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Introduction

In 2011, the Victorian Government committed to examine the feasibility of returning passenger rail services on the 250km of lines between Geelong, Ballarat and Bendigo (via Maryborough and Castlemaine) – the Rail Revival study.

Over the last year the Rail Revival study has investigated the potential to:

> Upgrade the existing line between Geelong and Ballarat to cater for regular passenger rail services, and reactivate disused railway stations at Bannockburn, Lethbridge, Meredith and Lal Lal
> Enhance existing passenger rail services between Ballarat and Maryborough
> Reactivate the line between Maryborough and Castlemaine for regular passenger rail services, and reactivate disused railway stations at Carisbrook and Newstead
> Improve line capacity between Castlemaine and Bendigo.

In doing this, the study has:

> Commissioned aerial photography and feature surveys of the rail corridor
> Undertaken detailed condition assessments of:
  > railway bridges
  > railway track
  > disused railway stations.
> Inspected and determined works required at level crossings
> Interviewed existing rail and bus passengers
> Conducted origin – destination surveys
> Developed patronage forecasts
> Prepared indicative rail service plans (timetables)
> Prepared track, civil and architectural drawings
> Prepared project delivery cost estimates
> Assessed the benefits and costs of a potential Rail Revival: Geelong-Ballarat-Bendigo project.
> Prepared an indicative delivery programme.

This report summarises the findings of the study.
Figure 1: Context map: Geelong–Ballarat–Bendigo rail corridor
1. Background

1.1 Strategic context

The Rail Revival study forms part of the ‘Midland Arc’ strategy and the Victorian Government’s Transport Solutions framework, which aims to boost the efficiency and productivity of Victorian industry and enhance regional growth.

The “Midland Arc” generally follows the alignment of the Midland Highway from Geelong to Ballarat, Maryborough, Castlemaine, Bendigo, Shepparton and Benalla (and Mansfield). This corridor contains four of the ten largest regional cities in Victoria and a relatively dense settlement of small towns and villages. Some peri-urban growth areas fall within this arc. By 2050 it is expected the population of the Arc corridor will be approximately 1 million people.

In undertaking the Rail Revival study, the Victorian Government has referenced relevant regional strategic plans developed by local councils and communities. These describe key challenges and priorities for local government and communities in the Midland Arc region, and include the:

> Central Highlands Regional Strategic Plan
> Southern Loddon Mallee Regional Strategic Plan
> G21 Regional Strategic Plan.

These plans highlight the importance of identifying opportunities within the Midland Arc to manage and facilitate settlement growth and regional development. They also articulate short, medium and longer term priorities to enhance freight and public transport connectivity in this region.
1.2 History

Passenger rail services between Geelong, Ballarat and Bendigo were withdrawn in the late 1970s – due to a lack of adequate rolling stock, out-dated infrastructure, and a developing culture for a preference to travel by car.

The Geelong – Ballarat passenger rail service was replaced by a bus service in November 1978 – after the railcar working the line came to the end of its operable life. Some loco-hauled trains were run in place of the railcar in the last few weeks of November 1978, before being substituted by a bus. The rail service was not officially replaced by the road service until around 1981, even though no passenger train had run on the line for some time.

The Maryborough – Castlemaine passenger service was withdrawn in July 1977, also being replaced with a bus service. The track was closed in 2004.

The withdrawal of the passenger services between Geelong and Ballarat, and the decommissioning of the Maryborough – Castlemaine line means that there is no direct passenger rail link between Geelong, Ballarat and Bendigo.

Since the removal of these services in the 1970s, the populations of these centres have increased by between 14% and 49%, as shown in Table 1.

To provide for high speed passenger trains on the Melbourne-Bendigo line, track upgrade works in 2006 removed the second track from 22 km of the 36 km long corridor between Castlemaine and Bendigo. Although passenger services can now run at speeds of up to 160km/h, the long sections of single line track limit the capacity of this line to its current service frequencies.

Table 1: Regional city populations since the removal of passenger services

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<tbody>
<tr>
<td>Geelong</td>
<td>126,795</td>
<td>127,143</td>
<td>129,977</td>
<td>128,307</td>
<td>131,295</td>
<td>137,220</td>
<td>143,921</td>
<td>14%</td>
</tr>
<tr>
<td>Ballarat</td>
<td>65,600</td>
<td>66,997</td>
<td>67,958</td>
<td>68,084</td>
<td>71,618</td>
<td>78,221</td>
<td>85,935</td>
<td>31%</td>
</tr>
<tr>
<td>Bendigo</td>
<td>55,665</td>
<td>58,351</td>
<td>62,608</td>
<td>64,381</td>
<td>67,600</td>
<td>76,051</td>
<td>82,794</td>
<td>49%</td>
</tr>
<tr>
<td>Victoria</td>
<td>3,832,443</td>
<td>4,019,468</td>
<td>4,244,225</td>
<td>4,373,520</td>
<td>4,644,950</td>
<td>4,932,422</td>
<td>5,354,042</td>
<td>40%</td>
</tr>
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</table>

To travel between Geelong, Ballarat and Bendigo on public transport today, passengers must either travel via Melbourne by rail, or V/Line cross-country buses.

The rail corridor between Castlemaine and Bendigo is currently provided with approximately 18 weekday services in each direction running at speeds of up to 160km/h.

A V/Line bus service operates four times a day in each direction between Maryborough and Castlemaine.

V/Line also provides a bus service twice per day between Maryborough and Ballarat – this includes the overnight bus from Mildura. In addition to this, a single rail service now operates out of Maryborough in the morning, bound for Ballarat and onto Melbourne, with a single return rail service into Maryborough in the evening.

The only direct public transport link between Geelong and Ballarat is a V/Line coach service running twice per day.
1.4 Regional socio-economic demographics

The socio-economic characteristics of each section of the Rail Revival corridor differ significantly. In particular, there is a clear distinction between the Geelong – Ballarat and the Ballarat – Bendigo sections of the corridor.

The Geelong – Ballarat section is characterised by strong positive growth trends in all age brackets, and is comparatively socially advantaged. This suggests that over time there will be an increasing need for access to public transport, particularly for employment opportunities, in this section of the corridor.

Bannockburn, 22 km from Geelong in the Golden Plains Shire, has experienced substantial growth as a commuter town – housing commuters working in Geelong and Melbourne. As such, much of Bannockburn’s future sustainable growth is dependent on the linkages with Geelong being enhanced.

In 2011, Bannockburn had a town population of 3,513. Commuters living in Bannockburn and working in Geelong are limited to the V/Line coach service or private car to make this commuter journey. At present the public transport (V/Line coach) timetabling to and from Bannockburn is mismatched with traditional work starting times, with Bannockburn commuters unable to use the service for convenient and timely travel to and from their workplace in Geelong.

