collapsed Bridge Deck - 61.116 km

In regard to the review of culverts APR did not inspect culverts along the line as they considered that there was reasonable matching of existing records for these structure and they generally have a very slow rate of deterioration. Although GDC made limited inspection of culverts they note specific instances of culvert collapse, blocking and subsequent pounding along the rail line. They also note the widespread subsidence of embankments along the closed section of track. GDC recommends a more detailed assessment and inspection of culverts to ensure sufficient allowance is made for proper clearance and repair. It is estimated the full cost to restore bridges and culverts along the line for passenger train operations would be approximately $11.2 million.

An alternative form of construction using circular steel sections (originally designed for wind turbine towers) has been suggested for bridges along the Leongatha line which is a feasible form of

construction and has been used on other lines. However, structure costs does not effect the conclusions or preferred option from the economic analysis and therefore does not change the outcome or conclusions of the economic analysis.

9.3.4. Implications from Bridge & Culvert Assessments

It is considered that the cost to restore bridges along the line will need to include some additional provision in order to cover the cost of continent items i.e. check rails. Given the time that the line has been closed and the known deterioration along the line, a full inspection of culvert may be required to fully assess the work and cost of restoring them to a full operating condition. Therefore the estimated cost of $11.2 million to restore bridges and culverts may be a minimum to re-instate these assets.

9.4 Level Crossings

9.4.1. Introduction

There are 26 level crossings on the line between Cranbourne and Leongatha. Twelve of these have or had flashing light protection (see Table 9-8 below).

Table 9-8: Level Crossing with Flashing Light Protection

Name of Roadway	Distance from Melbourne (Kms)	Name of Nearest Railway Station	Protection Type
South Gippsland Highway (High Street)	45.277	Cranbourne	Flashing lights
Narre Warren Road	46.227	Cranbourne	Flashing lights & pedestrian gates
Berwick Road	48.106	Cranbourne	Flashing lights
Clyde / Five Ways Road	50.047	Cranbourne	Flashing lights
Rossiter Road	67.346	Koo-wee-rup	Flashing lights
Westernport Road	77.205	Lang Lang	Flashing lights
McDonalds Track	78.487	Lang Lang	Flashing lights
Poowong Road	90.703	Nyora	Decommissioned flashing lights
Bena Road	107.441	Korumburra	Flashing lights
Warragul Road	111.406	Korumburra	Flashing lights
Turner Street	126.077	Leongatha	Flashing lights
McCarten Street	126.511	Leongatha	Flashing lights

Level crossings at High Street, Warragul Road, Turner Street and McCarten Street were operating in 2005. The remaining level crossings are understood to have Passive Protection i.e. only warning signs and no electric bells and flashing lights.

9.4.2. Level Crossing Assessment Overview

GDC did not have the opportunity to inspect the level crossing protection equipment between Cranbourne and Nyora as part of their review.

9.4.3. Assessment Findings

APR has undertaken a comprehensive review of all level crossings along the line. GDC considered that APR's review was comprehensive and reasonable, but made some further suggestions and recommendations.

APR found that those level crossings with flashing light protection were found to be in various states of disrepair. APR recommended that a further 10 level crossing should be upgraded from passive protection to flashing lights and bells. GDC considered that only 4 of these level crossings warranted the upgraded protection and that with effective passive protection 6 should not have the upgraded protection when restored.

GDC also makes a number of other recommendations, including:

- The signage and view clearance at most level crossing would need to be urgently upgraded before the line reopened.

- Most of the road crossing would need to be reconditioned, including clearing/improving road drainage.

The full cost to upgrade level crossings along the line to current safety standards is estimated to be approximately $10 million.

9.4.4. Implications from Level Crossing Assessments

It will be essential that all level crossings are restored to full operating condition and a detailed risk assessment is undertaken to ensure the type of protection reinstated not only provides the appropriate protection but takes full account of the period of time that these level crossings have not been in operation so that any reinstated crossing protects existing motorist who use these level crossings. It should be noted that Cardinia Shire Council has raised concern about re-opening the level crossings on the line, particularly those within the townships of Lang Lang and Koo Wee Rup. It is suggested that in addition to the risk assessment that Cardinia Shire Council and out municipalities along the lines should be consulted on the type of level crossing protection to be re-instated.

