

Greater Shepparton City Council

THE SHEPPARTON – MELBOURNE RAIL CORRIDOR



A Guide to Proposed and Planned Infrastructure Projects

July 2017

John Hearsch Consulting Pty Ltd

The Shepparton – Melbourne Rail Corridor

A Guide to Proposed and Planned Infrastructure Projects

Contents

1. Overview	3
2. Infrastructure implementation sequencing	7
3. Project outcomes	8
4. Detailed project listings	9
Inland Rail – lowering of rail track levels under overline structures Melbourne-Mangalore for double stacking	9
New connection Albion to Truganina for access to proposed WIFT facility	10
New Western Interstate Freight Terminal (WIFT) facility at Truganina	11
Seymour – track and signalling alterations	12
Seymour-Shepparton – level crossings upgrading	13
Mangalore-Shepparton – track upgrade Class 3 to Class 2	14
Seymour-Shepparton – Automatic Block Signalling to replace Train Orders safeworking system ..	15
Tabilk – new 1500m crossing loop	16
Shepparton – VLocity stabling and servicing facility	17
Shepparton – expanded train crew facilities	19
Craigieburn to Seymour – provision of Automatic Block signalling	20
Interim Wallan turnback facility	21
Wallan and Donnybrook – station upgrading	22
Beveridge – new station	23
Lockerbie – new station	24
Dysart-Seymour – duplication of Goulburn River bridge	25
Essendon – Buckley Street level crossing removal	26
Essendon – turnback facility	27
Glenroy – Glenroy Road level crossing removal	28
Melbourne Metro completion	29
Upfield line diversion comprising:	31
Signalling upgrading North Melbourne-Upfield for express services	31
Gowrie-Upfield duplication	31
Relocation of Upfield stabling facilities	31
Upfield-Roxburgh Park rehabilitation and duplication	31
Roxburgh Park –grade separated junction	31
Roxburgh Park – Craigieburn quadruplication	31
Craigieburn – additional platforms	31
Craigieburn – Wallan electrification	32
Southern Cross – Melbourne Airport railway	33
Melbourne Airport – Oaklands Junction link	35
Oaklands Junction – Wallan link (via OMR)	36
Wallan Interchange facility and train stabling	38
Wallan – Seymour track upgrade Class 2 to Class 1 using gauge convertible sleepers	39
Wallan – Seymour – Shepparton standard gauge conversion	40
Shepparton – Tocumwal and (if reopened) Shepparton-Dookie standard gauge conversion	41
Toolamba – Echuca – Deniliquin standard gauge conversion	42

The Shepparton – Melbourne Rail Corridor

A Guide to Proposed and Planned Infrastructure Projects

1. Overview

Prepared for the City of Greater Shepparton, this paper sets out details and a logical sequence for implementation of proposed and planned rail infrastructure projects that have relevance to the Melbourne-Shepparton rail corridor.

Shepparton is Victoria's fourth largest regional centre. However, its present rail services do not cater well for the area's increasing population – currently approximately 67,000 with over 90,000 in its catchment area extending to the NSW and beyond. Passenger demand is depressed due to the limited relevance of the timetables to customer needs, uncompetitive journey times and aging rolling stock. The rail service deficiencies are mainly a product of inadequate infrastructure which has received little significant investment over a very long period.

Melbourne to Seymour and Shepparton is the only regional rail corridor from Melbourne that was not part of the former Regional Fast Rail (RFR) project (2002-2006) and little has changed since. The more recent \$4 billion Regional Rail Link (RRL) project provided further significant enhancement to Geelong, Ballarat and Bendigo line services but had no bearing on North-Eastern or Goulburn Valley services. The Ballarat line received a further \$518 million allocation in the 2016/17 State Budget for major upgrading while the Gippsland line received \$435 million in the 2017/18 State Budget for the same purpose.

Shepparton and the Goulburn Valley region is significantly disadvantaged relative to the other major regional centres within a comparable distance from Melbourne. For example, Bendigo with a catchment area of similar size and distance from Melbourne, but with almost 50% greater population, currently has 22 weekday services each way to and from Melbourne. From January 2017, Shepparton has four. Significant improvement in service frequency will not be possible without appropriate infrastructure investment.