Compared to the Geelong-Ballarat corridor, the area between Ballarat, Maryborough and Castlemaine has a generally older population, and is less socially advantaged. This can mean that those individuals who are least equipped to cater for their commuting and other travel needs through private means are impacted. Current projections in this section show a more significant ageing trend, suggesting minimal population growth and potential social isolation. Accessible public transport will therefore play an important role in providing the community with access to social networks, services and health care.

Maryborough, in the Shire of Central Goldfields, has experienced prolonged social disadvantaged, as reflected in SEIFA (Socio Economic Index For Areas). The Shire of Central Goldfields has stated it believes this social disadvantage was somewhat perpetuated by poor transport connections with other regional centres, both by rail and road.

The passenger rail service was recently reactivated between Maryborough and Ballarat (and onto Melbourne), providing one journey out of Maryborough in the morning, and one return journey in the evening. As this service does not provide inward journeys into Maryborough during the day, it limits the line’s potential to act as a tourist, social or business attractor for Maryborough.

Ballarat and Central Goldfields Shire Councils argue that a major challenge Maryborough had in recruiting highly skilled people was that there often wasn’t a job available for their equally highly skilled partner. The transport barriers to other regional centres where a partner could work were often perceived as excessive, and as such the couple would choose to locate elsewhere.
Major centres
Intermediate towns

- Newstead
- Talbot
- Carisbrook
- Creswick
- Clunes
- Meredith
- Lal Lal
- Bannockburn
- Lethbridge
1.5 Land use

The regional cities along the corridor are complex economic centres with a mixture of land uses.

Education

Land uses important to the area include the university campuses that are located in southern Bendigo, southern Ballarat, south-western Geelong and Creswick.

Agriculture

Most of the rural land is used primarily for agricultural grazing, although new uses such as intensive animal husbandry, industrial redevelopment and wind farming are emerging – particularly in the south-eastern corner of Golden Plains Shire.

Parks and reserves

State forests and conservation areas in the region include the Lal Lal forest, reservoir catchment and waterfall reserves, the Brisbane Ranges National Park, Mount Beckworth Scenic Reserve, Paddys Ranges State Park (and nearby Maryborough state forests) and the Castlemaine Diggings National Heritage Park.

Local services

The smaller townships along the corridor are of similar size. They typically provide services including primary schools, general stores, local recreation facilities and small-scale retail businesses that target passing traffic on the Midland Highway.

Heritage

Gold-rush era heritage is of important historical value in the areas north of Ballarat, but also a constraint on land use and potential development.
2. Infrastructure constraints

The condition of the existing 250 kms of track, bridges, culverts, and disused stations along the Geelong to Bendigo rail corridor was examined in order to determine necessary infrastructure works to enable the reintroduction of passenger services.

2.1 Bridge and culvert condition

The bridge investigation included:
- a review of the current condition of bridges and culverts
- a review of the capacity of bridges to support VLocity trains up to a line speed of 160km/h
- identifying bridges and culverts which would require further work to bring them up to an acceptable standard for carrying higher speed passenger trains
- recommending remedial works required to meet acceptable standards for passenger trains.

There are 77 railway bridges and 14 road overbridges or footbridges in this rail corridor with a variety of structures and materials, including:
- timber or concrete deck on steel or wrought iron beams
- prestressed concrete deck beams
- rail slabs
- masonry arches (nearly all are heritage protected in Victoria)
- reinforced concrete box culverts
- corrugated steel pipes (Armco).

Most of the bridges in this corridor are located between Ballarat and Castlemaine. They are among the oldest railway bridges in Victoria, with the majority of masonry arch bridges built circa 1860. Bridge conditions vary; some are in a condition suitable for commuter rail, some require only regular monitoring, and some require works, with estimated costs ranging between $500 (to remove debris) and $850,000 for replacement decking.

There are 448 culverts in the Geelong – Bendigo rail corridor. They incorporate a variety of structures and materials, including:
- earthenware pipes
- reinforced concrete pipes
- reinforced concrete box culverts
- stone box culverts
- armco multi-plate steel pipes
- stone arch culverts
- brick arch culverts
- brick barrel culverts.

Culvert investigations largely focused on the disused Maryborough – Castlemaine line. The findings suggest that none of the culverts require urgent maintenance, but some may require further monitoring. The most common issue during the inspection was the influx of plants, dirt and other materials within the structures.

The brick arch and barrel culverts generally need non-urgent mortar replacement, and the costs for these works could potentially range from $5000 for minor upgrades to $20,000 for strengthening and other works.
2.2 Track condition and civil infrastructure constraints

The track investigation included:

- identifying constraints and recommending actions to enable increased line speeds between Geelong and Ballarat
- evaluating the condition of passing loops between Geelong and Maryborough and determining their suitability for reactivation and extension
- evaluating the condition of the existing track between Maryborough and Castlemaine
- identifying sections of existing track between Maryborough and Castlemaine that might be capable of supporting a passenger service, indicating any remedial works required
- identifying sections of track which would require complete replacement.

Currently, the Geelong – Ballarat line is only utilised for freight services, which have different standards and speed requirements to those required for passenger services. The Geelong – Ballarat section and the Maryborough – Castlemaine section would require considerable work in order to handle passenger train services.

Geelong – Ballarat

The Geelong – Ballarat track was recently upgraded, providing a line speed of 80km/h for freight services. Track suitable for operating freight services at 80km/h is usually suitable for passenger trains operating at higher speeds.

North Geelong Stabling Yards

The previous “Ballarat Main Line” through the North Geelong Yards was decommissioned in 1980, around the time the Geelong – Ballarat passenger train service was withdrawn.

Since decommissioning, a number of turnouts with hand-operated points have been installed on these lines between North Geelong Station and west of Thompson Road.

These connections effectively make the former main line tracks freight sidings within the North Geelong West Yard. As a result the current operating speed along this 2.6 km section is limited to between 15km/h and 20km/h.
North Geelong – Gheringhap line capacity

There is only a single track for broad gauge trains between North Geelong and Gheringhap, which is shared with standard gauge trains. Line speed for broad gauge services in this section is limited to 80km/h due to operational restrictions associated with the dual gauge track.

This ARTC controlled section accommodates both broad gauge trains between Geelong and Ballarat, and standard gauge services between Geelong and Adelaide – the sole interstate rail connection between Melbourne and Adelaide. During 2011, ARTC augmented this single track with two standard gauge passing loops between Thompson Road and Ballan Road. Although this provides additional flexibility for standard gauge services, Geelong – Ballarat broad gauge services cannot use these additional tracks.

