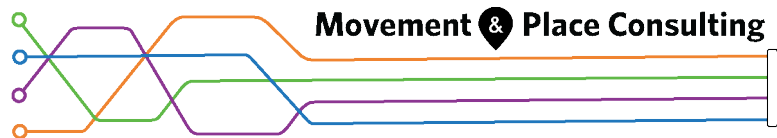


BALLARAT'S FUTURE RAIL NETWORK

Background Paper
3 June 2019





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This document has been commissioned by the City of Ballarat and was developed based on a range of sources in particular a discussion paper and background report prepared by AWTY Transport Consulting.

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EXECUTIVE SUMMARY

This Heavy Rail Background Paper has been commissioned by the City of Ballarat to explore the issues, challenges and opportunities for the heavy rail network in the Ballarat region. This Background Paper will inform the Ballarat Integrated Transport Plan.

Ballarat has a long heritage of reliance of the railway since it was first connected from Ballarat to Geelong in 1862. Ballarat became a hub for railway activities in western Victoria including construction and maintenance workshops and expansive infrastructure required for efficient railway operations.

Railway use tended to decline from the 1970's until the early 2000's as the infrastructure and rolling-stock conditions gradually declined. Following completion of the Victorian government's Regional Fast Rail project in late 2005, patronage on the Ballarat line has surged. This patronage increase is arguably a result of faster and more reliable travel times, more comfortable rolling stock, more services and improved access via stations such as Wendouree. Passenger services have since been extended to Ararat and Maryborough providing a greater catchment for passengers travelling to and from Ballarat in three different directions.

This Background Paper summarises the existing situation, strategic policy direction and specific projects that are currently underway. It considers the population growth in Ballarat and surrounding centres (including Geelong) and highlights the role that heavy rail can play to improve access and economic activity within and between these centres. The heavy rail network is integral to Ballarat's economic and social prosperity for several reasons:

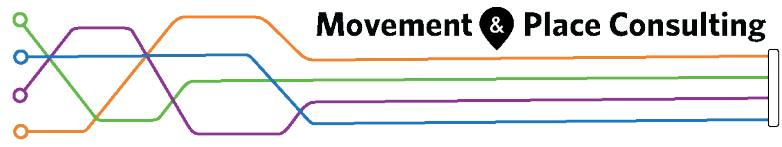
- Passenger services on the network provide an affordable alternative to car use, which in turn improves:
 - Local economic activity because 80% of transport cost savings get spent locally;
 - Road safety;
 - Health and environmental outcomes;
- Passenger services improve access to employment for people who do not own a car or do not want to drive long distances (employment options could be in Ballarat or elsewhere); and
- Freight services on the rail network reduce local traffic congestion and improve road safety.

There is a critical need to continue investing in Ballarat's passenger railway network to improve the network reach, access to stations, service levels (train frequency and capacity), travel times and reliability. Improvements to the region's freight network are more focussed on access terminals, and consistent timing of shuttle services to key locations such as the Port of Melbourne.

Ballarat is currently growing at around 2% per annum and is expected to have a population of at least 160,000 people by 2040. Over the past 15 years, population growth and passenger rail network and service upgrades have generated a significant growth in patronage. This patronage growth will continue as Ballarat's population continues to grow, and more passenger train services are added.

This background paper plans for that growth by proposing short, medium and long term improvements to the infrastructure and passenger rail service offerings in the region. This includes service improvements to key destinations including Ararat, Geelong, Maryborough and Melbourne. Key improvement options put forward in this paper include:

- Improved passenger rail connections to Melbourne;
- Improved access to Ballarat from Melbourne and regional destinations;
- Ballarat Metro rail service;
- New railway stations in growth areas and at Ballarat's Major Events Precinct; and
- Freight specific improvements that support economic activity and reduce road congestion.



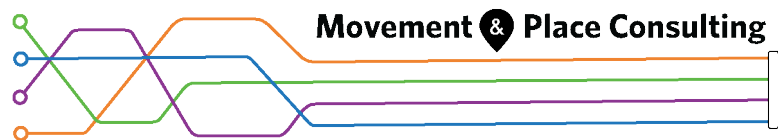


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1. INTRODUCTION

Victoria's population is expected to grow to over 7 million by 2050. This will place significant pressure on planners to provide amenity for urban and rural residential development. The challenge is further intensified by population growth in areas that lack services.

As a result, government policy places a priority on creating more jobs locally and reducing reliance on commuting to jobs and services in far-away places. In order to accomplish this, it is important to support the roles of Ballarat, Ararat and Bacchus Marsh as regional centres and provide the transportation infrastructure necessary to support thriving communities. *Plan Melbourne* echoes this policy goal emphasising the need to rebalance Victoria's population growth from Melbourne to rural and regional Victoria over the life of the strategy.

Transport strategies to serve Victoria's regions need to take a sub-region to sub-region focus to facilitate short work-based (and other) trips to places like Ballarat. At this sub-regional level Melbourne Airport, Geelong and Sunshine create sub-regional synergies for a rail network serving Ballarat.

It is essential that any strategy facilitate growth in three key elements to serve the Ballarat region more comprehensively over time:

- Growth in local jobs – more within the local region, followed by the adjacent sub-regions and regional catchments;
- Increased local access to high-quality education offerings – with more emphasis on an increase within the local regions and adjacent sub-regions and regional catchments; with
- Heavy rail support helping to boost investment in jobs and education access and boosting the community's confidence in the local economy.

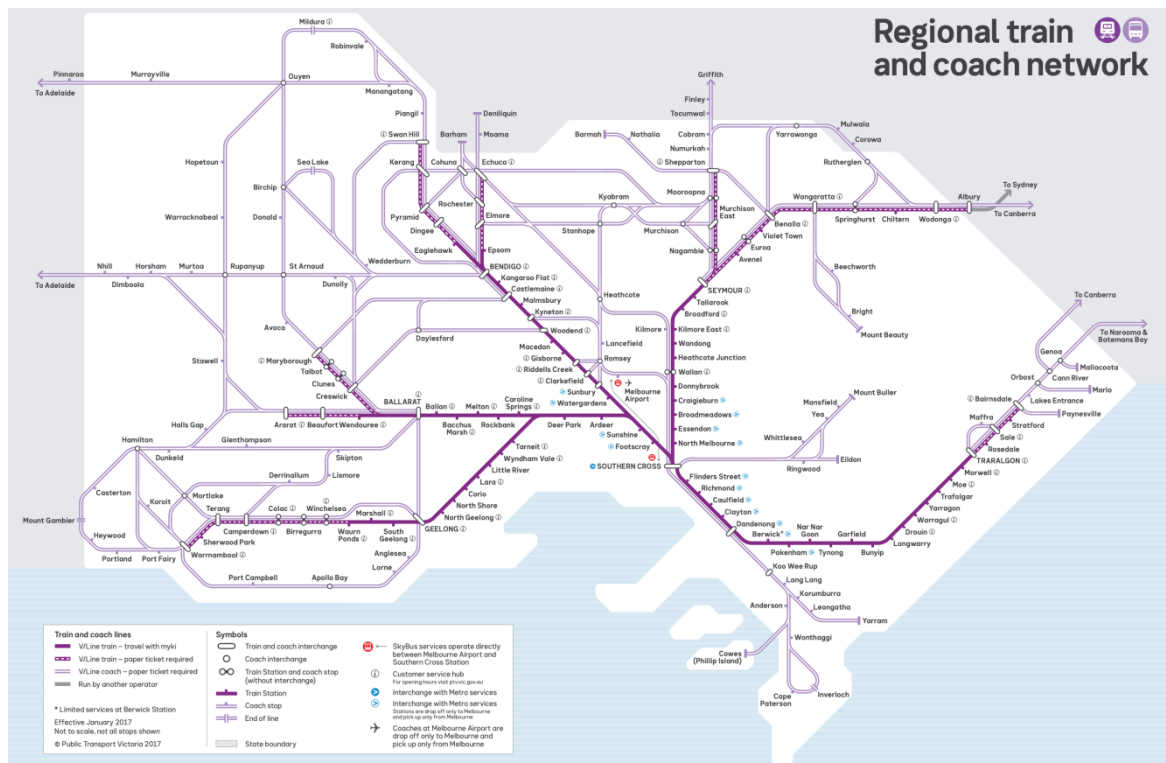
1.1 Existing Rail Network and Services

Ballarat lies at the confluence of four railway lines arriving from the north, south, east and west. Historically, there were nine railway lines radiating from Ballarat. Currently only three lines are used for passenger services and all four are currently used for freight. There are no passenger services currently operating on the Ballarat-Geelong Line. Freight tends to be confined to the two lines that form the Geelong-Ballarat-Maryborough corridor, but can be facilitated on the Ararat-Ballarat-Melbourne corridor if necessary.

There are 44 passenger train services between Ballarat and Melbourne each weekday (20 eastbound and 24 westbound). Nine of these services extend to/ from Ararat and four services extend to/from Maryborough each weekday.

The existing passenger rail and coach network is shown in Figure 1-1 below.

Figure 1-1: 2019 Regional Train and V/Line Coach Network



Source: PTV Website

The Western Line is double track from Southern Cross Station to Caroline Springs where it becomes single track with crossing loops. These loops are currently located at various intermediate locations and facilitate more frequent bi-directional movements along the line. The Regional Rail Revival – Ballarat Line Upgrade includes a range of works including duplication of track to Melton and additional passing loops to increase capacity and improve reliability along the line.

From Ballarat junction, single tracks continue to Ararat in the west and Maryborough in the north. A single track from Geelong in the south joins the railway corridor at Warrenheip and continues to Ballarat.