Figure 9-3: Berwick - Cranbourne Road Level Crossing

9.5 Station Assessment

9.5.1. Introduction

When passenger rail services were reintroduced in 1984 the following stations were open to rail passengers:

Table 9-9: Leongatha Line Stations

Station	Distance from Melbourne (kms)
Koo Wee Rup	67.1
Lang Lang	77.4
Nyora	90.5
Loch	95.0
Kurumburra	111.8
Leongatha	126.7

Clyde, Tooradin, Dalmore and Monomeith stations, which had been open prior to the withdrawal of passenger rail services in 1981, were not re-opened in 1993. The list of station in the above table are those identified for re-opening in the feasibility study released in May 2001 and are those used as part of the stations assessment undertaken by independent consultants since the feasibility study was released.

9.5.2. Station Assessment Overview

The major difference between the independent consultants reviews on stations is that GDC recommended the replacement of station platforms using concrete sheeting slabs, steel rail posts and timber coping rather than refurbishing part of some the existing platforms. Outlined below is a brief summary of their assessments.

Figure 9-4: Lang Lang Station

Lang Lang and Koo Wee Rup are in similar states of deterioration. The station buildings have been removed and the platforms are mostly overgrown with weeds and small trees. The platforms are in poor condition and do not meet the safety clearance standards. Considerable work would be required to clear the existing sites and make them serviceable for passenger trains. This work would include: a new platform, a passenger shelter, car parking, coach access, lighting, signage, remote PA system, fencing, landscaping, access pathways, DDA compliance.

The stations from Nyora to Leongatha are in better condition due to the efforts of SGTR, but would still require considerable work to bring them up to an acceptable standard for passengers and rail services. This would require similar work to that required at Lang Lang and Koo Wee Rup.

It was also noted by GDC that Korumburra station building is on the Government Heritage Register and Context noted in their heritage assessment that the station building, platform and other

surrounding buildings are documented with Heritage Victoria. They also note that at Leongatha the station building complex, platform, former goods shed and footbridge have been recommended (2004) for inclusion within the Heritage Overlay.

9.5.3. Assessment Findings

APR found that all stations and platforms would require considerable work to bring them up to an acceptable safety and passenger comfort standard for the reintroduction of passenger trains. This is estimated to cost in the order of $3.8 million.

9.5.4. Implications from Station Assessments

It is essential that railway stations are restored to an appropriate safety and passenger comfort standard and the upgrades recommended by APR are considered to be appropriate.

9.6 Train Radio

9.6.1. Introduction

The train radio communication system previously used on the Leongatha line was the Non Urban Train Radio (NUTR), which is a radio communication system between trains on the line and a base location (usually the train control centre managing the trains). This radio system is for trains operating outside the metropolitan rail system.

The NUTR was originally installed as an aid to operations, however complete radio coverage is now considered an essential requirement for rail lines used for passenger rail services or were the lines operating system[19] (or safeworking system) requires the use of train radio communications.

9.6.2. Train Radio Assessment Overview

In 2005 independent consultants APR were engaged by DOI to conduct an assessment of Train Radio coverage along the Leongatha line. This included an assessment of train radio coverage data from 1992 to identify areas not achieving full radio coverage. To rectify the radio coverage "dead spots", field tests were undertaken that involved elevation of antenna heights; repositioning of existing base stations and the establishment of additional base station sites to achieve full radio coverage.

9.6.3. Assessment Findings

The assessment of train radio coverage on the Leongatha line concluded that:

- The section between Dandenong and Lang Lang is adequately covered and no remedial action is warranted.
- Dead spots between Lang Lang and Nyora could be remedied by relocating the Nyora base station to a site at Mosquito Hill or by elevating the antenna height at Nyora.
- The area around Bena is in very difficult terrain from a radio propagation perspective and could only be reached with a dedicated (new) base station at Jeetho Road.
- A new base station will be require (on a private property site) between Kardella and Ruby to cover the entire Korumburra – Leongatha line section.

APR provided three radio coverage options which are outlined below:

Table 9-10: Leongatha Train Radio Options

Option	Features
1	Restore radio coverage with 3 base stations by combining the Eastern and South Eastern radio zones into a single radio zone.
2	Restore radio coverage with 5 base stations by establishing a New Independent Radio Facility for the Leongatha Line.
3	Restore radio coverage with 5 base stations by providing independent facilities integrated into the existing NUTR network.

Option 3 is preferred and would cost approximately $2.7 million to implement.

[19] The Train Operating or Safeworking System is the permission given to train drivers, in addition to any proceed signals, that allows their train to enter a section of line between locations.

9.6.4. Implications from the Train Radio Assessments

Full radio coverage is essential for effective train operations on train lines and provided full coverage is achieved any of the options identified by APR would be appropriate.