There are approximately 15 standard gauge services timetabled on the North Geelong – Gheringhap line per day. There is an average of 2-3 broad gauge freight services using this track per day to travel between Geelong and Ballarat. The indicative service plan prepared as part of this study timetables between 8 and 14 additional passenger services through this section of track per day.

This section of track presents one of the biggest constraints on the Geelong – Bendigo corridor for the reintroduction of passenger services.

The reintroduction of passenger services would need to make sure that existing services were not adversely affected. To ensure that all services in this 9 km section of shared track could be accommodated, provision of an additional track may be required.

Gheringhap – Ballarat

This section of track would be suitable for 130km/h passenger services, providing the following is made:

- cant adjustments to existing curves
- upgrades to level crossings
- alteration of the track maintenance regime.

By replacing the existing timber sleepers with concrete sleepers, passenger service speeds could be increased up to 160km/h. However, there are two curves south of Lal Lal and four south of Warrenheip Junction that would not be suitable for speeds over 130km/h due to track geometry.

Ballarat – Maryborough

A daily return passenger service currently operates between Maryborough and Ballarat. Following signalling upgrades, which are currently underway, the maximum line speeds for passenger services on this corridor will increase to 130km/h. However, the geometry of track alignment in this section imposes speed restrictions due to some low radius curves. Approximately 50% of the 69 km of track has a geometric speed limit of 115 km/h or less.

Current curves in the track alignment along stretches of the line near Creswick, Clunes, and Maryborough limit speeds to between 65km/h and 80km/h, so considerable realignment works would be required if constant speeds above 80km/h were to be achieved. To enable speeds of higher than 130km/h, the existing timber sleepers would need to be replaced by concrete sleepers.
Maryborough – Castlemaine

The line between Castlemaine and Maryborough was opened in 1874, with the last passenger services being withdrawn in 1977. The line still continued to cater for freight and special services until 2004 when the Castlemaine – Maryborough line was booked out of service. The 35 km of track between Maldon Junction and Moolort has not been used since this time, and has fallen into disrepair.

The Victorian Goldfields Railway continues to use a one kilometre section of track between Castlemaine station and Maldon Junction for tourist railway operations to Maldon.

A 17km section of line between Maryborough and the ballast siding and grain silo at Moolort was active for freight services with a reduced line speed of 25km/h until 2010.

The floods of late 2010 and early 2011 have caused further damage to several sections of the track structure between Maryborough and Castlemaine. The track is currently unusable for passenger and freight services.

To bring the Maryborough – Castlemaine line up to a standard capable of supporting passenger or freight services, a significant investment would be required to upgrade track infrastructure, including:

> reconstruction of damaged formation, capping layer and ballast (the stones and materials used to support tracks), new (concrete) sleepers, rail and fastenings
> minor realignment and regrading of track
> cleaning of drains along the side of the tracks
> measures to prevent erosion and land slippage.

Generally, the geometry of the existing track between Maryborough and Newstead could reach speeds of up to 160 km/h, with only a few low-speed curves requiring realignment.

However, due to tight curves, it is unlikely that the Newstead – Castlemaine section would be suitable for passenger train speeds above 100km/h, except in some limited sections. To increase speed, there is 24 km of track that would require a degree of realignment to eliminate some tight curves and grades of 2% (1 in 50) or steeper. This would include:

> realignment and easing of the steepness of grades to enable best, practical operating speeds
> reconstruction of track drains
> improvements to prevent erosion and slippage using flat slopes, netting, the use of plants and other means.

There are 31 bridges in this section that are 40 to 140 years old, as well as two newer bridges.

The majority of the older bridges have some decaying timber decks, and severe corrosion of the top flanges. While the corrosion has not yet affected the strength of the bridges, it is recommended that work be carried out to repair or replace the defects.

Some of the bridges show the effects of the 2011 floods. Four bridges also show the effects of fire damage, and would need repair or replacing in order to reopen the line.

Castlemaine – Bendigo

The section between Castlemaine and Bendigo previously had two tracks. Due to track upgrade work carried out by the Regional Fast Rail Project (2006) to provide for high speed passenger trains, many sections of the second track were removed where clearance constraints existed around road-over-rail bridges. As a result, line capacity is currently constrained. New structure clearance requirements, and the existing offsets to bridge abutments (road over rail) prohibit track re-duplication without very large investments.

The track arrangement between Castlemaine and Bendigo now comprises a combination of single and double track sections with a general line speed of 160km/h.

There are five masonry arches, five deck-on-beam bridges and one rail slab in this section of the corridor. Many of the masonry arches are heritage protected, constraining bridge modification.

For the railway bridges (rail-over-road), the low parapets on both sides of the bridge would present a constraint to track re-duplication and would likely be required to be cut back.

The only tunnel in this section is Big Hill Tunnel. Reinstatement of a second track in this tunnel would be constrained by:

> current track and structure clearance standards
> the tunnel’s existing internal diameter
> a heritage listing – any modifications to the tunnel or bridges would require approvals from heritage authorities.
2.3 Station conditions

On-site station condition audits were conducted at Bannockburn, Lethbridge, Meredith, Lal Lal, Carisbrook, Newstead, Harcourt, and Golden Square railway stations.

The existing buildings, platforms and other structures were inspected. Recommended actions were provided to:

- ensure the buildings did not fall into further disrepair
- enable the reactivation of the stations for passenger use.

The stations were reviewed against the appropriate railway, building and disability standards. This included checking for access (including access ramps and sufficient car parking), space for features such as waiting rooms, and public and staff amenities. In addition to assessing current structures for basic building safety and useability requirements, the audit indicated the measures required to maintain or enhance historical features.

**Bannockburn**

Bannockburn station is located between Geelong and Ballarat and currently operates as a Bed and Breakfast. The bluestone station building is in sound structural condition and there are extensive established gardens.

**Lal Lal**

Lal Lal station is located between Geelong and Ballarat and is currently vacant. The main bluestone station building is in sound structural condition.

**Lethbridge**

Lethbridge station is located between Geelong and Ballarat and is currently vacant. The main bluestone station building is in sound structural condition.

**Meredith**

Meredith station is located between Geelong and Ballarat and is currently leased as a private residence. The main bluestone station building is in sound structural condition.

**Carisbrook**

Carisbrook station is located between Maryborough and Castlemaine and is currently vacant. Although the structure of the brick station building is in a sound condition, significant asset rectification and replacement works would be required to the building fabric, both external and internal due to a lack of ongoing maintenance, water damage and extreme termite activity.
Newstead
Newstead station is located between Maryborough and Castlemaine and is currently vacant. The structure of the main brick station building is in overall sound condition.

Harcourt
Harcourt station is located between Castlemaine and Kangaroo Flat and is currently leased as private residence. The station building of brick construction appears to be in good condition and well maintained.