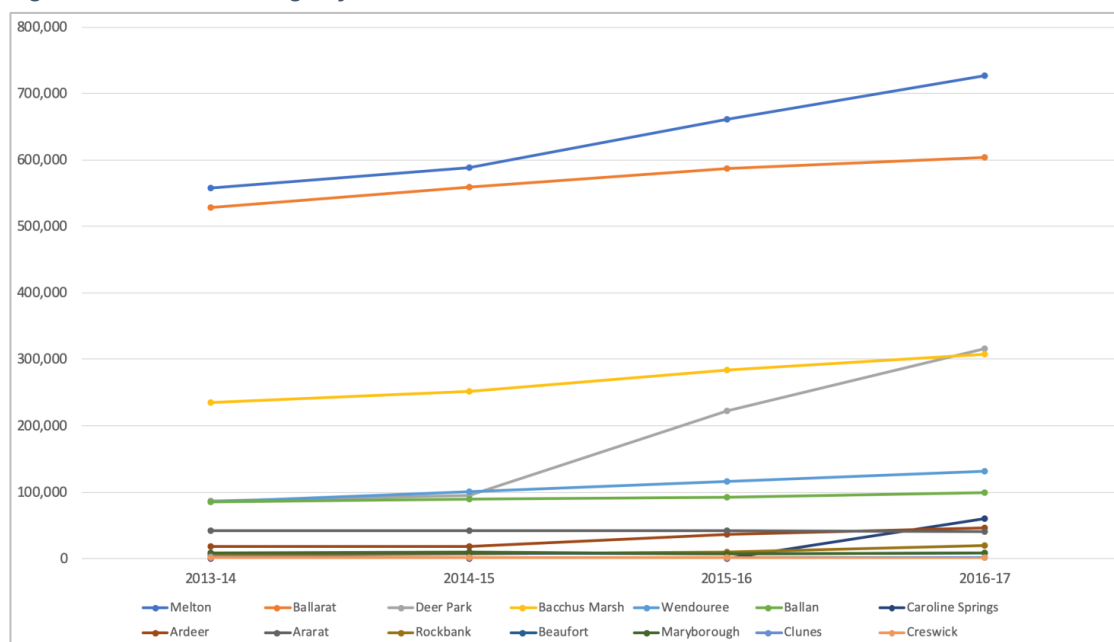
The signal system from Melbourne to Ballarat uses relatively new Optic Fibre with bells and boom gates at level crossings and the Train Protection Warning System (TPWS). Train control from Ballarat to Ararat and Maryborough uses the staff and ticket system (a manual safe-working system).

1.2 Patronage

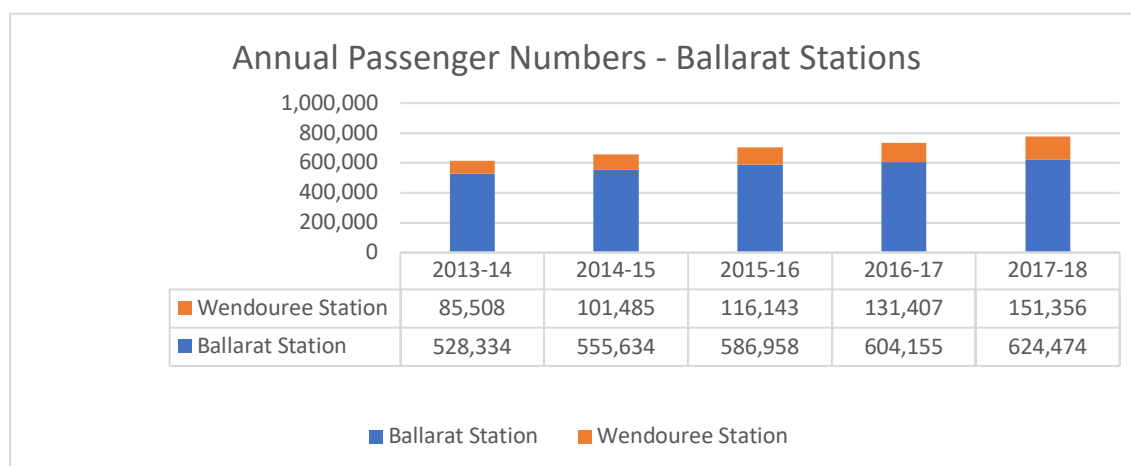
Ballarat commuters are increasingly choosing to catch the train with patronage growing even faster than the rate of population growth. In 2016 930 Ballarat residents caught the train to work, 117 more than in 2011 (a 14.4% increase over 5 years). In 2011 1.9% of workers caught the train to work, rising to 2.1% in 2016.

Ballarat based patronage growth is principally from Ballarat residents commuting from Ballarat and Wendouree stations to destinations in Melbourne. Population growth is also increasing patronage growth on the Western line at Bacchus March, Melton and other destinations in the metropolitan area. Melton, Ballarat and Bacchus March stations respectively the highest levels of patronage on the Western line (excluding Southern Cross) and all are experiencing strong growth in patronage.

Figure 1-2: Patronage by Station



Ballarat station is experiencing significant increases in patronage averaging 4.3% p.a over the last 4 years. Although starting from a lower base than Ballarat station, Wendouree station is experiencing significant patronage growth averaging 15.4% annually between and 2013-14 and 2017-18. Significant future patronage growth at Wendouree station is expected due to the substantial population growth within the catchment of Wendouree station on Ballarat's western and northern fringes.



Source: Department of Transport

Based on historical growth trends, the stations in Ballarat are expected to generate over 800,000 passenger boardings in 2019 and the Victorian Integrated Transport Model predicts over 1 million passenger boardings at Ballarat by 2021. With strategic improvements to infrastructure and services a sustained growth in market share can be expected. The forecast is for 2.3% of journey to work trips to be by train in 2021. Expansion of the rail network could also increase this percentage – particularly if passenger services are provided to Geelong, this extension alone is forecast in the *Regional Rail Revival Report* to add over 250,000 passenger boardings to Ballarat Stations each year.

2. BACKGROUND

2.1 State and Local Strategies

A range of State and local policies, strategic plans and projects are relevant to a discussion about *Ballarat's Future Rail Network*. The following documents have been considered during preparation of this Report:

1. *Plan Melbourne 2017-2050* (2016) the Metropolitan Planning Strategy which makes specific reference to growing regional centres such as Ballarat
2. *Central Highlands Regional Growth Plan* (2014) supports creation of a "State of Cities"
3. *Regional Rail Revival – Ballarat Line Upgrade* (2016-2019)
4. *The Western Rail Plan*, Victorian State Government (2018)
5. *Connecting Regional Victoria*, Victoria's Regional Network Development Plan (May 2016)
6. *The Murray Basin Rail Project* documents and website (2014-2019)
7. *Regional Rail Revival: Geelong-Ballarat-Bendigo* study (2013).
8. Moorabool Shire Council's *Heavy Rail Development Plan*
9. The Rail Futures Institute's *InterCity* report, July 2016
10. *Grampians and Barwon South West Region Passenger Services Cost and Feasibility Study* (2017)
11. The Rail Freight Alliance's (RFA) *Policy Statement* (2018).

A summary of key elements of the strategies is provided below.

Plan Melbourne is the Metropolitan Planning Strategy which includes a specific direction to *improve connections between cities and regions*. It summarises the population and economic growth expected to occur in Ballarat and similar regional cities such as Bendigo and Geelong.

The essence of this Plan is to facilitate complementary regional and metropolitan growth. Some growth will occur organically within the home region and inevitably, some will occur further from the local boundaries. The development of two key areas in Plan Melbourne will complement Ballarat's growth – Sunshine and the Airport as a larger development cluster about half the distance to Melbourne than the CBD; and Geelong. Geelong and Ballarat can work together exploring economic synergies achieved through creation of better fundamental rail connectivity between the two cities.

Both the Sunshine National Employment Cluster and the Airport, along with Geelong are very accessible to Ballarat. Ballarat equally can grow from strengthened linkages to Geelong.

Direct investment in Ballarat (and by extension Geelong) and improving connections will both serve as catalysts for strong economic and community development of the Greater Ballarat region.

The Central Highlands Regional Growth Plan covers the municipal areas of Ararat, Ballarat, Hepburn, Moorabool and part of Golden Plains. It addresses a range of land uses including agriculture, tourism, environmental assets, commercial and residential. Checks and balances that need to be applied are recommended as well as infrastructure and services when considering future growth. It states as an objective that "We will maximize the growth potential of Victoria by developing a state of cities which delivers choice, opportunity and global competitiveness".