9.7 Engineering Assessment Summary

Engineering assessments in 2000 determined the cost to reinstate passenger rail services between Cranbourne and Leongatha to be $5.5 million[20] and it was estimated that a further $15.7 million of maintenance works would be needed on the line over the first 10 years of passenger train operation. The 2000 assessments were not done to the level of detail that the subsequent engineering assessments have included and as a consequence the cost estimate seriously underestimated the full extent of work required to reinstate the rail line to an appropriate standard for passenger trains.

In 2005 and 2006 Independent Consultants APR and GDC were engaged by DOI to undertake more detailed engineering assessments and review of assets to reinstate passenger rail services between Cranbourne and Leongatha. These engineering assessments covered track, bridges and culverts, level crossings, signals, stations and train radio.

The track between Cranbourne and Nyora has had no maintenance for 10 years and no major maintenance cycle for 17 years. The track between Nyora and Leongatha has received minimal maintenance by SGTR since 1994 to make it “fit for purpose” to operate their tourist trains and it is understood the approximately 3,000 sleepers (10% insertion rate) have been inserted over this time.

Clearly all rail assets along the Leongatha line will require significant upgrade in order to safely operate passenger train services. Given the length of time that the Leongatha line has been closed, with 36 kilometres under minimal maintenance for the last 13 years and the remaining 45.5 kilometres without a maintenance cycle for 17 years, the higher estimate for sleeper replacement made by GDC is considered to be a realistic assessment of the work required on the Leongatha line to reinstate passenger train services. The estimated cost to restore the Leongatha line for the reintroduction of passenger rail services is outlined below:

Table 9-11: Estimated Total Asset Upgrade Costs

Task/Asset Upgrade	Estimated Upgrade Cost $M
Vegetation & Clearance	1.0
Bridges & Culverts	11.2
Track	43.0
Level Crossings	10.0
Stations & Platforms	3.8
Train Radio	2.7
Total	**71.7**

Source: Department of Infrastructure

In addition to the $71.7 million upgrade costs there would be a further $1.8 million each year in signalling and train operating costs to reinstate passenger train services on the Leongatha lines.

[20] Department of Infrastructure, 2001, *Feasibility study on the re-introduction of passenger rail services to South Gippsland,* Department of Infrastructure, Melbourne

10 Transport Option Cost Benefit Analysis

10.1 Scope of assessment

Arup has been engaged by DOI to assist with the assessment of transport options associated with the potential return of passenger services to the Leongatha Rail Line. In particular Arup has prepared an economic evaluation to assist with the overall assessment of options.

Arup has worked with TransNet to:

- Review past investigations conducted for the corridor, including patronage forecasts and costs involved in reinstating and operating services.
- Develop and define options for assessment.
- Prepare inputs for and undertake economic assessment of the identified options.

The economic evaluation has considered two main options:

- Continuation of existing coach services – the Base Case
- Restoration of rail infrastructure and the reintroduction of passenger services – the Rail Option

The evaluation addresses the project costs and benefits streams over a 30 year evaluation period, assuming that rail services would commence from 2007. Following conventional procedures the economic performance is indicated by the Net Present Value (NPV) of the cost and benefit streams.

Benefits for the Rail Option are determined by calculating the change in costs in comparison to the Base Case.

10.2 Key inputs and assumptions

10.2.1. Services provided

The Base Case is the existing coach service from Leongatha. Peak weekday services operate between Leongatha and Dandenong, with off-peak services operating between Leongatha and Southern Cross Station.

The Rail Option will operate with the following weekday rail services:

- One morning peak service in both directions between Dandenong and Leongatha.
- One midday service in both directions between Southern Cross Station and Leongatha.
- One afternoon peak service in both directions between Dandenong and Leongatha.

The weekend services to Leongatha will include 3 services per day between Southern Cross Station and Leongatha. At other times the Rail Option includes coach services equivalent to those provided in the Base Case.

10.2.2. Patronage

Three patronage cases are considered. For the Base Case the existing patronage is used, taken from the current coach service and grown using V/Line growth rates for the Traralgon corridor. For the Rail

Option three scenarios are defined. The inception patronage, that is the patronage predicted to occur on re-introduction of the rail service, is shown for each of the three cases in the following table.