Golden Square
Located in Bendigo, this station closed in 1981 and is currently commercially tenanted.

The weatherboard station building and platform would require significant remedial works to enable the site to function as an operating railway station.

Other stations
The Moorabool station building (located between Geelong and Ballarat) was sold 30 years ago and is not currently being considered for reactivation.

Elaine, Yendon, Guildford, and Campbell were former stations on the corridor. These station buildings were demolished many years ago, and are not being currently being considered for reactivation.
2.4 Level crossings

Between Geelong and Ballarat there are:

> 13 passively protected crossings
   ("Give Way" or "Stop" sign)
> 5 actively protected crossings
   (bells and flashing lights)
> 6 actively protected crossings
   (boom gates, bells and
   flashing lights).

All level crossings would need to be upgraded to actively protected level crossings (boom gates, bells and flashing lights), gated, or closed to enable the reintroduction of a regular passenger service and comply with current rail safety requirements.

Between Ballarat and Maryborough there are:

> 49 existing level crossings.

All existing crossings along this corridor have either been upgraded to active protection (boom gates, bells and flashing lights), gated, or closed over the last two years as part of the Maryborough line upgrade.

Between Maryborough and Castlemaine there are:

> 8 unprotected crossings
> 24 passively protected crossings
> 7 actively protected crossings
   (bells and lights).

All level crossings would need to be either upgraded to actively protected level crossings (boom gates, bells and flashing lights), gated, or closed to enable the reintroduction of a regular passenger service and comply with current rail safety requirements.

Castlemaine – Bendigo

All existing level crossings along this corridor were upgraded to acceptable rail standards as part of the Regional Fast Rail (RFR) project in 2006.
2.5 Operational constraints

There are limited passing opportunities for freight services to cross between Geelong and Maryborough following the decommissioning of the Meredith, Lal Lal, Sulky, and Tourello passing loops. Between Gheringhap and Ballarat, only Gheringhap and Warrenheip passing loops are available. There are no passing loops currently active between Ballarat and Maryborough.

The lack of crossing or passing loops prevents existing freight and potential passenger trains travelling in both directions simultaneously. This limits the capacity of the line, and imposes operational constraints for grain freight services in the harvest season and restricts paths available for passenger services.
2.6 Environmental constraints

A preliminary investigation of existing environmental conditions along the rail corridor was undertaken in 2011. This desktop study captured available information from the Department of Transport, government registers, and a range of publicly available data.

The following summarises the environmental factors investigated as part of the study.

**Geotechnical**

A number of geological features exist in the corridor that could potentially impact rail design and construction, and would require management with appropriate engineering. These include:

- reactive soils
- rock fall
- abandoned mine shafts
- soft compressible soils
- soils unsuitable for re-use
- seismic activity due to geological faults.

As there is currently a lack of existing site-specific geotechnical data, a detailed site investigation would need to be undertaken for any new structures, structure upgrades and sections of track that are proposed to be realigned or duplicated.

**Contaminated land**

The main potential sources of contamination (not necessarily classified as major sources) identified along the Rail Revival corridor include:

- the storage, handling and disposal of chemicals
- fuel and liquid waste and potential leakage of stored goods
- potential use of pesticides, herbicides and agricultural fertilisers
- mining activities during the Goldfields Railway era of the late 1800s
- fill material associated with sections of the railway formation, levelling of land and disposal / re-use of construction debris.

Other potential sources of contamination identified include the past use of turntables, locomotive depots, coal stands, oil unloading points, ash pits, goods sheds and maintenance sheds at the five main centres along the corridor (Geelong, Ballarat, Maryborough, Castlemaine and Bendigo).

**Hydrology**

The majority of the existing railway line is located above declared flood levels and has not been overtopped in recorded flood events. However, the Carisbrook line and station were inundated by floodwaters during the September 2010 and January 2011 flood events.

**Flora and fauna**

A range of ecological constraints exist within the Geelong – Bendigo rail corridor, or derive from adjacent landscape types and land uses, such as State Parks and watercourses. Should the project proceed to detailed design, a more complete understanding of ecological conditions within the corridor would need to be undertaken.

**Cultural heritage**

To ensure culturally and historically significant locations would be recognised and protected, archaeological and heritage experts were engaged to survey the rail corridor, as well as a buffer zone of 100m. A number of historically listed sites of architectural, historical, scientific, social, and aesthetic significance such as railway stations and bridges have been identified.
Geelong – Ballarat heritage constraints
Ballarat – Maryborough heritage constraints

- Mariners Reef
- Main Lead Puddler
- Workhouse Gully
  Alluvial Mining Precinct
- Scandinavian Lead & Rock Flat Lead Workings
- Lothair Mine
- Mines
  - New Australian
  - Creswick Deep Lead
  - Lady Pomeroy
  - High Junction
  - Grand Trunk
  - Junction
  - Imperial
  - Pomeroy
- Calembeen Park
- Maryborough Railway Station
- Maryborough
- Maryborough Railway Station
- Talbot Railway Station Precinct*
- Clunes Railway Station Precinct*
- Creswick Railway Station
- Ballarat Railway Station
- Ballarat

* Heritage Overlay
Maryborough – Castlemaine heritage constraints
Castlemaine – Bendigo heritage constraints
3. Strategic considerations

3.1 Increased line speed potential

Also considered and investigated in the study were methods to improve journey time between centres through increasing line speeds to 160km/h between Ballarat, Maryborough and Castlemaine. The remaining sections of the study area are already running at speeds of 160km/h or are geometrically capable of running at 160km/h.

Maryborough – Castlemaine

The current track alignment between Maryborough and Castlemaine (first opened in 1874) imposes speed constraints due to sharp bends in the alignment. Designs have been prepared to realign and ease curves along this section to increase line speeds up to 160km/h between Maryborough and Joyces Creek, and lower speeds between Joyces Creek and Castlemaine. Land acquisition (not affecting houses) would be required to accommodate some of these realignments.

The track between Maryborough and Castlemaine has been closed for a number of years, is in poor condition, and is currently unusable; therefore installation of new track would be required to provide for any functioning passenger service.

If the track is rehabilitated on the existing alignment, and the realignments to increase line speed were provided at a later stage, this initial programme of works would ultimately provide (and fund) redundant infrastructure.

If the new track is installed on the “ultimate” alignment initially, there will be no wasted or redundant infrastructure installed, saving funds in the long term. It is currently estimated that an additional $50-$83 million would be required to accommodate this new alignment in full.

Ballarat – Maryborough

Designs have also been prepared to realign and ease curves on the existing track alignment on the Ballarat-Maryborough corridor enabling an increase in line speeds up to 160km/h. Land acquisition (not affecting houses) would be required to accommodate some of these realignments.