Shepparton trains are also much slower than those on the Bendigo line. The fastest Bendigo service takes 92 minutes at an average speed of 106 km/h. The fastest Shepparton service takes 145 minutes - an average speed of 75 km/h. Investment since 2002, both in new rolling stock and the Bendigo line infrastructure explains almost all of the difference. Shepparton trains are actually slower now than 20 years ago. They have used the same locomotives and carriages for more than the past 30 years.

Rail passenger services to Seymour and Shepparton are also significantly constrained by developments that will increasingly affect transit of these trains through the metropolitan area. In the absence of other actions, the coming operation of additional metropolitan services on the Craigieburn and Upfield lines and later, electrification to service the burgeoning Wallan, Beveridge and Donnybrook areas, will further impede Seymour and Shepparton services. The result will be that no satisfactory regional passenger service will be possible on this corridor when the infrastructure is shared with an intensively operated metropolitan service.

All of these issues can be resolved and passenger services to Seymour and Shepparton progressively enhanced through a well planned and sensibly implemented programme of short, medium and longer term infrastructure investments along the Melbourne-Seymour/Shepparton rail corridor, including the longer term diversion of these services to operate via Melbourne Airport. These

investments must also be dovetailed with other planned projects on the relevant corridors within the metropolitan area.

There are also proposals for conversion of the corridor from broad gauge (1600 mm or 5'3") network to standard gauge (1435 mm or 4'8½") in line with similar gauge standardisation works being implemented elsewhere on the Victorian rail network.

While the overall cost of a basic gauge conversion scheme for the Goulburn Valley and connecting lines is likely to be relatively modest at around \$100 million (including conversion of passenger rolling stock), the main benefits of such a project would accrue to freight, rather than to passenger traffic. In part, this is because standardisation would encourage multiple rail operators to enter the Victorian market, thus providing more aggressive competition with long distance road transport. The likely result is that increased volumes of rice, grain and other commodities would be transported by rail and other new opportunities would also emerge for rail freight.

A basic conversion scheme would not, of itself, involve any upgrading of the existing railway, but would simply reduce the distance between the rails by 165 mm, generally by using mechanised equipment to relocate one rail on the existing timber or gauge convertible concrete sleepers and track modifications on bridges and through level crossings. It would also require conversion to dual gauge of several tracks in Seymour and Echuca yards and associated signalling alterations.

If undertaken in the short term, standardisation of the Goulburn Valley lines as a standalone project would result in passenger and freight traffic being diverted from the broad gauge double line south of Seymour onto the single standard gauge line controlled by ARTC. This has significant downsides for efficient operation of Shepparton passenger services, and would raise many of the issues that have plagued V/Line Melbourne-Albury services since their conversion to standard gauge in 2011. That service has endured ongoing disruption and very poor reliability which has seriously damaged its reputation. This may also be partly attributable to the split responsibility between ARTC for infrastructure and V/Line for rolling stock and operations. There is ample anecdotal evidence to suggest that this has blurred accountability and led to ongoing blame shifting.

A more strategic and sustainable approach would be for gauge conversion of all broad gauge infrastructure north of Wallan to coincide with the proposed Melbourne Airport to Wallan link as detailed in this paper. It would also include conversion of the broad gauge lines between Wallan and Seymour and, once upgraded, enable Albury line passenger trains to again use the double track former broad gauge lines south of Seymour. Under this scenario, all north-eastern passenger trains would be diverted via the Melbourne Airport link, interchanging with metropolitan services at Wallan. Standard gauge freight trains would continue to use the ARTC corridor. This would produce an optimal outcome for both passenger and freight traffic.

This paper seeks to put some order, rationale and scope descriptions into the array of projects, some proposed in the March 2017 Passenger Services Improvements report to the Council¹, and others being implemented or proposed in Government documents and plans, that will be required over the coming years to overcome the present infrastructure deficiencies. The projects include those on the direct Melbourne-Seymour/Shepparton corridor and connecting lines, those in the metropolitan area that interact with the corridor and other wider development projects that will also have a direct or indirect effect on the corridor.