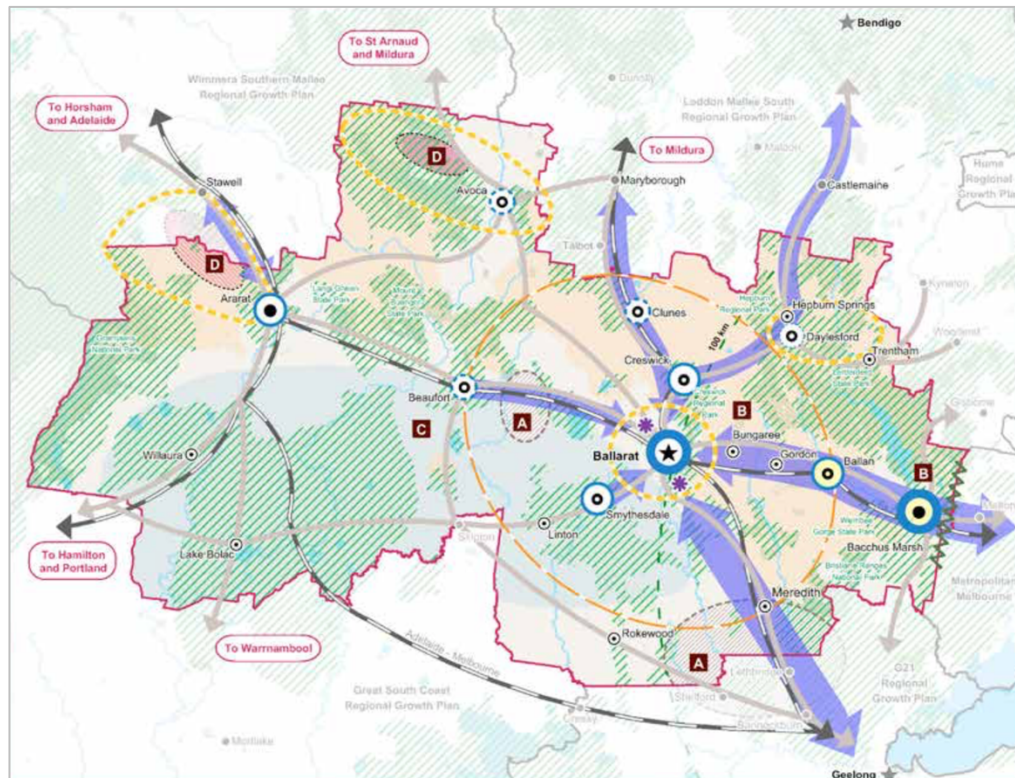
The transport network is focused around the Western Highway and rail corridors linking Melbourne to Adelaide and Melbourne to Ararat. Future directions outlined by the Plan include:

- Improve the capacity and functioning (including safety, reliability and resilience) of the region's transport networks;
- Ensure access and connectivity between settlements within and external to the region;

- Provide social infrastructure that is well located and accessible in relation to residential development, public transport services, employment and educational opportunities; and
- Prioritise infrastructure investment that facilitates economic growth and urban development.

The physical layout of the region, settlements, land uses and transport corridors is depicted in the Regional Growth Map in Figure 2-1 below.

Figure 2-1: Regional Growth Plan



Source: Central Highlands Regional Growth Plan

Victoria's Regional Network Development Plan states:

More people are travelling between regional towns and cities for work. Across regional Victoria, a growing number of people are travelling outside traditional business hours. For example, young people need public transport in the evenings and weekends to access work, study and social opportunities. Providing these connections is critical to retaining young people in regional areas.

The Plan aims to:

- Deliver a better public transport network across regional Victoria, with new connections, more trains, better stations and improved bus and coach services;
- Develop tailored public transport priorities and actions for each region that respond to changing local travel needs and support local infrastructure and services plans;
- Make better use of existing assets and infrastructure;
- Guide future planning for and investment in the freight and passenger rail network, with a focus on encouraging economic development and job creation;

- Support the growing regional tourism industry; and
- Give communities across Victoria a say in planning for future public transport services in their region.

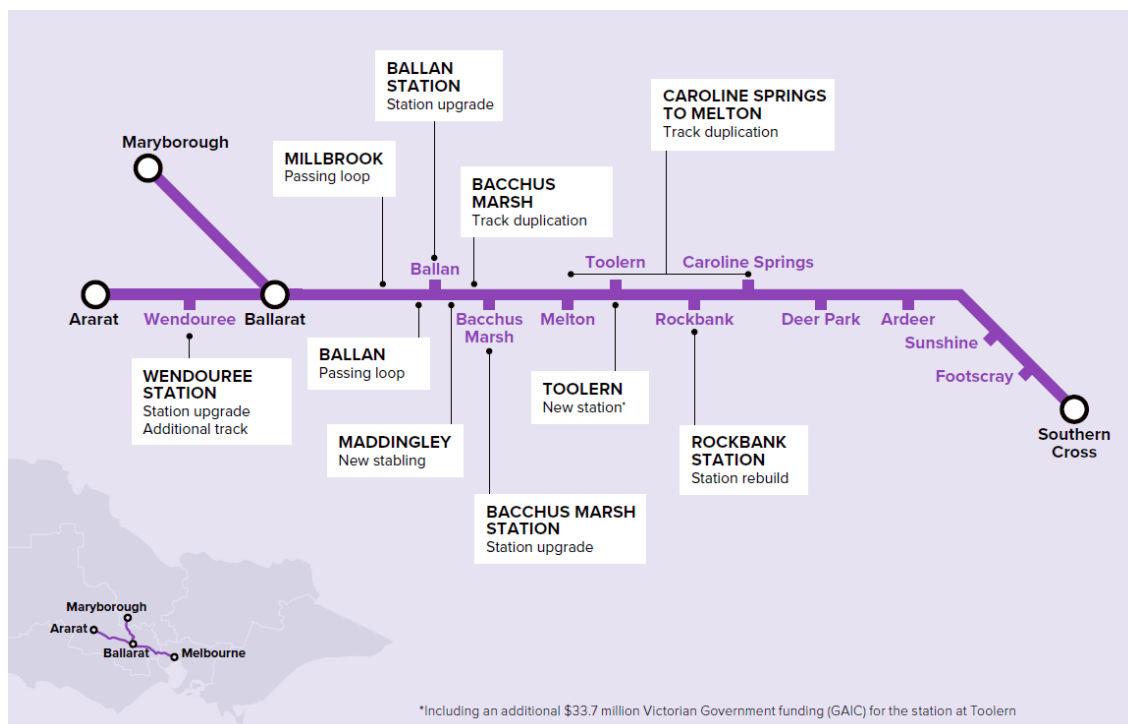
Improving the rail network serving Ballarat and the surrounding regions is critical to achieving the State government's strategic objectives. Critical elements that have not been understood in the State plans to date include the need to provide more than one train line to Geelong and the need to better connect Victoria's second and third largest cities through *better use of existing assets and infrastructure*.

The *Ballarat Line Upgrade* is a specific plan of upgrade works to improve service frequency, travel times and reliability in the western corridor. The upgrade includes:

- Additional services to/from Maryborough and Melbourne to Ballarat each day;
- Extra car parking spaces at Ballarat and Wendouree stations;
- Investigation of the need for extra stations at Ballarat; and
- Improved safety at regional level crossings.

A schematic of the upgrade works is shown in Figure 2-2 below.

Figure 2-2: Ballarat Line Upgrade



Source: *Regional Rail Revival Project – Ballarat Line Upgrade*

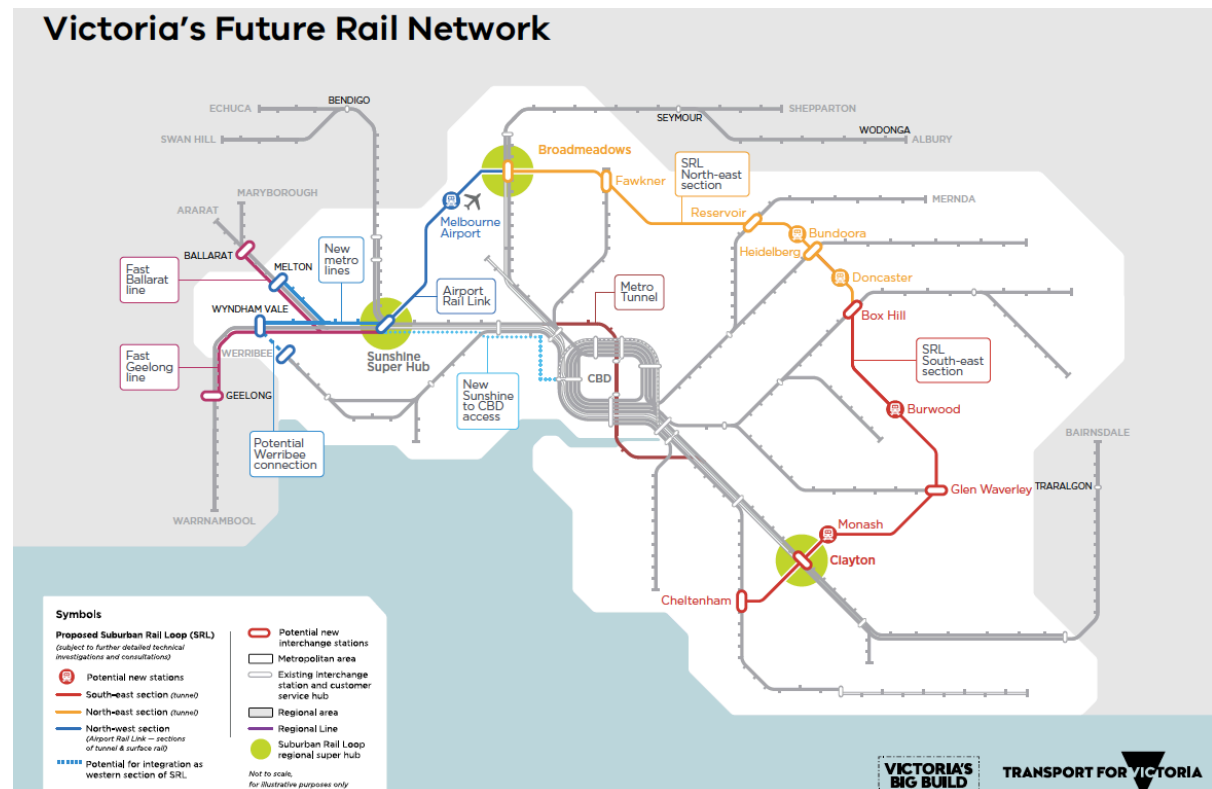
The Western Rail Plan is a long term strategic document that highlights how metropolitan passengers will be catered for with new electrified lines and regional services will be made faster and more reliable. The Western Rail Plan lays the groundwork for Victoria's high capacity train network servicing growing regional centres. There are three primary projects which include:

- Two new electrified metro rail lines through the western suburbs to growth areas in Melton and Wyndham Vale;

- Increased track capacity between Sunshine and the CBD to cater for faster and more frequent metro and regional trains; and
- Major investment in the Geelong and Ballarat lines to run trains faster than 160km/h. This will include exploration of electrification of these lines and new, fast electric regional trains.