As there is already a functioning line between Ballarat and Maryborough, any deviations or realignments to the existing alignment are not time dependant. If no track realignment occurs on this corridor – the line still adequately functions (albeit to a constrained speed along certain sections). These deviations could be provided at a later time, providing the same benefit as if they were provided with the initial project scope, although at an increased cost due to price escalation.

As curve easing on the Ballarat-Maryborough line would cause some of the existing line infrastructure to become redundant, unless there was an immediate imperative to increase line speed – these works can be deferred until the existing line infrastructure warrants replacement.
4. Service options

In developing service plans, a number of service level options exist, based on the following considerations:

- Which stations to reactivate
- The frequency and number of services provided
- The time at which the service is provided
- Appropriate line speed and journey time.

All existing stations on the Geelong-Ballarat-Bendigo rail corridor were considered for reactivation. Moorabool station, located between North Geelong and Bannockburn, is now privately owned so is not currently being considered for reactivation.

The former stations at Elaine, Yendon, Guildford, and Campbell's Creek no longer exist and are therefore not part of the current proposal. Table 2 shows the intermediate stations between Geelong, Ballarat and Bendigo investigated for reactivation.

Table 2: Stations investigated for reactivation and projected patronage

<table>
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<th>Section</th>
<th>Station</th>
<th>2011 population</th>
<th>Proposal</th>
<th>2016</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geelong – Ballarat</td>
<td>Geelong</td>
<td></td>
<td>Existing Station</td>
<td>410*</td>
<td>580*</td>
</tr>
<tr>
<td></td>
<td>North Geelong</td>
<td>143,921</td>
<td>Existing Station</td>
<td>300*</td>
<td>410*</td>
</tr>
<tr>
<td></td>
<td>Bell Post Hill</td>
<td></td>
<td>New Station</td>
<td>120</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>Bannockburn</td>
<td>3,513</td>
<td>Reactivation</td>
<td>200</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Lethbridge</td>
<td>590</td>
<td>Reactivation</td>
<td>120</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>Meredith</td>
<td>738</td>
<td>Reactivation</td>
<td>110</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Lal Lal</td>
<td>599</td>
<td>Reactivation</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>Ballarat – Maryborough</td>
<td>Ballarat</td>
<td>85,935</td>
<td>Existing Station</td>
<td>750*</td>
<td>900*</td>
</tr>
<tr>
<td></td>
<td>Creswick</td>
<td>2,942</td>
<td>Existing Station</td>
<td>90</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Clunes</td>
<td>1,656</td>
<td>Existing Station</td>
<td>130</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Talbot</td>
<td>715</td>
<td>Station under construction</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>Maryborough – Castlemaine</td>
<td>Maryborough</td>
<td>7,630</td>
<td>Existing Station</td>
<td>450</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td>Carisbrook</td>
<td>1,143</td>
<td>Reactivation</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Newstead</td>
<td>802</td>
<td>Reactivation</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Castlemaine – Bendigo</td>
<td>Castlemaine</td>
<td>6,751</td>
<td>Existing Station</td>
<td>310*</td>
<td>380*</td>
</tr>
<tr>
<td></td>
<td>Harcourt</td>
<td>872</td>
<td>Reactivation</td>
<td>60**</td>
<td>60**</td>
</tr>
<tr>
<td></td>
<td>Kangaroo Flat</td>
<td></td>
<td>Existing Station</td>
<td>70*</td>
<td>50*</td>
</tr>
<tr>
<td></td>
<td>Golden Square</td>
<td>82,794</td>
<td>Reactivation</td>
<td>80**</td>
<td>120**</td>
</tr>
<tr>
<td></td>
<td>Bendigo</td>
<td></td>
<td>Existing Station</td>
<td>140*</td>
<td>190*</td>
</tr>
</tbody>
</table>

Patronage projections are for “boardings” plus “alightings” for each station on an average weekday
* Patronage projections do not include existing rail journeys to and from Melbourne
^ Patronage projections from “Enhanced Service” plan (see section 4.2.2)
4.1 Potential patronage

Patronage demand forecasts indicate that by 2016, on an average weekday 1,700 to 2,000 passengers would travel on a Geelong-Ballarat-Bendigo rail service, rising to 2,300 to 2,800 passengers by 2031. These projections are in addition to passengers on existing rail services between Geelong and Melbourne, and between Bendigo and Melbourne.

In comparison, Geelong-Ballarat-Bendigo service would carry about 25% of the passengers carried by the current Melbourne – Traralgon service. On opening, the indicative service plan is predicted to carry 1,700 passengers on 10 trains per day, while the Melbourne – Traralgon service currently carries 6,300 passengers on 35 trains per day.

Census journey to work data suggests the corridor is currently car-oriented and car-dependent. There is some travel between the major regional centres, but most work trips are within one local government area or to the nearest major centre.

The indicative Rail Revival service plans are based on the principle of providing an attractive commuter service, and also a service that meets the social needs of the community. This would consist of:

> An equivalent level of service for the three major centres – Geelong, Ballarat and Bendigo
> A morning commuter service (journey to work)
> A mid-day service (social connection)
> An evening commuter service (return journey home from work).

An Enhanced Service Plan has also been developed and would utilise track capacity to provide an additional morning, midday and evening service in each direction. This would add some flexibility to the time of travel for passengers, but at an additional operating cost.

4.2 Potential rail service plans

The commuter destination stations for passengers on this corridor are the three main centres of Geelong, Ballarat and Bendigo. Melbourne could also be a destination point via a connecting rail service from North Geelong, Ballarat, or Castlemaine.

To ensure workers could arrive at their place of work by 9am, morning services would be scheduled to arrive at these three destination stations at around 8:30am (see Table 3).

The return journey in the evening is based on a departure time of between 5pm and 6pm to cater for passengers completing work at around 5pm.

The third proposed service period (midday) has been developed around the need to provide a social connection catering for medical appointments, shopping in the larger cities, or tourism. The midday service could provide the return journey of the morning service, or the initial journey – and passengers could return on the evening service.