Table 10-1: Patronage Scenario Options Assessed

Patronage Scenario	Inception Patronage (2007)
Base Case	61,463
Low Case	93,700
High Case	213,075

Each of these figures in the table is then grown over the 30 year design period using the V/Line growth rates for the Traralgon corridor. The Low patronage scenario is considered the most likely outcome for the Rail Option.

10.2.3. Parameter values for costs and benefits

Capital expenditure for rail infrastructure has been identified based on the findings of the current review. Bus and rail fleet rolling stock and operating costs are based on advice from DOI and V/Line. Parameter values for the calculation of user benefits and non user benefits have been sourced or developed from relevant sources, using standard values.

Some key assumptions are:

- Average revenue per passenger of $9.75. This figured was determined by using the ticket type breakdown from previous surveys, and adjusting for current ticket prices. This figure is independent of travel mode (rail or coach).
- New coach procurement price of $75,000, replacement cost of $40,000. These figures specified in consultation with DoI representatives.
- Coach maintenance and fuel costs of $1.85 per km, registration costs of $10,000 per annum, and driver costs of $42.70 per km.
- Rail capital expenditure of $67.81 million, for upgrade of track, bridges, station buildings, noise barriers, and level crossings. An additional $2.72 million is required for upgrades to train radio.
- Rolling stock purchase price of $7,487,586, for new 2-car DMUs.
- Rail maintenance costs of $2.55 per km, track access charges of $5.915 per km metro and $7.736 regional, fuel costs of $1.41 per km, driver costs of $46.15 per hour, conductor costs of $32.55 per hour, and radio operational costs of $99,000 per annum.

10.2.4. Reestablishment of Freight Services Sensitivity Test

Including 300,000 tonne of rail freight was included as a sensitivity test for the economic analysis only. Previous economic analysis of the Leongatha rail extension have included the benefits of transferring some of the freight volumes from road to rail, using intermodal shipping containers and reach stackers to lift the containers between road and rail. However, the feasibility of several of these options and cost to private industry has not been assessed. It was not recommended to include the benefit of freight transport without a detailed feasibility study that compared the difference in cost between road and rail and whether there is enough incentive for the private industry to invest.

10.2.5. Capital Risk Sensitivity Test

With all infrastructure projects an allowance of risk is built into the estimate to account for any unknown conditions or costs that are often incurred when undertaking a project. Without the knowledge of perfect information, such as on the current state of the infrastructure or earthworks and

future prices of materials and labour, it often not possible to accurately forecast the total cost of the project. Experience has shown that with any size infrastructure project a certain percentage of risk needs be included above the estimated price for undertaking the project in present value dollar terms. The end figure with risk included is advisable for budgeting because it is considered to be the cost that the project may increase to, and therefore any justification for the project should include this value. However it is also noted that there is also a chance the project may not utilise all or even part of the risk contingency in the budget, and for this purpose we have conducted a sensitivity test with no budgetary allowance for risk.

10.3 Evaluation results

The evaluation results are summarised in the following tables. Sensitivity tests were defined to provide an indication as to how variation in some key input variables would impact the NPV. These are:

- The Low and High patronage variation for the Rail Option (as discussed above);
- Consideration of a no Capital Risk case; and
- Consideration of the benefits if freight services were to be re-established.

Table 10-2: CBA - Patronage Option

Patronage	Freight (Mtpa)	Discount Rate	NPV	BCR	IRR
Base	0	6.00%	-$ 121,100,253	-0.717	N/A
Low	0	6.00%	-$ 102,076,571	-0.447	N/A
High	0	6.00%	-$ 60,213,005	0.146	N/A

Table 10-3: CBA - Freight Option

Patronage	Freight (Mtpa)	Discount Rate	NPV	BCR	IRR
Base	300,000	6.00%	-$ 58,612,828	0.169	N/A
Low	300,000	6.00%	-$ 39,589,145	0.439	N/A
High	300,000	6.00%	$ 2,274,420	1.032	6.20%

Table 10-4: CBA - No Capital Risk Option

Patronage	Freight (Mtpa)	Discount Rate	NPV	BCR	IRR
Base	0	6.00%	-$ 98,808,735	-1.048	N/A
Low	0	6.00%	-$ 79,785,053	-0.654	N/A
High	0	6.00%	-$ 37,921,487	0.214	N/A

Table 10-5: CBA - No Capital Risk & Freight Option

Patronage	Freight (Mtpa)	Discount Rate	NPV	BCR	IRR
Base	300,000	6.00%	-$ 36,321,309	0.247	N/A
Low	300,000	6.00%	-$ 17,297,627	0.641	N/A
High	300,000	6.00%	$ 24,565,938	1.509	8.67%

The results for the Rail Option in comparison to the Base Case Coach Option indicate the following:

- The most likely Rail Option outcome has an NPV of negative $102 Million, indicating it is not an economically viable option in comparison to the Base Case coach option.
- Other cases examined in the sensitivity test process improved the performance of the Rail Option, but even under these optimistic and unlikely outcomes the NPV remains negative and is not economically viable.