The Western Rail Plan forms a part of Victoria's Future Rail Network as shown in Figure 2-3 below.

Figure 2-3: Victoria's Future Rail Network



Source: Western Rail Plan website

Critically, none of the current plans and strategies recognise that the Ballarat-Geelong rail corridor previously had very successful passenger services and the corridor is still suitable for passenger services. The Geelong corridor also previously had two tracks for its full length, more capacity than has ever been provided in the Ballarat-Melbourne corridor.

Currently this infrastructure is not being put to best use and as a result there are several thousand people driving between Ballarat and Geelong every day, many of whom would prefer to catch the train.

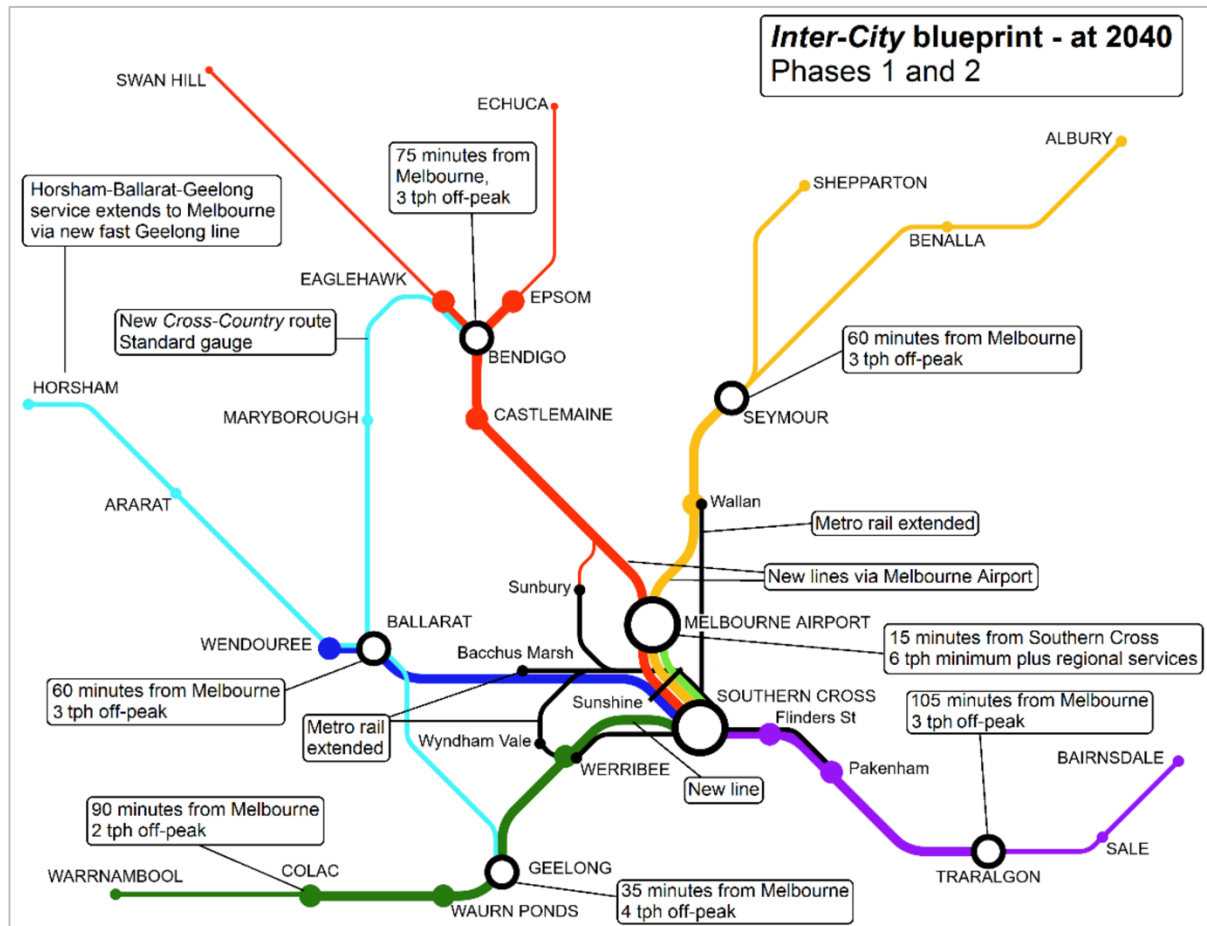
Rail Futures Institute in its *Introducing InterCity* report highlights strategic initiatives which could facilitate the growth of a more viable State of Cities. Key planks in its 'Blueprint' at 2040 proposed include specific creation of stronger, faster, clearer regional linkages specifically including:

- Stronger regional routes to Ballarat (Wendouree) with a clear focus on a Sunshine hub (also linked to the Airport);
- Stronger region-to-region links to Geelong and Bendigo and sub-regional linkages to Ararat and Horsham (and places in-between); and

- Other improvements include the track quadruplications, electrification of key tracks and provision of long passing loops removing current track constraints.

The long-term map envisaged for Victoria's rail network is shown in Figure 2-4 below.

Figure 2-4: InterCity Victoria's Envisaged 2040 Rail Network



Source: Rail Futures Institute, *Introducing InterCity* (2016)

The network above provides a truly ambitious network and level of service that could reduce the need for car ownership and use related to some trips, particularly commuting.

3. IMPROVEMENT OPTIONS

The rail network around Ballarat historically consisted of nine lines all with passenger services. This was scaled back to just two passenger lines in the mid 1990's – one to Melbourne and one to Geelong. Passenger services on the Geelong line ceased and there was only one passenger line (Ballarat to Melbourne) until 2004 when the Ararat line was reopened for passenger service. Since that time, passenger volumes through Ballarat have continued to increase faster than the population growth due to:

- Expansion of the network (to Maryborough);
- New or significantly improved stations (such as Beaufort and Wendouree); and
- Improved travel time reliability (provided by new track and signalling infrastructure).

To achieve State government objectives for the regions, significant new investment is required, not just to connection regional cities to Melbourne but to connect them to each other. This will require significant investment, without which the development of regional cities will be constrained, while metropolitan Melbourne continues to strain under the pressure of much more rapid growth.

The improvement options listed below are as much about growth pressures in metropolitan Melbourne as they are about improving transport, accessibility, lifestyle and economic development in Ballarat and surrounding regional cities and towns.

Improving transport and accessibility to Ballarat (and its surrounds) will reduce pressures in the metropolitan region and its more monocentric growth being concentrated in and around the CBD: specifically, congestion can be reduced and some outer areas growth (argued as being less economically attractive) can be avoided. As important, land value can be held and intensified into key policy areas whilst avoiding reduction in value of agricultural offerings on productive farming land.

3.1 Network

Getting the network right is of critical importance because without a robust network, services cannot be provided. State Government documents make specific references to expanding Victoria's rail network, making better use of existing infrastructure and connecting regions and regional cities with rail services. Plan Melbourne includes Direction 7.2 (Improve connections between cities and regions) with justification that *"strong links, both within the regions to major hub destinations as well as back to Melbourne, make it easier to live and do business in regional areas."* A range of other statements highlight government's commitment to investigating all options that improve rail network connections between regional towns and cities.

Connecting Regional Victoria

The rail network has historically connected regional towns and cities in Victoria. Expansion of the network around Ballarat over the past 15 years has shown there is a role for train services to improve access for people in regional cities and towns and provide confidence for future investment in those towns. Strengthening Victoria's regional railway network is essential to improving the performance of the regions and securing the investment required to strengthen their economies.

The Victorian Government undertook a *Regional Rail Revival* study between 2011 and 2013. The project considered the feasibility of returning passenger rail services on the 250km of lines between Geelong, Ballarat and Bendigo via Maryborough and Castlemaine. A *Project Feasibility Summary Report* was released in April 2013. The report surmised that due to the substantial cost of rebuilding track in the Maryborough to Castlemaine corridor, the project as a whole would not currently provide enough benefit

to the community relative to the project cost. This study report (summary) lacked detail regarding some important considerations, including:

- Consideration of the Geelong-Ballarat section upgrade as a potential stand-alone project;
- The ability to reduce road network upgrade costs was not included (although additional road upgrades would be required if the rail upgrade does not proceed);
- The rail maintenance costs that have been avoided over recent years (resulting in diminished track capacity) should have been invested. This previous saving to government (from reduced maintenance) was ignored and leads to a higher amount of investment required for the future upgrade; and
- The impact on other policy initiatives that now elevate the importance of regions to the overall economy was not considered. For example, there are significant savings and benefits for the higher education, tourism, migrant settlement and housing affordability programs that flow from improved public transport links in Victoria's regions.

If the report had taken these factors into account, it seems likely that a positive story could be told about how reinstating passenger train services on the Ballarat to Geelong rail corridor would benefit Victoria's economy.

Ballarat to Geelong Connectivity

The *Regional Rail Revival* study found that minor upgrades to the existing line between Geelong and Ballarat could provide for a passenger rail service operating speed of 130km/h on most of the line. These relatively low cost works would have a much more reasonable benefit-cost ratio than the entire Bendigo-Geelong project. The cost of this and other works through the Geelong Freight yards would come to \$250-320M (2012). While the benefit cost ratio of the whole project was found to be low, the cost of the Ballarat to Geelong upgrade is only 30% of the overall cost, and it would generate 70% of the project benefits. The benefit cost ratio of the Ballarat-Geelong section is therefore much more favourable than the whole project.

Connectivity between Ballarat and Geelong has been recognised by the State Government as an important factor that supports or undermines the future economic potential of both cities and their regions. It is therefore a critical weakness that public transport services between the two cities consists of four services per weekday in each direction (49 services per week) compared with 8 services per weekday in each direction to Ararat (111 per week). For reference Geelong has 20 times the population of Ararat but only half the service levels to Ballarat.