¹ "Shepparton Passenger Services Project – Passenger Improvements – 2017 Updated Report, GHD March 2017

In this context, the paper deals with the following projects:

Seymour-Shepparton corridor and connecting lines – Passenger and Freight Projects

- Seymour – track and signalling alterations
- Seymour-Shepparton – level crossings upgrading
- Mangalore-Shepparton – track upgrade Class 3 to Class 2
- Seymour-Shepparton – Automatic Block signalling to replace Train Orders safeworking system
- Tabilk – new 1500m crossing loop
- Shepparton – VLocity stabling and servicing facility
- Shepparton – expanded train crew facilities
- Seymour-Shepparton standard gauge conversion
- Shepparton – Tocumwal and (if reopened) Shepparton-Dookie standard gauge conversion
- Toolamba – Echuca – Deniliquin standard gauge conversion

Melbourne-Seymour corridor (excluding metropolitan projects)

- Inland Rail – lowering of rail tracks beneath overline structures Melbourne-Mangalore for double stacking
- Craigieburn-Seymour – provision of Automatic Block signalling
- Interim Wallan turnback facility
- Wallan and Donnybrook – station upgrading
- Beveridge – new station
- Lockerbie – new station
- Dysart-Seymour – duplication of Goulburn River bridge
- Wallan – Seymour track upgrade Class 2 to Class 1 using gauge convertible sleepers
- Wallan-Seymour standard gauge conversion

Metropolitan area projects (relevant to the Seymour/Shepparton corridor)

- Essendon – Buckley Street level crossing removal
- Essendon – turnback facility
- Glenroy – Glenroy Road level crossing removal
- Melbourne Metro completion
- Upfield diversion comprising:
 - Gowrie-Upfield duplication
 - Upfield-Roxburgh Park rehabilitation, duplication, electrification
 - Roxburgh Park –grade separated junction
 - Roxburgh Park – Craigieburn quadruplication
 - Craigieburn – additional platforms
- Craigieburn – Wallan electrification
- Wallan Interchange facility and metro train stabling

Wider network development projects

- Inland Rail – new connection Albion to Truganina for access to proposed WIFT facility
- New Western Interstate Freight Terminal (WIFT) facility at Truganina
- Southern Cross – Melbourne Airport railway
- Airport – Oaklands Junction link
- Oaklands Junction – Wallan link (via OMR)

Section 2 of the paper provides an overview of the most likely sequencing of these projects assuming they are progressively funded and approved for implementation.

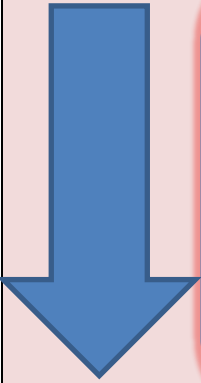
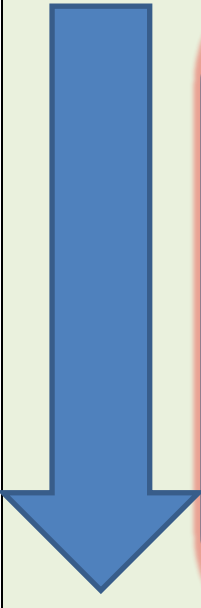
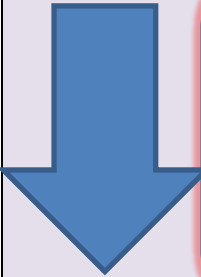

Section 3 of the paper provides a generalised appreciation of the project outcomes, particularly as to the benefits which are expected to accrue to Shepparton, the wider Goulburn Region and Victoria as a whole.

Section 4 is a detailed listing, project by project, showing in each case:

- Project high level description and scope
- Potential timing
- Likely cost
- Potential funding source
- Project precursors (where applicable)
- Purpose and benefits
- Timing implications
- Network and operational implications
- Explanatory notes

2. Infrastructure implementation sequencing

Below is an indicative project sequencing programme covering the following periods:

Timelines	Projects
2017  2021	<ul style="list-style-type: none"> • Essendon – Buckley Street level crossing removal • Glenroy – Glenroy Road level crossing removal • Craigieburn to Seymour – provision of Automatic Block signalling • Wallan and Donnybrook – station upgrading • Interim Wallan turnback facility • Seymour – track and signalling alterations • Seymour - Shepparton –upgrading of 32 level crossings • Mangalore - Shepparton – track upgrade Class 3 to Class 2 • Seymour - Shepparton – Automatic Block Signalling to replace Train Orders safeworking system • Tabilk – new 1500m crossing loop
2021  2026	<ul style="list-style-type: none"> • Shepparton – VLocity stabling and servicing facility • Shepparton – expanded train crew facilities • Inland Rail – lowering of rail track levels under overline structures Melbourne-Mangalore for double stacking • New connection Albion to Truganina for access to proposed WIFT facility • New Western Interstate Freight Terminal (WIFT) facility at Truganina • Lockerbie – new station • Beveridge – new station • Essendon – turnback facility • Melbourne Metro completion • Upfield line diversion comprising: <ul style="list-style-type: none"> • Signalling upgrading North Melbourne-Upfield for express services • Gowrie-Upfield duplication • Relocation of Upfield stabling facilities • Upfield-Roxburgh Park rehabilitation and duplication • Roxburgh Park –grade separated junction • Roxburgh Park – Craigieburn quadruplication • Craigieburn – additional platforms
2026  2031	<ul style="list-style-type: none"> • Craigieburn – Wallan electrification • Wallan Interchange facility and metro train stabling • Southern Cross – Melbourne Airport railway • Wallan – Seymour track upgrade to Class 1 using gauge convertible sleepers • Dysart - Seymour – duplication of Goulburn River bridge • Wallan – Seymour – Shepparton gauge conversion • Shepparton – Tocumwal and (if reopened) Dookie gauge conversion • Toolamba – Echuca – Deniliquin gauge conversion
2031  2036	<ul style="list-style-type: none"> • Melbourne Airport – Oaklands Junction link • Oaklands Junction – Wallan link (via OMR)

3. Project outcomes

The projects listed above are important enablers for a range of significantly improved passenger and freight services, many of which will be of direct benefit to Shepparton and the wider Goulburn Region. The potential outcomes are listed below in timelines corresponding to those in Section 2.

By 2021:

- Loco-hauled passenger trains replaced with VLocity railcars operating up to 8 return trips on weekdays and 7 on weekends with average trip times of 2 hours, 20 minutes via Broadmeadows for services running express between Seymour and Broadmeadows. Regional/metro interchange retained at Broadmeadows.
- Additional freight services operate between Melbourne and Tocumwal, making use of the crossing loop at Tabilk.

Between 2021 and 2026:

- VLocity railcars operating 9 return trips on weekdays and 8 on weekends with average trip times of 2 hours 15 minutes via Upfield for services running express between Seymour and Craigieburn. Regional/metro interchange relocated to Craigieburn.

Between 2026 and 2031:

- VLocity railcars operating 9 return trips on weekdays and 8 on weekends with average trip times of 2 hours 15 minutes via Upfield for services running express between Seymour and Craigieburn. Slower trip times through the metropolitan area following electrification to Wallan are offset by faster running between Wallan and Seymour following track upgrading. Regional/metro interchange relocated to Wallan.

Between 2031 and 2036:

- New bi-modal trains introduced in preparation for services to be diverted via Melbourne Airport.
- New bi-modal trains replace VLocity railcars and operating 10 return trips every day with average trip times of 1 hour 55 minutes to Southern Cross via Melbourne Airport (1 hour 40 minutes to the Airport). From Seymour, services stop at Wallan, Melbourne Airport and Sunshine only. Regional/metro interchange at Wallan and Sunshine.

Possibilities beyond 2036:

- High Speed Trains operating Melbourne to Sydney and Canberra via Melbourne Airport, Shepparton and Albury/Wodonga.
- Reopening of passenger services Melbourne to Echuca via Toolamba and Kyabram.
- Reopening of freight line Tocumwal to Narrandera enabling diversion of Griffith area freight trains via Shepparton and providing an alternative inland rail corridor Melbourne to Brisbane via Shepparton.
- Rail freight bypass line added to Goulburn Valley Highway bypass with connection to major GV Link intermodal freight terminal and freight precinct.