11 Concluding Summary

11.1 Objectives

In May 2001 the Department of Infrastructure released a Feasibility Study on the re-introduction of passenger rail services to South Gippsland. Only preliminary assessments had been undertaken prior to that time as outlined in 2.3 Source Documents.

Since releasing the Feasibility Study in May 2001 there have been extensive assessments and feasibility studies undertaken to ensure the full extent of work and the associated cost of returning passenger train services to Leongatha is understood.

The assessments and feasibility studies undertaken since 2001 on the Leongatha line include:

- Ecological Assessment;
- Cultural Heritage Study;
- Passenger Market Survey;
- Freight Opportunities Assessment;
- Engineering Assessment:
  - Track;
  - Bridges & Culverts;
  - Level Crossings; and
  - Stations; and
- Train Radio Assessment.

In May 2005, the State Budget allocated $3m to enable detailed feasibility investigations, including scope, cost-benefits and ecological, to be undertaken on the potential restoration of Leongatha train services. This Report has been commissioned by the Department of Infrastructure to draw together the findings of the detailed feasibility investigations undertaken since the preliminary feasibility study was released in 2001, as outlined in 2.3 Source Documents.

11.2 Background

The Cranbourne to Leongatha railway line was part of the South Gippsland regional rail network which included extensions to Wonthaggi (from Nyora) and beyond Leongatha to Yarram. These lines operated both freight and passenger train services.

Due to declining traffic, passenger train services to Yarram and Leongatha were withdrawn in June 1981 and April 1981 respectively and were replaced by road coaches. In August 1981 a fully co-ordinated road coach services replaced the temporary road coach service between Melbourne and Yarram.

Passenger train services to Leongatha were introduced on 9th December 1984 and in 1986 road coach services were introduced to supplement the rail services. In 1993 the Government withdrew the passenger train services and replaced them with road coaches.

In total there are 160 coach services currently operating on the corridor to and from Melbourne each week. The journey time for express coach services ranges from 2 hours to 2 hours 25 minutes and for stopping services it ranges from 2 hours to 2 hours 37 minutes.

11.3 Detailed Investigation Findings

11.3.1. Passenger Market

The major findings of the Passenger Market studies are outlined in Table 1-1 below:

Table 11-1: Comparison of Passenger Market Studies

Survey Item	2000 Passenger Market Study	2005 Passenger Market Studies
Study methodology	Phone survey, passenger surveys, data modelling, Market research	Telephone surveys, data modelling, Census and V/Line rail catchment data modelling,
People surveyed	Not provided	824
Proposed weekly passenger train services in survey	13 return services	21 return services
Estimated % patronage increase	22%	25% to 45%
Estimated patronage increase	Growth of 16,000 to 87,000 boarding per annum (Leongatha line only)	Growth of 28,000 to 138,000 boarding per annum (includes Leongatha, Cowes, Inverloch & Yarram)
Those surveyed that rated the reintroduction of a passenger train service as their main priority	17%	20%
Those surveyed that were more interested in better service frequency, more direct services, more weekend services and shorter travel times	83%	80%

11.3.2. Freight Market

The major findings of the Freight Market studies are outlined in Table 1-2 below:

Table 11-2: Comparison of Rail Freight Tonne Estimates

Commodity	Estimated tonnes (2000)	Potential to capture to rail	Estimated tonnes (2005)	Potential to capture to rail
Construction sand	2,000,000	Yes	2,050,000	No
Export Dairy	150,000	No	220,000	No
Grain	150,000	Yes	Nil	No
Forestry	200,000	No	Nil	No
Total	**2,500,000**		**2,270,000**	

The 2005 Freight Market Assessments[21] identified potential rail freight tonnage for the Leongatha Line but it is considered that the suppliers would be unlikely to switch to rail because:

- It is unclear who would fund the capital cost for the freight terminals and sidings to load and unload the freight;
- All the existing freight traffic is currently on road and there would need to be some financial incentive, such as a reduction in freight rates (of approximately 10%), to switch to rail;

[21] Sinclair Knight Merz, 2005, *South Gippsland Rail Line Freight Opportunities*, SKM, Melbourne.