4.2.1 Base Service Plan

<table>
<thead>
<tr>
<th>Geelong to Bendigo service</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geelong</td>
<td>–</td>
<td>7:24</td>
<td>12:32</td>
<td>17:10</td>
<td>18:19</td>
</tr>
<tr>
<td>Ballarat</td>
<td>6:27</td>
<td>8:30</td>
<td>13:38</td>
<td>18:22</td>
<td>19:30</td>
</tr>
<tr>
<td>Maryborough</td>
<td>7:35</td>
<td>9:30</td>
<td>14:45</td>
<td>19:30</td>
<td>20:38</td>
</tr>
<tr>
<td>Castlemaine</td>
<td>8:17</td>
<td>10:15</td>
<td>15:27</td>
<td>20:11</td>
<td>–</td>
</tr>
<tr>
<td>Bendigo</td>
<td>8:38</td>
<td>10:35</td>
<td>15:50</td>
<td>20:31</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bendigo to Geelong service</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bendigo</td>
<td>–</td>
<td>6:24</td>
<td>12:30</td>
<td>16:10</td>
<td>17:05</td>
</tr>
<tr>
<td>Castlemaine</td>
<td>–</td>
<td>6:46</td>
<td>12:52</td>
<td>16:32</td>
<td>17:27</td>
</tr>
<tr>
<td>Ballarat</td>
<td>7:15</td>
<td>8:23</td>
<td>14:25</td>
<td>18:06</td>
<td>19:17</td>
</tr>
<tr>
<td>Geelong</td>
<td>8:21</td>
<td>9:30</td>
<td>15:30</td>
<td>19:16</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 3: Indicative Geelong-Ballarat-Bendigo Timetable – “Base Service Plan”
4.2.2 Enhanced Service Plan

The Enhanced Service Plan maintains the services provided under the Base Service Plan, but utilises track capacity to provide an additional morning, midday and evening service in each direction (see Table 4). This would add some flexibility to the time of travel for passengers.

The Enhanced Service Plan has also been designed to provide paths for freight services. Should a more frequent passenger services be desired than the Enhanced Service Plan, an additional infrastructure investment (such as passing loops) would be required to ensure that freight paths were not affected.

Table 4: Indicative Geelong-Ballarat-Bendigo Timetable – “Enhanced Service Plan”

<table>
<thead>
<tr>
<th>Geelong to Bendigo service</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geelong</td>
<td></td>
<td>7:24</td>
<td>8:34</td>
<td>11:32</td>
<td>12:32</td>
<td>17:10</td>
<td>18:19</td>
<td>19:25</td>
</tr>
<tr>
<td>Geelong to Bendigo service</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Bendigo</td>
<td></td>
<td>6:24</td>
<td>7:22</td>
<td>12:30</td>
<td>13:30</td>
<td>16:10</td>
<td>17:05</td>
<td>18:28</td>
</tr>
</tbody>
</table>

Grey shading indicates additional service when compared to the “Base Service Plan”.
4.3 Projected journey times

The journey times on the existing rail corridors of Ballarat – Maryborough (approx. 53 minutes), and Castlemaine – Bendigo (approx. 23 minutes) would remain unchanged. A reintroduced rail service between Geelong and Ballarat would reduce journey time by approximately half an hour from that of the existing bus service, and by approximately five minutes between Maryborough and Castlemaine (see Table 5).

There is currently a Geelong-Ballarat-Bendigo bus service operating twice per day in each direction – one service travels directly between Ballarat and Castlemaine, bypassing Maryborough, the other travels directly between Ballarat and Bendigo, bypassing Maryborough and Castlemaine. The journey times between Geelong and Bendigo for these bus services range between three and a half, and four and a half hours.

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Current</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rail</td>
<td>Bus</td>
</tr>
<tr>
<td>Geelong</td>
<td>–</td>
<td>1:35</td>
</tr>
<tr>
<td>87km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ballarat</td>
<td>0:53</td>
<td>1:07</td>
</tr>
<tr>
<td>69km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maryborough</td>
<td>–</td>
<td>0:45</td>
</tr>
<tr>
<td>55km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castlemaine</td>
<td>0:23</td>
<td>0:45</td>
</tr>
<tr>
<td>37km</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bendigo</td>
<td>–</td>
<td>3:30 to 4:40</td>
</tr>
<tr>
<td>Geelong-Bendigo (h:mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Potential infrastructure scope

5.1 Geelong – Ballarat

The Geelong-Ballarat corridor currently has a maximum line speed of 80km/h for freight trains. The track infrastructure and geometry between Gheringhap and Ballarat is capable of supporting a line speed of 130km/h for passenger trains with minor track improvements, such as cant adjustment at curves. Appropriate train control would be required as well as level crossing upgrades.

Line speed is currently restricted to 15 – 20km/h through the North Geelong stabling yards, which includes the former Geelong – Ballarat track alignment. The proposal includes segregating the “through” tracks from the rest of the stabling tracks to provide an increased line speed of 65km/h through this section.

Significant track works would be required along the ARTC-controlled section between North Geelong and Gheringhap to accommodate additional passenger services, and not adversely impact existing freight services. The proposed service plans assume a line speed of 80km/h between Geelong and Gheringhap, due to the speed limitations of dual gauge tracks.

Reinstatement of the Warrenheip Junction would also be necessary. Installation of this junction would create a 6 km passing loop between Ballarat and Warrenheip providing reliability improvements for both Melbourne – Ballarat and Geelong – Ballarat line services. Passing loops would be needed at Lethbridge, Tourello, Maryborough and Newstead.

Bannockburn, Lethbridge, Meredith and Lal Lal stations have been investigated for passenger services, as well as a potential new station at Bell Post Hill.

5.2 Ballarat – Maryborough

Signalling has recently been installed between Ballarat and Maryborough, as well as active protection at all level crossings along the corridor – catering for a maximum line speed of 130km/h.

The passing loop at Tourello would need to be reinstated and extended to a length of 1,200m to allow both passenger and freight trains to cross between Ballarat and Maryborough.
5.3 Maryborough – Castlemaine

The existing track along the Maryborough – Castlemaine corridor is disused and not in a suitable state to accommodate either passenger or freight services – installation of new track would be required to reactivate any rail service.

The installation of new track with concrete sleepers would be capable of supporting passenger rail services of up to 160km/h between Maryborough and Joyces Creek, provided appropriate train control and level crossing protection is installed. A lower line speed between Joyces Creek and Castlemaine would be expected due to existing track geometry constraints.

To ensure that future gauge standardisation is not precluded along the corridor, all new concrete sleepers would be “gauge convertible”.

A 1 km section of this line near Castlemaine is now used by the Victorian Goldfields Railway, to run a tourist service between Castlemaine and Maldon. A bypass of the tourist railway track is proposed, enabling Maryborough-Castlemaine services to operate independently from the existing Victorian Goldfields Railway.

A holding road is also proposed at Castlemaine, to enable the turnback of Geelong services at Castlemaine, should existing line capacity restrictions remain through to Bendigo.

Carisbrook and Newstead stations have been investigated for passenger services.

5.4 Castlemaine – Bendigo

Duplication of the single line section between Castlemaine and Ravenswood Loop would be needed to provide additional track capacity on the Castlemaine-Bendigo section. This would cater for new rail services between Geelong and Bendigo, while not adversely impacting on existing Melbourne – Bendigo services.