4. Detailed project listings

Project high level description and scope	Inland Rail – lowering of rail track levels under overline structures Melbourne-Mangalore for double stacking As an integral part of the Melbourne-Brisbane Inland Rail project, the existing ARTC standard gauge line has to be lowered beneath overline bridges at approximately 18 locations between Albion and Mangalore to provide 7.1m clearance above rail level so as to enable double stacking of containers on rail wagons.
Potential timing	Complete by 2024
Likely cost	Approximately \$250 million
Potential funding source	Commonwealth Government equity contribution to ARTC
Project precursors (where applicable)	None
Purpose and benefits	To enable double stacking of containers between Melbourne and Brisbane and between Melbourne and Perth (both via Parkes). Benefits are reduced unit costs for line haul of containers through improved asset utilisation.
Timing implications	Intention is to complete by 2024 so that double stacking of containers can occur between Melbourne and Brisbane via Inland Rail from day one of operations. For this to occur, the WIFT facility project also needs to be completed as double stacking is not possible via the existing corridor into the Melbourne Dynon area freight terminals, principally due to the tight dimensions of the Bunbury Street tunnel under Footscray.
Network and operational implications	The major implication of this project is an anticipated major uplift in the rail market share of freight (possible 300% increase over 5 years) between Melbourne and Brisbane. In addition, to take advantage of its potential double stacking capability, some Melbourne-Perth services which now operate via Adelaide, are likely to be diverted to instead operate via Parkes and Broken Hill. These factors could produce an up to four-fold increase in train numbers operating on the ARTC corridor between Melbourne and Albury. In turn, this will drive the need for early consideration of completing duplication of the standard gauge line between Jacana and Seymour.
Explanatory notes	Provision of double stacking clearance has to occur over the entire route of the proposed Melbourne-Brisbane Inland Rail corridor before it can be utilised as such. In addition, the proposed WIFT terminal facility and its connecting links to the ARTC network would need to become operational as double stack trains cannot operate from the present Melbourne end interstate rail terminals in the Dynon area. When completed, these projects will also allow trains conveying double stacked containers to operate between Melbourne and Perth, running via Albury, Parkes and Broken Hill instead of via Adelaide.