- It will be difficult to provide competitive rail freight haulage rates compared with road haulage rates because of:
    - The additional capital cost required to reinstate/construct sidings and loading and unloading facilities that will have to be included in the rail freight rates; and
    - Road being more cost effective over shorter haulage distances like that between Leongatha and Melbourne, particularly where B-doubles are deployed.
- There are a number of other interrelated issues that would need to be resolved to get suppliers to shift from road to rail i.e. train paths in the metropolitan network, terminal lease conditions, etc.

11.3.3. Engineering Costs

The engineering assessment undertaken in 2000[22] determined that the cost to reinstate passenger rail services between Cranbourne and Leongatha was $5.6 million[23], plus a further $19.65 million of maintenance works on the line over the first 10 years of passenger train operation. The 2000 assessment was a scoping study and was not done to the same level of detail as the subsequent engineering assessments. Consequence the cost estimate did not fully consider the extent of work required to reinstate the rail line to an appropriate standard for passenger trains.

In 2005 and 2006 independent consultants Asia Pacific Rail and George Deutsch Consulting were engaged by the Department of Infrastructure to undertake more detailed engineering assessments to reinstate passenger rail services between Cranbourne and Leongatha. These engineering assessments covered track, bridges and culverts, level crossings, signals, stations and train radio.

The track between Cranbourne and Nyora has had no maintenance for 10 years and no major maintenance cycle for 17 years. The track between Nyora and Leongatha has been under minimal maintenance for 13 years and since 1994 has received approximately 3,000 sleepers (10% insertion rate) to make it “fit for purpose” to operate South Gippsland Tourist Railway tourist trains over the line.

Key assumptions used in the detailed cost estimate are:

- Sleeper replacement rate of 70% of all existing sleepers;
- There are approximately 1,600 sleepers per kilometre along the line;
- Ballast depth of 100 mm is required to restore the track formation base;
- Additional ballast would be required to rectify numerous formation subsidence’s and failures along the line;
- Replacement platforms or platform rehabilitation would be required at most locations;
- A minimum of 50% of bridge timbers would need to be replaced on bridges between Cranbourne and Nyora;
- The majority of culverts will need to be cleared, cleaned and restored; and
- All level crossings would need to upgraded or rehabilitated.

[22] Asia Pacific Rail, (2000), Leongatha and Mildura Rail Infrastructure Assessment – Leongatha Final Report, Asia Pacific Rail, Melbourne.
[23] Department of Infrastructure, 2001, *Feasibility study on the re-introduction of passenger rail services to South Gippsland,* Department of Infrastructure, Melbourne

The estimated cost to restore the Leongatha line for the reintroduction of passenger rail services is outlined below:

Table 11-3: Estimated Total Asset Upgrade Costs

Task/Asset Upgrade	Estimated Upgrade Cost $M
Vegetation & Clearance	1.0
Bridges & Culverts	11.2
Track	43.0
Level Crossings	10.0
Stations & Platforms	3.8
Train Radio	2.7
Total	**71.7**

In addition to the $71.7 million upgrade costs there would be a further $1.8 million each year in safeworking and train operating costs to reinstate passenger train services on the Leongatha line.

The Cost Benefit Analysis, which compared the existing Leongatha Road Coach services (the Base Case) against the restoration of rail infrastructure and the reintroduction of passenger services (the Rail Option), concluded that:

- The most likely Rail Option (i.e. 3 return services per day with the AM and PM Peak services connecting with suburban trains at Dandenong) outcome has a Net Present Value (NPV) of negative $102 Million, indicating it is not an economically viable option in comparison to the Base Case coach option.
- Other cases examined in the sensitivity test process improved the performance of the Rail Option but even under the most optimistic and unlikely outcomes the NPV remains negative and is not an economically viable option.

12 Appendix 1 – Economic Analysis

Introduction

The project for reintroducing a rail line and delivering passenger rail services to Leongatha is based on a previous business case undertaken in 2001. The purpose of this study is to update the business case and critically assess whether any changes in recent years have changed the conclusions of that business case.

This study scope of economic analysis is to consider only the costs and benefits of reintroducing the rail link for passenger services. No additional costs and benefits from freight transport have been included.

Purpose of this report

The purpose of this report is to outline economic analysis carried out for the Leongatha rail line. This includes confirmation of the:

- Options assessed, and the
- Economic parameters and framework for assessing each option.