The rail connection between Ballarat and Geelong is also important for key Victorian strategies including the Education State. Ballarat has two universities and Geelong has a large presence of Deakin University. There are many regional students who grow up in one of those cities and enrol in tertiary education in the other.

The connection to Geelong provides one coach in each direction that meets the needs of a traditional working day in Geelong, but does not provide any services timed to the needs of a traditional working day in Ballarat. Patronage estimates show that an increased level of services would be used by the public. Modelling of train patronage in the Ballarat-Geelong corridor shows that from day one, trains would attract a very similar level of patronage per train to the services on the Traralgon corridor (around 180 passengers per train).

Trains from Ballarat to Geelong can also continue to Melbourne. For many decades, Ballarat to Melbourne trains routinely used the Geelong track to provide counter peak services and improve reliability of peak direction trains on the Ballarat Melbourne track via Bacchus Marsh. Due to the operating speeds possible on each track, the trip via Geelong was not much longer than other services in the timetable. The lack of this option in the current timetable directly impacts on people wishing to travel back to Melbourne from

Ballarat between 4 and 6pm on any weekday. There are no trains during that time, and the only alternative is a road coach departing at 5:15pm. This road coach arrives into Melbourne at 7:15pm, taking more time than the train would need to travel from Ballarat to Melbourne via Geelong.

In summary, utilising the existing railway track between Ballarat and Geelong could cater for high speed services that attract a significant number of people and provide greater flexibility and reliability on the main Ballarat-Melbourne corridor. Such services would have a positive impact on the economies of both cities and their regions and reinforce State government efforts to create a State of several significant cities. It would also improve safety on the rural roads linking the cities.

Other network links

A range of other rail network extensions could be considered, and have been proposed or mooted by others. These include reinstating passenger services on existing freight tracks to Stawell, Horsham, Dunolly and St Arnaud. With the exception of Dunolly (which has been mentioned as worth investigating in State government studies), there is limited evidence regarding the potential cost of these extensions and their likely passenger demands.

These connections should be considered by the Ballarat community with regard to prioritising the service connections they would most like to see evolve and improve in future.

3.2 Services

The quality of the rail network will be judged based on the number of services provided each day at times when the community needs them to be provided. Service improvements need to be targeted to make rail more viable as a transport alternative to private transport for regional travel (for a wide variety of trip purposes and travel times). Providing a standard level of service across the network is an important tool for communication and marketing.

The benefits from higher service levels include safety and traffic congestion along with local financial and economic benefits that flow from reducing household transport costs.

Improving service levels requires the following:

- Improving Frequency and Reliability;
- Improving Service Speed through better track conditions and better rolling stock fleet options (more flexible rolling stock in terms of passenger loads and interoperability under relevant line conditions) and maintenance regimes pertaining to track and rolling stock; and
- Providing alternatives linkages that will assist services recovery if services were lost on other current rail services.

Improving Frequency and Reliability

Regional rail services have been subject to significant service cuts and closures until the Regional Fast Rail project in 2005 reversed the decline in regional rail patronage. The passenger rail service between Ballarat and Melbourne is experiencing significant passenger growth that has been continuing for most of the past 15 years. This patronage growth is causing service capacity constraints with overcrowding on the trains and on the track in terms of reliability (as more and longer trains are added to cope with patronage growth).

Service Frequency and Span

The attractiveness and viability of the train network as an option to meet a range of transport needs depends on service frequency and span. Previous State government transport strategies have referred to minimum service standards related to frequency and span. The suggested minimum service standards for regional connections into Ballarat such as train and coach services include:

- Service Span of 15 hours (from 6am-9pm); and
- Service frequency of at least one service per hour in each direction.

Application of these service levels would need to take into account:

- Differentiation between modes (with regard to passenger perceptions);
- Modal integration along transport corridors;
- Common service types and common vehicle types along connected corridors that could respond to the demand; and
- Service frequencies required to provide flexibility in arrival and departure times similar to that provided with a car.

The Ballarat community should discuss and agree a position on service level expectations that will meet the needs of the local area and surrounding region. This discussion should note that service levels dictate how helpful the railway track can be to its community, and that a railway with very minimal services highlights an inefficient use of the fixed asset.

Reliability

The Ballarat Line Upgrade project is currently duplicating the track from Caroline Springs to Melton. This will leave a single line track from Melton to Ballarat with crossing loops at various locations to increase the bi-directional capacity of the track. Under the current timetable this would still have 34 service crossings a day, where one train has to physically stop in a crossing loop to allow the oncoming train to pass. This arrangement can have a significant impact on service reliability.

When additional Inter-Regional services from Bacchus Marsh to Melbourne are introduced, it is likely that further track duplication will be necessary to maintain service reliability.

Ultimately, full track duplication is required in order to operate a reliable railway with services in both directions. The finite limitation of each timetabled iteration of service for each track duplication level should be clearly modelled (if not already) and understood. This could help understand the constraints and opportunities to invest in additional track duplication.

As the metropolitan segment of the western railway line becomes busier, there will be a need for increased train capacity and services to those areas. The Western Rail Plan is investigating those issues and may result in the need for additional track capacity to ensure that service reliability and high speeds for regional services can be maintained. The Ballarat community are highly likely to support any initiatives focussed on reducing train travel times and improving service reliability.

Improve Service Speed

Service speed is the most important element of a train service in order to boost patronage. Trains on the Ballarat Line have been much faster historically than they are today, in part due to the capacity constraints impacting on reliability and passing loops dictating where trains can cross.

In addition, sufficient rolling stock is necessary, and of sufficient capacity to run the levels of service required. There needs to be a clear rolling stock cascade program which is underpinned by best for service units operating on lines based on their optimal deployment.

However, there are a range of other factors that can be resolved to improve the speed of rail services in the corridor. Particular attention should be given to the service scheduling process. The current train timetable has several inconsistencies that seem on first glance to be making the train services significantly slower. One example is the additional minutes that are added into the timetable for almost every train service as it passes through Ballarat. Typically, each service has a two minute layover at Ballarat Station to allow time for boarding and alighting and potential crew changes. However, this is unnecessary addition

to the travel time. At least one service in the timetable has the train arriving and departing at the same time (as happens at most stations) and many trains have been observed arriving and departing Ballarat in less than one minute (particularly if they are running late).

In 2004 the fastest train from Ballarat to Melbourne took 87 minutes. In 2006 the timetable boasted a Ballarat-Melbourne flagship service taking 64 minutes in each direction. The current timetable's best service time between Ballarat and Southern Cross is 73 minutes and many services often take as high as 92 minutes to traverse the 115-kilometre journey. By 2021 it is reasonable to expect a flagship Ballarat-Melbourne service taking no more than **60 minutes** in each direction. The Western Rail Plan is investigating the potential for higher operating speeds and could develop a plan for even shorter travel time. The direct line from Ballarat to Melbourne is constrained by hilly terrain as well as the multiple passing loops that need to be traversed.

Travel time variability

Of particular annoyance to passengers is the delay that occurs on most services (particularly those travelling through to Ararat or Maryborough). Trains arriving at Ballarat are typically scheduled to pause for several minutes. The time delay varies significantly and without any clear reason. The current timetable shows only one service that is not delayed at Ballarat. All other services are delayed by a seemingly random amount of time between one and twenty minutes.

For example, the 5:41pm arrival from Ararat each weekday waits at Ballarat Station for 20 minutes before continuing to Melbourne (enough time for the train to travel from Ballarat to Ballan). The delay may relate to the lack of passing loops between Ballarat and Ballan, but it still raises the question regarding why the train left its origin (Ararat) so early in the first place. The logic for including such variable delays and building them into the timetable (forcing them onto passengers) is unclear.

In 2004 each train service took 82-103 minutes to travel from Melbourne to Ballarat. In 2019 the variability has increased to 73-106 minutes. The variability in travel times has increased from 26% to 66% and reduces confidence in the service schedule. If travel times to Wendouree were considered, the 20 minute delay at Ballarat would increase variability even more. While sometimes the delay is partly due to the need to join or separate two trains, it remains a delay that is not appreciated by the passengers and causes some of them to drive rather than catch the train.

Restore and Upgrade Regional Rail Services

There is significant scope to reopen selected railway lines that had been closed or improve regional connections to attract an increased share of the overall transport task. Ballarat is a key regional destination for services and employment, attracting a large number of the commuters from surrounding regions and increasingly Melbourne's outer west. Of any location in Victoria, the focus for reintroduction of passenger services should be on the Ballarat-Geelong corridor in recognition of the strategic value of this link between the two regions and in recognition of the large number of car trips between the two centres that could be substituted using frequent rail-based trips.

Transport for Victoria has commissioned standard gauge version of the VLocity for use on the North East line to Albury/ Wodonga. The Murray Basin Rail project involves placing a standard gauge connection between Ballarat and Gheringhap. The commissioning of a standard gauge VLocity could enable the running a passenger rail service between Ballarat and Geelong at significantly lower cost than identified in a previous analysis.

There are numerous townships between Ballarat and Geelong that could also be served by such a passenger train corridor. Towns such as Meredith could benefit from an operational railway station and the Golden Plains populations of Bannockburn and Batesford.

The use of standard gauge track for passenger services could also enable passenger trains currently terminating at Maryborough to be extended to Dunolly, St Arnaud and Donald as mentioned in the Rail Futures InterCity Report.

Significant towns not included in either the Ballarat-Horsham or the Geelong-Ballarat-Bendigo Cross-Country connections could be complemented by Cross-Country coach-link services. Coach-based services can match or nearly match train-based frequency at train terminus or key interchange points. These will assist towns like Daylesford.