Stations at Harcourt and Golden Square could also be reactivated for passenger services following track duplication.
6. Project costs

Preliminary cost estimates based on the service plan and scope of works described previously are summarised in Table 6.

The capital cost for the reinstatement of the rail connection between Geelong and Castlemaine is estimated to be in the range of $550 million to $715 million with an annual operating cost of $10 million to $14 million. Capital works between Castlemaine and Bendigo would cost an additional $210 million to $220 million.

Delivery of this project will be subject to funding availability in future state budgets and an assessment against other government funding priorities.

Table 6: Scope of works and preliminary cost estimates for the programme to deliver rail services

<table>
<thead>
<tr>
<th>Section</th>
<th>Capital expense ($million)</th>
<th>Annual operating expense ($million)</th>
<th>Summary of scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geelong – Ballarat</td>
<td>$250 to $320</td>
<td>$6 to $8</td>
<td>&gt; 2.7 km bypass track through North Geelong Stabling Yard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Duplicate up to 9 km of ARTC track</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 1 new station</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Level crossing upgrades</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Signalling / train control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Passing loop at Lethbridge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Warrenheip Junction reinstatement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 4 reactivated stations</td>
</tr>
<tr>
<td>Ballarat – Maryborough</td>
<td>$20 to $30</td>
<td></td>
<td>&gt; Passing loop at Tourello</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Minor bridge and culvert works</td>
</tr>
<tr>
<td>Maryborough – Castlemaine</td>
<td>$230 to $290</td>
<td>plus $4 to $6</td>
<td>&gt; 55 km track and formation renewal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Track bypass at Maldon Junction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Holding road at Castlemaine Station</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Level crossing upgrades</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Signalling / train control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Passing loop near Newstead</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>&gt; Passing facility at Maryborough Station</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 2 reactivated stations</td>
</tr>
<tr>
<td>Castlemaine – Bendigo</td>
<td>$210 to $220</td>
<td>plus $1 to $3</td>
<td>&gt; 12 km track duplication between Castlemaine and Ravenswood Loop</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; Second bridge over Calder Freeway at Harcourt</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 2 reactivated stations</td>
</tr>
<tr>
<td>Rolling stock</td>
<td>$50 to $75</td>
<td></td>
<td>&gt; 3 x 3-car V/Locity units – Geelong to Maryborough service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 4 x 3-car V/Locity units – Geelong to Castlemaine service</td>
</tr>
<tr>
<td>Total ($2012)</td>
<td>$760 to $935</td>
<td>$11 to $17</td>
<td></td>
</tr>
</tbody>
</table>
7. Benefit-cost assessment

7.1 Economic benefits

A high level of accessibility to transport is an important part of a well-functioning and resilient economy as it:

- provides firms with a large client base and a deep pool of skilled labour
- helps reduce transaction costs between suppliers and distributors
- allows workers to match their skills to the best possible employment.

The benefits that flow from this accessibility include more productive economic activity, higher taxation receipts, high levels of liveability and social cohesion.

Melbourne’s heightened accessibility (resulting from land use and transport improvements) has been a driving factor of its significant population growth over the past decade. Over the last five years, population growth in several regional areas has kept pace, and in some places exceeded that of Melbourne. The reasons for this regional growth include:

- growing commuter populations
- more affordable housing
- the “tree change” lifestyle
- local economic growth
- regional centralisation and specialisation.

Revival of the Geelong-Ballarat-Bendigo rail corridor could further enhance the development of regional centres and commuter towns; for example, by influencing household and workplace location, and travel behaviour. Better connecting centres and their surrounding regions provides increased access to a wider range of jobs, services and facilities. It may also play a role in further developing the existing tourism activities which draw people from the surrounding region and Melbourne.

Other benefits would be achieved through introducing an attractive commuter and social needs rail service between Geelong, Ballarat, and Bendigo. These can be described in terms of social and operational benefits, outlined as follows.
7.2 Social benefits

- Improve access of regional residents to public transport services.
- Improve mobility of regional Victorians.
- Provide better connections between communities.
- Increase use of public transport in the region.
- Reduce travel and waiting time for passengers.
- Enable fast connections between these major regional cities.
- Enable fast connections between satellite towns and their regional centres.
- Strengthen tourism linkages to towns along the corridor.
- Stimulate the economic growth of towns and cities.

7.3 Operational benefits

- Provide a secondary passenger rail connection between Ballarat and Melbourne – for use should the direct Ballarat – Melbourne line be out of service for either emergency or planned works.
- Provide a secondary passenger rail connection between Maryborough and Melbourne – for use should the existing Maryborough – Ballarat line be out of service for either emergency or planned works.
- Provide a secondary passenger rail connection between Bendigo and Melbourne – for use should the existing Castlemaine – Melbourne line be out of service for either emergency or planned works.
- Provide a direct freight rail link between Bendigo and Geelong, eliminating the need to travel via the Melbourne suburban rail network.
- Improve service reliability for existing Melbourne – Ballarat passenger services, with the reinstatement of the Warrenheip Junction.
- Improve line capacity (for freight and passenger services) between Geelong and Maryborough, with the provision of passing loops.

7.4 Benefit-cost assessment

The ratio of benefits to costs, following national standards for project assessment, for constructing a rail link now between Geelong, Ballarat and Bendigo has been estimated by PTV to be between 0.1 and 0.2.

The high upfront cost of infrastructure significantly outweighs the relatively low amount of predicted benefits, using traditional standards for evaluating transport projects.

Recognising that major transport projects can have more widespread benefits than captured in the existing standards for project assessment, PTV obtained further advice from SGS Economics & Planning to identify the potential uplift that the reintroduction of a rail service could have on the economy and community.

Given the uncertainties about future regional growth patterns, SGS made a range of estimates for two scenarios:

- Evolution Scenario – The return of rail services acts to increase the employment and population growth at a rate only slightly higher than long-term base case projections would suggest.
- Revolution Scenario – The integration of the Geelong-Ballarat-Bendigo corridor provided by the Rail Revival project acts as a catalyst for a significant reshaping of the corridors economy with significant uplifts in population and employment growth.

If the wider benefits of the revolution scenario are included, the ratio of benefits to costs rises to between 0.3 and 0.5.

These assessments suggest that the project would not be successful in securing funds in competition with other projects.

Circumstances may change, such as more rapid population growth in the corridor, and options to build the project at a later time should be protected.

In the interim, opportunities to upgrade coach services should be explored.
8. Potential staging

The re-introduction of passenger rail services between Geelong, Ballarat and Bendigo could be staged:

**Stage 1** Enhance existing bus services

**Stage 2** Enhance passenger rail services between Ballarat and Maryborough

**Stage 3** Provide rail services between Geelong, Ballarat and Maryborough

**Stage 4** Provide rail services between Maryborough and Castlemaine

**Stage 5** Enhance rail services between Castlemaine and Bendigo as part of a future Bendigo line upgrade

Stage 1 would increase the frequency of existing bus services along the Rail Revival corridor, providing services at more convenient commuting times, encouraging the use of public transport between towns.