The economic framework for each option is different based on the mode of transport comparing road with rail, however each option contains the following broad categories:

- Capital Expenditure
- Operational Expenditure
- Revenue
- User Costs
- Non-user Benefits (Project Option Only)

Options to assess

There are two main options to assess:

- The Base Case – Continuation of the Coach Service, No Rail Solution
- The Rail Option – Construction of the rail line and re-introduction of passenger rail services

The Base Case Economic Framework

The economic framework for the road base case is set out in the following table.

Category	Economic Costs/Benefits
Capex	• Sustaining capital from procurement of road coaches
Opex	• Fuel • Servicing and Maintenance

	• Tyres • Drivers • Cleaning
Revenue	• Fare Revenue
User Costs (from coaches)	• Greenhouse Gas Emissions • Other Emissions • Congestion • Accidents

The Rail Option

The economic framework for the rail option is set out below:

Category	**Economic Costs/Benefits**
Capex	• Infrastructure construction costs including o Rail Line Construction o Train Radio o Level Crossing Upgrades o Station Upgrades • Rolling Stock Capital
Opex	• Fuel • Servicing and Maintenance • Tyres • Drivers • Conductors • Cleaning • Track Access
Revenue	• Fare Revenue
User Costs (from rail)	• Greenhouse Gas Emissions • Other Emissions
Non-User Benefits (from reduced car usage)	• Congestion • Accidents • Pollution

Method of Analysis

Net Present Value Analysis

The project option for rail will be compared against the base case using the Net Present Value method. A positive economic NPV would recommend that State Government should invest in the project and a negative NPV would recommend that the State Government should not invest.
The real discount rate or real expected rate of return used to bring all future cash flows to the present value will be assumed constant at 6%, which is consistent with other economic infrastructure projects.
All cost will be presented in 2007/08 Real $A.
The internal rate of return will also be calculated and a number of sensitivities on the discount rate will be undertaken on the NPV analysis.

Patronage Report

A number of marking studies have been completed to assess the potential market for rail re-introduction in the Leongatha corridor. The three major studies completed are:

- *South Gippsland Rail Review - Passenger Service Demand Assessment*, Booz Allen Hamilton, 2000
- *Estimation of Demand for Rail Services for Leongatha Line*, Pathfinder Solutions, 2005
- *Reintroduction of Rail Services on the South Gippsland Line - Demand Survey Report*, Market Solutions Pty Ltd, 2006

Each of these studies has different conclusions in terms of likely patronage of a reintroduced rail service. The patronage figures developed are shown in the table below.

Report	**Patronage**		
	Low	Medium	High
Booz Allen Hamilton	78,800	88,750	93,700
Pathfinder Solutions	40,133	137,959	213,075
Market Solutions		160,000	263,300

These figures represent the patronage in the year immediately following rail reintroduction. A growth rate is applied to these figures to obtain an estimated patronage for future year scenarios. The growth rates used are taken from VLine data for the Traralgon corridor, and are shown in the table below.

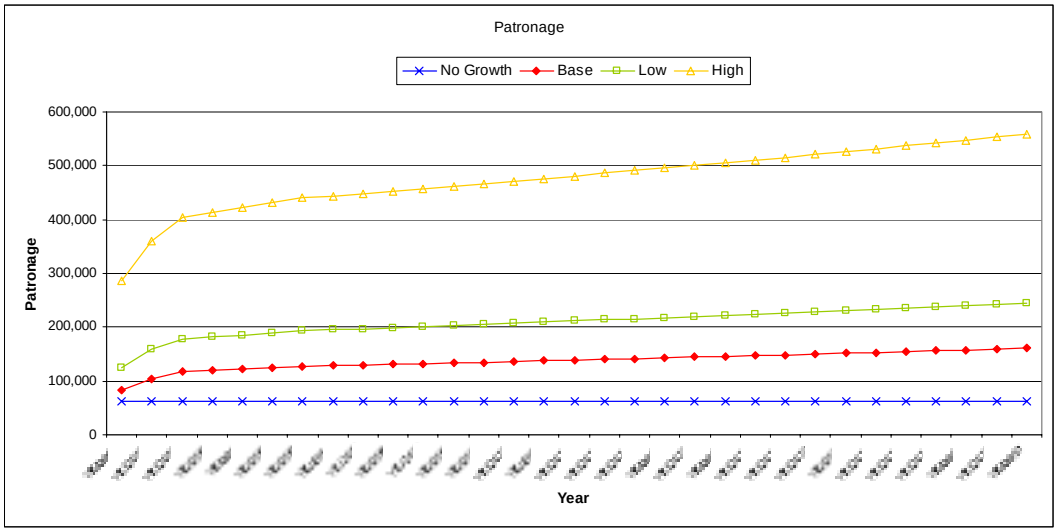
Year Ending	**Growth Rate**
2007	34.1%
2008	25.9%
2009	12.5%
2010	2.1%
2011	2.1%
2012	2.1%
2013	2.1%
2014 - 2037	1.0%

Three patronage cases are considered in the sensitivity analysis.