It is important the government be asked to update the Geelong-Ballarat-Bendigo Project Feasibility study in a manner that introduces a better contextualisation of the true economic benefit of these new options over a range of investment options.

Ballarat Metro Rail Service

Ballarat-based Metro Rail Services can be introduced similar to the initiative introduced into Bendigo and investigated for Geelong. The majority of rail commuters are currently using the train to access destinations in Melbourne. Rail trips originating and terminating between Wendouree and Ballarat stations and vice versa are currently low in frequency and could be increased in line with increased services offerings both in the Melbourne direction and in the Horsham direction. In between these times, complementary bus services could plug service gaps to provide a travel frequency more becoming of metro-based services.

This could be promoted for a short time using a range of Public Transport incentives. Timetabling and infrastructure currently aren't designed to specifically facilitate this type of travel. However, anecdotal evidence suggests commuters are already doing this trip which takes approximately 8 minutes between stations. Travel is principally from Wendouree station to Ballarat Station to access employment and services in the Ballarat CBD.

To facilitate this, track should be duplicated between Ballarat and Wendouree stations to accommodate an increase in movements and to accommodate a greater number of movements in both east-west directions.

Planning for Level Crossing Removals

Increased rail traffic within and through Ballarat could lead to increased disruption to local traffic at level crossings. It is considered prudent for the City of Ballarat, the community and transport authorities to plan for future grade separations at key locations and consider how future projects might facilitate the grade separations over time. If well-planned, level crossing removals can generate a range of benefits for the surrounding community related to transport amenity, social inclusion and perceptions of safety.

The most significant benefit of level crossing removal projects in Ballarat is likely to be the way such projects facilitate and stimulate economic development on sites that are close to the level crossing and would otherwise be left vacant.

It is noted that Ballarat already has seven grade separated crossings of the railway corridor in the urban area. These are concentrated in the east of Ballarat where the number of train services are highest. The Level Crossing Removal Project has published a *Site Prioritisation Framework* for assessing level crossing removal projects and testing the priority that should be allocated based on evidence of safety, congestion at place making at each level crossing. It is unlikely that any of the remaining level crossings in Ballarat would meet the criteria for prioritisation under this framework in the short term. This is mainly due to the number of trains and vehicles using each crossing.

A high-level analysis using this framework would help the Ballarat community understand and decide the priority between potential level-crossing removal locations such as Burnbank Street, Creswick Road, Gillies Street North, Macarthur Street and other potential locations.

3.3 Access and Stations

Enhancing station access to create larger station catchments

Railways of their very nature encourage larger-scale passenger movements for significant population centres like Ballarat. Efficient passenger movements can induce large patronage increases especially via network and service improvements. Providing enhanced access points can help distribute the city's transport load. Key points across the city become best service points by offering best localised access and bring more people into community with each other.

Best 'last mile' access adds to high amenity offering of the best cities. This is evident across many rail-based urban communities. Moreover, last mile access and increased amenity increases localised land value offerings and attracts better quality commercial offerings. In essence, good rail services and high quality urban environments surrounding the station go hand-in-glove with each other.

Enhancing access at key points across the city, enhanced local amenity and land use access ranks highly with best value land use solutions. Nowhere more is this evident than around stations and their precincts supported by natural station catchments.

There are currently a number of projects underway already to provide increased access and amenities to stations and station precincts. These include station master plans for Ballarat and Wendouree stations. Further growth of the rail network also presents opportunities to upgrade or build new stations at Warrenheip, the major events precinct and in future growth areas with rail connections such as Beaufort and Creswick.

These are all ideal places to also provide for interchange between all modes (bus, bicycle, pedestrian and car). Improvements also must include provision for marginalised individuals and groups such as the aged and people with disabilities. PTV's access policy should be fully implemented at every juncture in these areas, but there is not more urgent opportunity than where major urban upgrades occur within the active station precincts.

Ballarat Station

Ballarat railway station opened in 1862 and is of significant historical importance. Ballarat station is experiencing significant increases in patronage (averaging 4.3% p.a over the last 4 years¹). A master plan has been prepared for Ballarat station which will improve access, introduce a range of new uses, a new bus interchange on the northern side of the station and additional car parking. The *Ballarat Station Precinct Redevelopment* includes a range of features:

- New bus interchange
- Commuter car park with 405 spaces
- Apartment Hotel with 77 rooms
- Conference and events centre including a 300-seat theatre and dining options and 150 car parking spaces
- Public plaza

¹ Source: V/Line patronage data 2014-2018

A render of the proposed development (now under construction) is shown in Figure 3-1 below.

Figure 3-1: Ballarat Station Precinct Redevelopment



Source: *Regional Development Victoria website*

A key issue for the Ballarat station is the lack of DDA compliance. Current access between platform 1 and 2 is via stairs which remains a substantial barrier for people with limited mobility. In addition, the platform height does not enable easy access to the carriages. The big step between the carriages and platform is problematic for many passengers. These issues should be addressed as a priority.

Wendouree Railway Station

Wendouree railway station is experiencing the most significant patronage growth of any station in the region (averaging 15.4% annually over the last 4 years²). In 2009, this station became Ballarat's second station on the modern line. In the press release which accompanied the opening, the following provisions were highlighted:

- Bike racks and lockers;
- Local bus route realignment and re-routing to connect to Wendouree; and
- 200 car spaces able to be increased readily to 500 spaces.

The City of Ballarat and Department of Transport is currently developing a Master Plan for the Wendouree Station Precinct. The draft Master Plan identifies a number of development opportunities, provides an action plan for infrastructure upgrades, and facilitates the delivery of projects including works at Wendouree Station as part of the Ballarat Line Upgrade.

The draft Master Plan envisages significant land use change in the Core precinct following a transit orientated development model. It includes an activity centre and residential development surrounding the station. The draft Master Plan identifies a number of priority opportunities, such as improving:

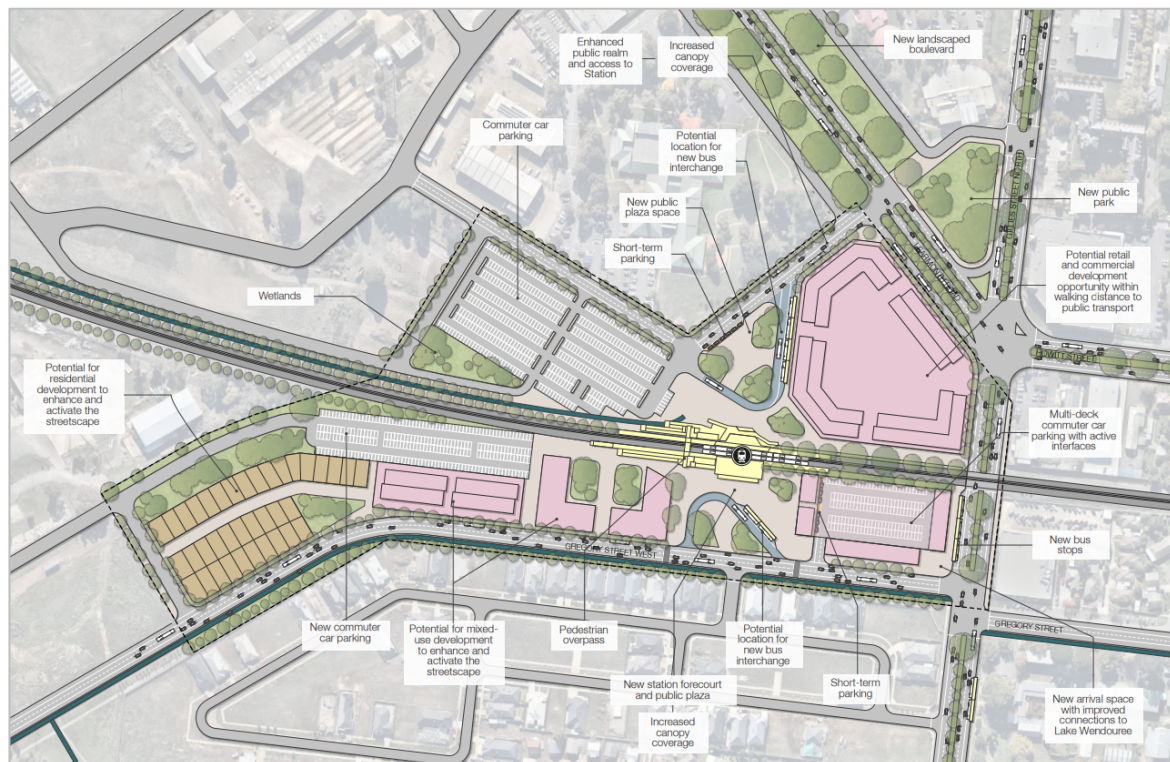
- Development opportunities for the revitalisation of the precinct including residential, retail and commercial opportunities;
- The function, usability and appearance of the precinct including a boulevard treatment of Learmonth Road;
- Access and movement for pedestrians, cyclists, vehicles and buses through:
 - A new pedestrian plaza and direct access from Gregory Street West;

² Source: *V/Line patronage data 2014-2018*

- Future additional car parking;
- Improved bus interchange to the north of the station; and
- A future bus interchange south of the station.

The draft Master Plan is shown in Figure 3-2 below.

Figure 3-2: Wendouree Station Precinct Draft Master Plan



Source: *Regional Development Victoria website*

Warrenheip Station

Warrenheip is located at the junction of the Melbourne and Geelong railway lines, eight kilometres from central Ballarat. The station was opened in 1873 and closed to passengers in 1981 as part of a state wide rationalisation of the rail network. The station could play an ideal park and ride role. The catchment of the station is likely to include a vast part of Ballarat and surrounding areas – due to its proximity to the Woodman’s Hill Freeway interchange. The proximity of the freeway and speed of trains through Ballarat means that residents in suburbs such as Delacombe (to the south west) and Miners Rest (to the north) could shorten their overall journey time by driving to Warrenheip – rather than driving to Wendouree or Ballarat.