Stage 2 would see the reinstatement of the Tourello passing loop to allow improved frequency of rail services between Ballarat and Maryborough.

Stage 5 would enhance an already high quality passenger service and would therefore only provide a marginal benefit to the community. Should Stage 5 not proceed, passengers would still be able to travel between Geelong, Ballarat and Bendigo – interchanging at Castlemaine station.

Stages 3 and 4 would provide rail connections which are not currently available. These two stages can therefore provide the most dramatic and obvious benefits to the community, although the works required to upgrade infrastructure would be costly.
8.1 Short term (Stage 1)

Transport

While the return of rail services between Geelong, Ballarat and Bendigo is the desired outcome, the capital cost of such works in the current economic climate is prohibitive.

In the meantime lower cost public transport initiatives such as increasing the frequency of existing coach services along the corridor, re-timetabled to service a commuter usage, as well as providing a social and tourist connection, could be explored.

Although a cheaper investment option, patronage projections for improving the frequency of existing bus services are half of those projected for a reactivated passenger rail service. It would, however, provide an improved linkage between centres encouraging more public transport usage between Geelong, Ballarat and Bendigo, leading the way for a future rail connection.

Planning

Until the stations are again required for railway purposes, currently unoccupied station buildings along the corridor such as Lethbridge, Lal Lal, Carisbrook, and Newstead stations could be leased out for public uses such as shops or community facilities. In doing so, this would ensure that these station buildings are used and maintained, and their condition does not deteriorate any further.

Through amendments to local planning schemes, future development within the towns along the rail corridor could be focused around these railway stations. This could also generate public activity around these buildings, making the stations into an activity hub and a focal point of the local community.

Table 7: Short term options

<table>
<thead>
<tr>
<th>Route</th>
<th>Current service</th>
<th>Short term options</th>
</tr>
</thead>
</table>
| 1 Geelong – Ballarat| > 2 services in each direction (Monday-Friday) | > Increase frequency of bus service to up to 7 trips in each direction per day  
|                     |                                        | > An increase in weekend services                        |
| 2 Ballarat – Castlemaine | > 1 service in each direction (Monday-Friday) | > Increase frequency of bus services to up to 4 trips in each direction per day  
|                     |                                        | > An increase in weekend services                        |
| 3 Ballarat – Bendigo| > 1 return service between Ballarat and Bendigo (via Newstead) per day | > Existing service to remain                             |
8.2 Medium term (Stage 2)

Delivery of rail infrastructure works, such as the reactivation of passing loops, would remove some of the issues constraining the future reactivation of rail passenger services.

Reopening of the Tourello Loop would enable an increase of rail passenger services between Ballarat and Maryborough – through reducing the conflict between additional passenger and existing freight services, rail freight efficiency would also be improved. An increase in the number of rail services between the two cities would provide services into Maryborough during the day – providing a tourist and social connection.

Alterations to bus routes and timetables to enable connections to the rail network could also be undertaken.

Where possible, timetables would be designed to enable connections between services.

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**Table 8: Medium term options**

<table>
<thead>
<tr>
<th>Route</th>
<th>Current service</th>
<th>Medium term options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong> Ballarat – Maryborough</td>
<td>&gt; 1 passenger rail service from Maryborough to Melbourne (via Ballarat) in the morning</td>
<td>&gt; Increase frequency of rail services between Maryborough and Ballarat to up to 6 services in each direction per day</td>
</tr>
<tr>
<td></td>
<td>&gt; 1 passenger rail service from Melbourne to Maryborough (via Ballarat) in the evening</td>
<td></td>
</tr>
<tr>
<td><strong>5</strong> Donald – Maryborough</td>
<td>&gt; 1 return bus service between Donald and Ballarat per day via Maryborough</td>
<td>&gt; Provide 2 return bus services between Donald and Maryborough per day, linking to a rail connection between Maryborough and Ballarat at Maryborough station</td>
</tr>
<tr>
<td></td>
<td>&gt; Overnight bus service between Mildura and Melbourne, via Donald, Maryborough and Ballarat (1 service in each direction)</td>
<td>&gt; Overnight service – unchanged.</td>
</tr>
<tr>
<td><strong>6</strong> Maryborough – Castlemaine</td>
<td>&gt; 4 services in each direction per weekday</td>
<td>&gt; Existing service to remain, but re-timetabled to link into connecting rail services where possible</td>
</tr>
<tr>
<td></td>
<td>&gt; 2 services in each direction on Saturdays</td>
<td>&gt; Services to Highview College to remain</td>
</tr>
<tr>
<td></td>
<td>&gt; 1 service in each direction on Sundays</td>
<td>&gt; An increase in weekend services</td>
</tr>
</tbody>
</table>
Long term
(Stages 3 and 4)

The concept designs for the infrastructure required to re-introduce passenger services between Geelong and Ballarat, and between Maryborough and Castlemaine have been completed. However, further design work would be required to enable any construction works to commence. In the meantime, the output of the Rail Revival study could form the “masterplan” for the Geelong-Ballarat-Bendigo corridor.

Bendigo line
(Stage 5)

Future works on the Castlemaine – Bendigo section would be considered as part of long term upgrade proposals of the Melbourne – Bendigo line. Passengers travelling from Geelong, Ballarat or Maryborough could change at Castlemaine station to continue their journey onto Bendigo.
9. Next steps

PTV has submitted this report to government for consideration.

PTV welcomes feedback, and encourages interested members of the community to submit questions or comments via the online enquiry form, which can be found at ptv.vic.gov.au/railrevival

The following technical reports are also available on the PTV website.

- Rail Revival: Interim Design Report, April 2013, Opus Rail
- Rail Revival: Preliminary Economic Appraisal, April 2013, PTV
- Rail Revival: Wider Economics & Social Benefits Report, March 2012, SGS
- Rail Revival: Indicative Service Plan Report, February 2012, PTV
- Rail Revival: Transport Planning & Network Development – Baseline Report, November 2011, AECOM
- Rail Revival: Track Assessment Report, October 2011, Coffey Rail
- Rail Revival: Bridge Assessment Report, September 2011, Coffey Rail
- Rail Revival: Environmental Assessment Report, August 2011, AECOM
- Rail Revival: Station Condition Reports, June – July 2011, Macutex
For more information visit ptv.vic.gov.au
or call 1800 800 007 (6am – midnight daily)

All forms and this document
are available on the internet
ptv.vic.gov.au/railrevival

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