The base case is representative of what is expected to occur on the coach service should the rail option not be implemented. The base case uses the current patronage volumes, which are then grown using the above growth rates.
The low case represents the patronage case considered most likely to occur following implementation of the rail service. It uses the Booz Allen Hamilton high patronage case, grown using the above growth rates.

The high case represents an unrealistically high patronage case, and uses the Pathfinder Solutions high patronage case, grown using the above growth rates. It is considered an unrealistic case because it would involve 347% growth of the current coach patronage.

A graph and table of these patronage figures are shown below.



Year	VLine Patronage	No Growth	Base	Low	High
		61,463	61,463	93,700	213,075
YEJ2007	34.1%	61,463	82,422	125,652	285,734
YEJ2008	25.9%	61,463	103,769	158,195	359,739
YEJ2009	12.5%	61,463	116,740	177,970	404,706
YEJ2010	2.1%	61,463	119,192	181,707	413,205
YEJ2011	2.1%	61,463	121,695	185,523	421,882
YEJ2012	2.1%	61,463	124,250	189,419	430,742
YEJ2013	2.1%	61,463	126,860	193,397	439,787
YEJ2014	1.0%	61,463	128,128	195,331	444,185
YEJ2015	1.0%	61,463	129,410	197,284	448,627
YEJ2016	1.0%	61,463	130,704	199,257	453,113
YEJ2017	1.0%	61,463	132,011	201,250	457,644
YEJ2018	1.0%	61,463	133,331	203,262	462,221
YEJ2019	1.0%	61,463	134,664	205,295	466,843
YEJ2020	1.0%	61,463	136,011	207,348	471,511
YEJ2021	1.0%	61,463	137,371	209,421	476,226
YEJ2022	1.0%	61,463	138,745	211,515	480,989
YEJ2023	1.0%	61,463	140,132	213,631	485,799
YEJ2024	1.0%	61,463	141,533	215,767	490,657
YEJ2025	1.0%	61,463	142,949	217,925	495,563
YEJ2026	1.0%	61,463	144,378	220,104	500,519
YEJ2027	1.0%	61,463	145,822	222,305	505,524
YEJ2028	1.0%	61,463	147,280	224,528	510,579
YEJ2029	1.0%	61,463	148,753	226,773	515,685
YEJ2030	1.0%	61,463	150,241	229,041	520,842
YEJ2031	1.0%	61,463	151,743	231,331	526,050
YEJ2032	1.0%	61,463	153,260	233,645	531,311
YEJ2033	1.0%	61,463	154,793	235,981	536,624
YEJ2034	1.0%	61,463	156,341	238,341	541,990
YEJ2035	1.0%	61,463	157,904	240,724	547,410
YEJ2036	1.0%	61,463	159,483	243,131	552,884
YEJ2037	1.0%	61,463	161,078	245,563	558,413

Freight

Previous economic analysis of the Leongatha rail extension have included the benefits of transferring some of the larger freight volumes from road to rail, using intermodal shipping containers and reach stackers to lift the containers between road and rail.

However, the feasibility of several of these options and cost to private industry has not been assessed. It was not recommended to include the benefit of freight transport without a detailed feasibility study that compared the difference in cost between road and rail and whether there is enough incentive for the private industry to invest. A sensitivity analysis of the impact of different freight volumes using the rail has been demonstrated.

Services Provided

Rail Services

The proposed Leongatha rail service will operate the following weekday services:

- 1 morning peak service in both directions between Dandenong and Leongatha

- 1 midday service in both directions between Southern Cross Station and Leongatha
- 1 afternoon peak service in both directions between Dandenong and Leongatha

The weekend services to Leongatha will include 3 services per day between Southern Cross Station and Leongatha.

Coach Services

Coach services are considered as a base case for comparison, and as such the existing service from Leongatha is presented. Peak weekday services operate between Leongatha and Dandenong, with off-peak services operating between Leongatha and Southern Cross Station.