Warrenheip also has a large amount of unencumbered space suitable for a park and ride facility. This would reduce the congestion around new mixed use facilities being developed at Ballarat and Wendouree Stations. A new Warrenheip station could also become a gateway station for Ballarat from Melbourne and Geelong, as part of a restored Geelong passenger rail connection, including a transfer point that would reduce the journey time from Ballarat to Geelong by train.

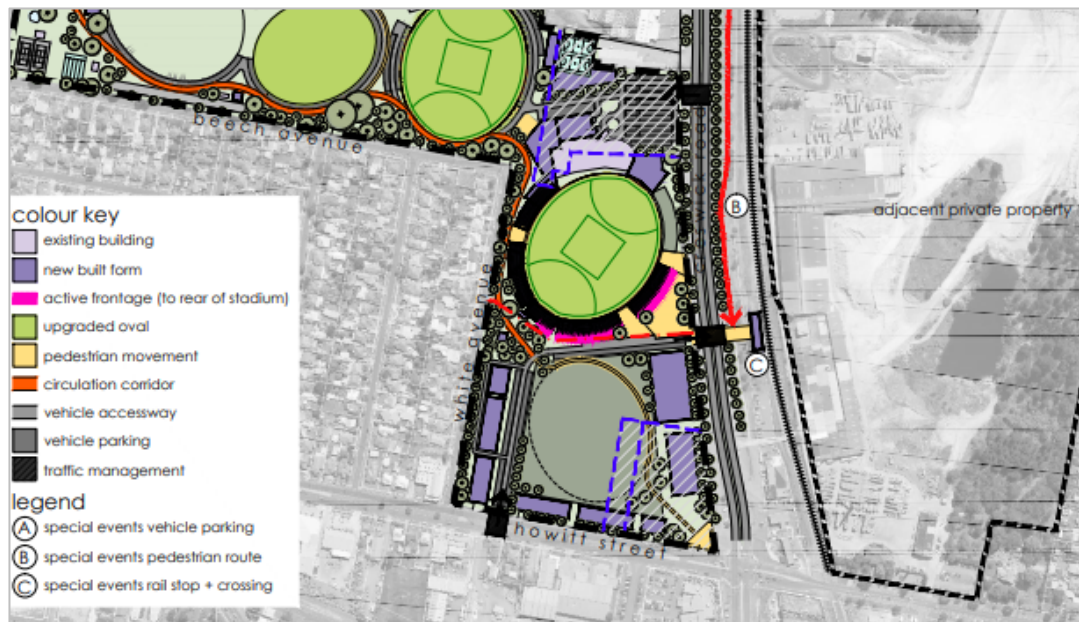
A Major Events Precinct station

Eureka (Mars) Stadium is located in the Ballarat Major Events Precinct and is the principal events stadium for the Ballarat region. It hosts a range of significant events including AFL matches and has a capacity for 11,000 people after a recent State government funded expansion in 2017. Further expansion of the precinct is envisaged with the Victorian government having already spent over \$30 million on Major Events Precinct projects. The Ballarat Strategy highlights the need for the “development of a new Special Events Rail Station along the eastern boundary adjacent precinct entry.”

Victoria's Major Event Stadia Strategy supports ‘more venues and events in regional Victoria through infrastructure... to enhance liveability and amenity for regional Victorians’. Further it states that Victoria needs to ‘Improve accessibility to the major venues network by better integrating transport and venues through... investment targeted at transport infrastructure and services’.

The Ballarat Major Events Precinct Master Plan has been developed and identifies the site for a future railway station approximately 250m north of Howitt Street on the Maryborough line as shown in Figure 3-3 below.

Figure 3-3: Ballarat Major Events Precinct Master Plan



Source: Ballarat Major Events Precinct Master Plan

This new railway station is essential to ensuring that Eureka Stadium can play the role envisaged for it by the Victorian Government and its Major Event Stadia Strategy. It should be a priority infrastructure project for the region to reduce the need for people to drive to major events and reduce the pressure that major events place on the local road network in the area, minimising the negative impacts felt by the surrounding community.

As a park and ride station this location would have some usage provided that the number of train services at the station matched that in Ballarat. For comparison, there is more existing urban activity and catchment area at this location than there is at the new Epsom Station recently built in the north of Bendigo. This location has the advantage of also providing for trips from Melbourne (Footscray in particular) to Ballarat by train for the AFL games that are scheduled at Eureka Stadium.

A park and ride station in this area, with the close proximity of the Western Freeway and large amounts of relatively unused car parking (that is required for the football matches) would have similar success to other

park and ride locations if frequent train services are provided. This would reduce congestion on the Western Freeway and improve availability of parking at the existing Ballarat and Wendouree Stations. There would also be scope to expand the range of activities in the precinct similar to that envisaged through the Wendouree Station Precinct Master Plan.

Growth Area Rail Connections

Ballarat's major growth front is to the west and is expected to accommodate the majority of the short and medium term greenfield residential expansion of the city. The *Ballarat Long Term Growth Options Investigation* is a feasibility study to determine which (if any) of the three Growth Investigation Areas (GIAs) had the ability to accommodate future residential development. The project investigated the environmental, economic, physical and community infrastructure constraints and opportunities of each of the three GIAs.

The Ballarat Strategy identifies several long-term greenfield investigation areas to be considered for their long-term development potential. A decision on which, if any, of these options is preferred, and in what order or form they may or may not take has not yet been made by Council. If opportunities arise, railway stations north of the Western Freeway on the Maryborough line, or west of Ballarat on the Ararat line should be considered as part of future Precinct Structure Planning.

Such stations could form part of the Ballarat Metro rail connection into Ballarat and Wendouree Stations, as well as connections to Melbourne and Geelong. Any future long-term greenfield growth should be assessed for possible rail connections at an early stage as part of integrated land use and transport planning.

3.4 Freight

In 2012, freight volumes between Melbourne and Ballarat constitute around 125 freight vehicle movements per day between the two cities. This is expected to grow to 195 freight vehicle movements per day by 2030. As the freight tasks grows, there is increased potential to use rail for freight movements.

Significant efficiencies can be gained from reducing freight transportation on roads and finding ways to connect seamlessly with key ports in Geelong and Bay West. An Intermodal Freight Hub has also been proposed to be located west of Wendouree Station. Finally, passengers and freight separation will further streamline efficiencies. High-quality access to the rail network has the potential to reduce freight costs for business and improve their competitive advantage. This is a significant issue for BWEZ, as high-quality access typically requires a railway siding extending into the business premises. The arrangement of lots and protection of land with direct railway frontage will be an important consideration as BWEZ develops.

Passenger-Freight Rail Separation Project

The project seeks to separate freight and passenger trains in the core of Ballarat's rail network, to provide faster and more reliable freight paths from the Murray Basin region to ports and reduce the potential for delays to passenger trains. The project will:

- Separate freight and passenger rail pathways through the Ballarat station precinct - separating broad gauge passenger services from standard gauge freight service
- Cater for a minimum of 42 weekly return freight paths from the Murray Basin region through Ballarat with the ability to increase to 65 if required via the Ararat and Maryborough loop
- Upgrade old signalling systems
- Improve line speed for freight services within the Ballarat precinct through improved track geometry and the removal of congestion points; and
- Provide for the future uplift of passenger services including:
 - a fifth weekday passenger service to Ararat

- future additional services to Maryborough
- potential future passenger services to Dunolly.

The topic of track gauge has the potential to distract from the needs of the Ballarat community. In short, the Ballarat community need two things from the heavy rail network:

- Fast, frequent and reliable passenger services
- Freight services that reduce the need for truck movements through Ballarat

It is of little consequence to the Ballarat community what gauge the train uses to provide either freight or passenger services. However, in planning the track geometry and signalling systems the Ballarat community should require that any track can be used for passenger services.

Getting Freight onto Rail

Victoria's current freight ports currently focus on the Ports of Melbourne, Geelong, Hastings and Portland. Rail access to various ports for Ballarat-based businesses is critical to reducing the amount of trucks on local roads. Reducing truck traffic requires a coordinated approach to providing freight rail services between Ballarat and the State's ports.

Infrastructure Victoria has identified Bay West as the future site for Melbourne's second major container port. It will be important that Bay West be provided with high-quality freight rail access. Improving rail freight access to all key ports could be an important strategic advantage for Ballarat-based businesses.

A waste to energy plant is proposed for Ballarat West Employment Zone south of the railway line opposite the proposed Intermodal Freight Hub. It is envisioned that a Waste to Energy plant would be able to accept waste from western areas of metropolitan Melbourne and via rail. This is of significant interest given the recent application of multi-national bans on accepting Australian waste and recycling material.

BWEZ Intermodal Freight Hub

The Intermodal Freight Hub proposed for Ballarat West Employment Zone (BWEZ) will help to reduce heavy vehicle traffic on the road and has the potential to reduce freight costs for local businesses. The Intermodal Freight Hub is located west of Wendouree Station and currently only has a broad-gauge railway line servicing the site. Depending on the changes that get made to the Ballarat-Geelong corridor, there may need to be commensurate changes to the Wendouree corridor so as to retain the ability for freight trains to reach the BWEZ.

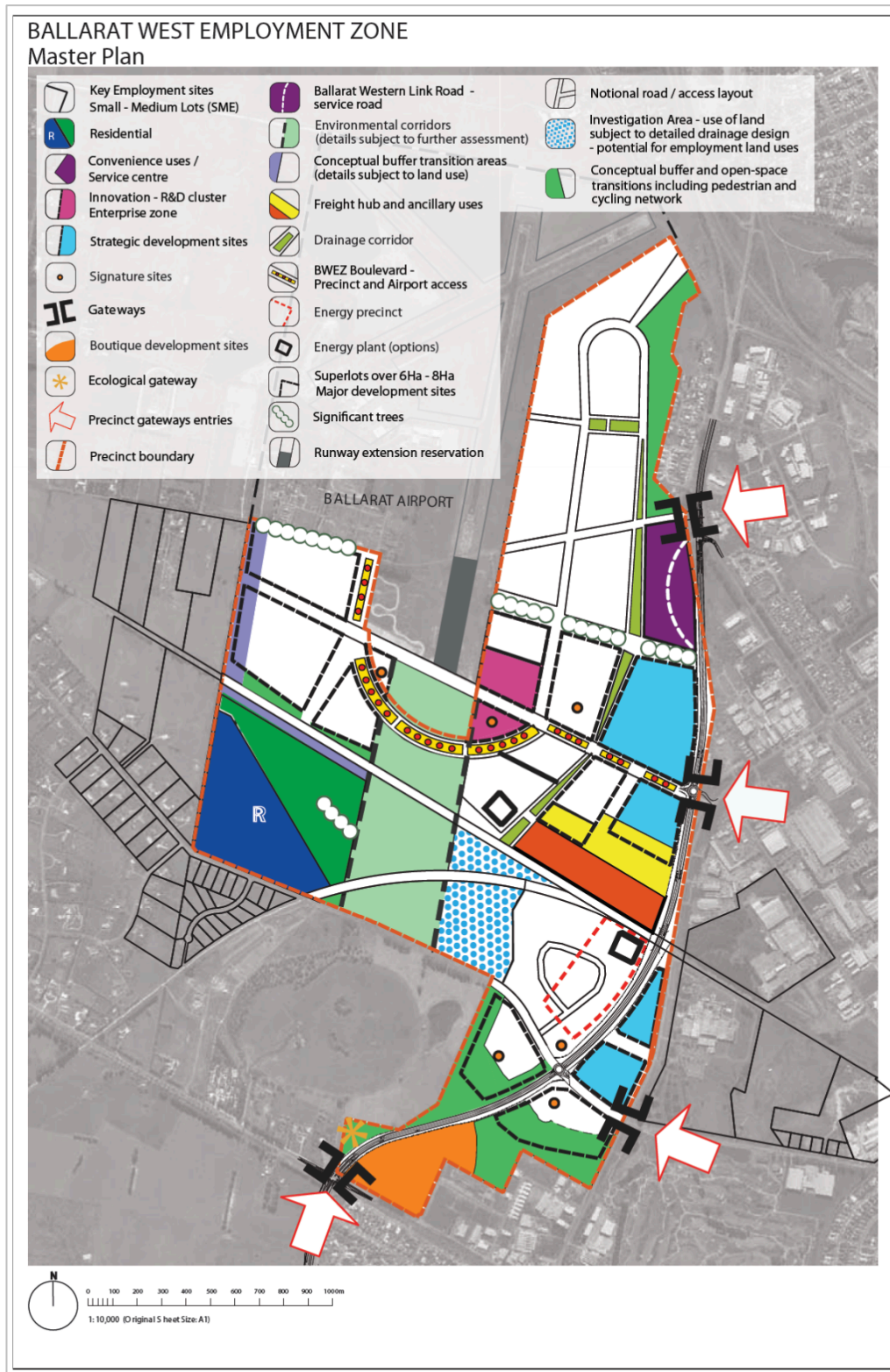
To enhance the capability of the Intermodal Freight Hub and provide direct access to the Port of Geelong, a standard gauge freight line should be constructed from the future Intermodal Freight Hub at BWEZ to connect with the Murry Basin Rail project. The 3.5km link could be provided in the existing corridor from the North Ballarat junction to the Intermodal Freight Hub. This will allow standard gauge freight trains to access the Port of Geelong. Due to constraints in the Wendouree Station precinct, the potential for dual gauge would need to be explored.

The long-held intention of the BWEZ freight hub is to be the Western gateway to the Metropolitan Freight Terminal Network, with freight trains to act as a port shuttle. The Ballarat Freight Hub—Proposal Summary noted:

A feasibility study was undertaken in 2009/2010 to evaluate and recommend the most appropriate physical location to develop an Intermodal Freight Hub that will service current and future freight needs for Ballarat and the Region. The study determined that there would be insufficient demand for balanced rail freight services to support that component of the Freight Hub until approximately 2030. The strategy using a dedicated port rail shuttle is consistent with the intent of the Victorian Freight Futures strategy.

The location of the BWEZ Freight Hub is shown by the orange and yellow in Figure 3-4 below.

Figure 3-4: Ballarat West Employment Zone Freight Hub



Source: Ballarat Planning Schemem (Ballarat West Employment Zone Master Plan)

The relocation of anchor tenants to the BWEZ freight hub including CHS Broadbent has resulted in demand for rail freight access being significantly ahead of projections and could be sufficient to make the rail component of the Intermodal Freight Hub viable in the near future. In this regard Regional Development Victoria has stated:

While it was initially envisaged that the freight hub would evolve from being road based only to road and rail over the long term, the establishment of Broadbent Grain (on BWEZ land immediately adjacent to the BIFH) and its significant freight demand (at least 300,000 tonnes of export containerised grain per annum initially) has meant that operator respondents to the EOI have envisaged a rail based solution from the outset, shipping by rail direct to the Port of Melbourne. Other potential rail freight loads are also being identified.

Other interest in rail operations at BWEZ is also being identified, although the BIFH is not reliant on these proposals going ahead to be viable.

In addition, the City of Ballarat has signed a non-binding heads of agreement with Malaysian Resources Corporation Berhad (MRCB) for the completion of a feasibility study into a waste to energy plant at BWEZ. The concept includes processing up to 400,000 tonnes of waste per annum. Ballarat's current waste load is less than 10% of this total, so it is expected that 90% of the waste would arrive by rail. If the project proceeds, the facility will need dedicated rails sidings on the southern side of the rail corridor.

3.5 Innovation

Ballarat has an established rail industry including Alstom, Bombardier and UGL Ballarat. The presence of three rail companies in Ballarat is part of the historical legacy from the time when Ballarat was a central node on the network, with cheaper land options than central Melbourne. These sites compliment other installations that rail companies have in Newport, Dandenong and West Melbourne. There are a range of innovations that these global companies are developing. The Ballarat community (including Council, Federation University and others) should seek to understand how they can collaborate with the heavy rail industry to leverage more local skills into the rail sector.

For example, Alstom have developed a hydrogen fuelled train (the Coradia iLint) which commenced passenger service in September 2018 in Germany. The train has a range of up to 1,000km and a top speed of 140km/h. There are a range of innovations that the Ballarat community could work with railway companies to bring to fruition. Key to facilitating such collaborations will be identifying the particular strengths that the Ballarat business and education communities can bring to the railway engineering sector and building collaborative partnerships between the various organisations.

This would provide Ballarat with several advantages:

- Enhancing the innovation and industrial sectors that Ballarat is already known for;
- Providing opportunities to pilot new innovations within the local market;
- Helping to establish Ballarat as an innovation and leadership city in Victoria.

The City of Ballarat should investigate the ways in which various organisations can collaborate regarding rail innovation.

3.6 Heritage Rail and Tourism

Steamrail operates heritage passenger rail services across Victoria and operates several services in Ballarat over two-days in conjunction with Ballarat Heritage weekend. In 2019, these passenger services will be the only passenger services on the Ballarat-Geelong corridor (the shuttles are travelling between Ballarat and Lal Lal).

Steamrail Victoria utilise some existing storage at Bombardier's Ballarat East Depot. There seems to be a range of opportunities to expand tourism related heritage rail passenger services in the Ballarat Region. This is in part due to the number of railway corridors and actual tracks that remain in the region, coupled with a vibrant and active railway engineering industry (making access to railway expertise and machinery easier than in other places).

The Ballarat community should investigate the potential to enhance Steamrail Victoria presence in Ballarat. This could be in the form of promoting volunteer opportunities, engaging with relevant community groups, collaborating with industry partners (across all industries including tourism, rail engineering and food) or finding interesting sites to operate heritage services to on a regular basis. For example, operating heritage services to Creswick could link in with various events held in either Ballarat or Creswick and provide a more consistent and efficient approach to operating steam trains in the Ballarat area.

Combined with a new station at the Major Events Precinct, Steamrail could also help achieve objectives of the State Major Events Stadia Strategy and Tourism Strategies through provision of a steam passenger service to Eureka Stadium.

4. CONCLUSION

Since 1862, the railway network around Ballarat has been integral to the economic development of the city. The railway connections have been critical for economic activity, fostering employment opportunities and linking to sub-regional communities.

The importance of passenger and freight rail services is again increasing as the population in Ballarat and other centres including Melbourne increases. Having efficient public transport connections between regional towns and cities is essential to Victoria's future economic prosperity. For Ballarat these connections increase economic activity, access to education and employment, facilitate community connections and improve transport safety.

Passenger growth on Ballarat rail services has been high over the past 5 years, and is expected to continue to grow rapidly as population and traffic congestion grow. Over 1 million passenger boardings are expected at Ballarat stations in 2021 and this is expected to grow to over 1.7 million boardings per year by 2041.

The Ballarat community should continue investing in rail infrastructure and services with a focus on:

- Restoring passenger services between Ballarat and Geelong;
- Increasing the frequency, reliability and span of services;
- Improving access to services with additional stations and high amenity precincts around all stations;
- Provision of intermodal freight facilities at Ballarat West Employment Zone; and
- Innovation in railway technology and celebration of Ballarat's railway heritage.

The community should also note the railway improvements closer to Melbourne such as track duplication and electrification serve to significantly improve the future services provided to Ballarat. In essence, travel times will become more reliable, and services will be less congested than otherwise following improvements along other parts of the network.

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