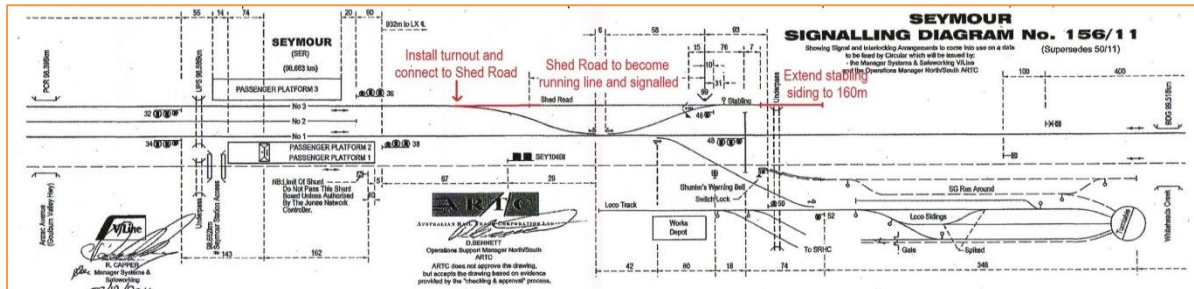


Double stack container train

Project high level description and scope	New connection Albion to Truganina for access to proposed WIFT facility. The WIFT project at Truganina is complementary to, but not part of the Melbourne-Brisbane Inland Rail Project. To connect to the proposed WIFT site, a new two-track rail corridor is to be established between a point north of Albion on the ARTC interstate line and Truganina, as shown on the attached maps
Potential timing	Complete by 2024
Likely cost	Approximately \$500 million
Potential funding source	Anticipated Commonwealth Government equity contribution to ARTC
Project precursors (where applicable)	The proposed corridor has yet to be protected through Planning Scheme amendments and subsequent acquisition processes.
Purpose and benefits	To provide access to the proposed Western Interstate Freight Terminal (WIFT) at Truganina. Benefits are to enable introduction of double stacking of containers between Melbourne, Brisbane and Perth (via Parkes) and overall improved terminal capacity and efficiency for interstate and other rail freight services..
Timing implications	Intention is to complete by 2024 so that double stacking of containers can occur between Melbourne and Brisbane via Inland Rail from day one of operations. For this to occur, in addition to the new rail corridor between Albion and Truganina to provide a connection into the proposed WIFT facility, the modification of rail tracks beneath all overline structures also needs to be completed as double stacking is not possible via the existing corridor into the Melbourne Dynon area freight terminals, principally due to the tight dimensions of the Bunbury Street tunnel under Footscray. This project can be regarded as an interim solution as the longer term proposition is to connect the WIFT facility directly into the Outer Metropolitan Ring (OMR) corridor from its western boundary with rail connections both north-east towards Sydney and Brisbane and south-west towards Adelaide and Perth.
Network and operational implications	The proposed new corridor will interface with the existing ARTC interstate corridor approximately 1km north of Albion through an at-grade junction. This connection will be used for trains to and from Albury, Sydney and Brisbane. Trains proceeding to and from Adelaide and Perth will use a connecting link which interfaces with the existing ARTC interstate corridor near Albion station through a further at-grade junction (see accompanying map). Westbound trains would then travel via Tottenham Junction, Brooklyn and Newport before proceeding directly towards Geelong. Provision of double stacking clearance has to occur over the entire route of the proposed Melbourne-Brisbane Inland Rail corridor before it can be utilised as such. When completed, this will also allow trains conveying double stacked containers to operate between Melbourne and Perth, running via Albury, Parkes and Broken Hill instead of via Adelaide.
Explanatory notes	

Project high level description and scope	New Western Interstate Freight Terminal (WIFT) facility at Truganina. The purpose of this proposed major facility is to replace the existing interstate rail freight terminals at South Dynon and North Dynon. The terminal would be located on a 300ha site at Truganina bounded by Christies Road to the east, Boundary Road to the south, Middle Road to the north and Hopkins Road to the west.
Potential timing	Originally proposed for 2030 or later, could now come forward 5 years or more due to potential Melbourne-Brisbane Inland Railway completion by around 2024.
Likely cost	Approximately \$1 billion
Potential funding source	Possible mix of Commonwealth, State and private sector sources
Project precursors (where applicable)	The proposed property has yet to be protected through Planning Scheme amendments and subsequent acquisition processes. It cannot function as a rail terminal until the proposed new connection Albion to Truganina is in place. Inland Rail project completion or near completion is a key driver.
Purpose and benefits	To replace existing congested freight terminals in the Dynon area and release some existing railway land for redevelopment. Benefits are to enable introduction of double stacking of containers between Melbourne, Brisbane and Perth (via Parkes) and overall improved terminal capacity and efficiency for interstate and other rail freight services..
Timing implications	Inland Rail project requires at least first stage of WIFT facility completion to permit double stacking of containers to/from Brisbane and Perth (via Parkes)
Network and operational implications	Once fully operational, WIFT should effectively release the existing South Dynon and North Dynon terminals for alternative use, noting that the South Dynon facility is leased to Pacific National until 2031. The North Dynon facility is managed by Qube Logistics under a short term arrangement with VicTrack and is principally used to service Aurizon trains heading to Perth and Brisbane. The expectation is that the North Dynon property will eventually be released to the Property Development market while South Dynon could be integrated with Port of Melbourne's operations. In turn, this should substantially diminish the number of long freight trains running between South Dynon Junction and Tottenham Junction and free up capacity in this corridor for port/rail shuttle trains and/or additional passenger train movements.
Explanatory notes	

Project high level description and scope	Seymour – track and signalling alterations. Involves provision of a new turnout immediately north of No.3 platform at Seymour, connection to a former stabling siding and its extension to 160 metres in length to accommodate a 6-car VLocity train.
Potential timing	As soon as practicable
Likely cost	Approximately \$4 million.
Potential funding source	State or Commonwealth Government budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To enable simultaneous arrivals and departures at Seymour of broad gauge services. Benefits are to facilitate operation of additional passenger and freight services between Melbourne, Seymour and Shepparton by virtue of increasing corridor capacity through more expeditious crossing of trains at Seymour.
Timing implications	Needed to accommodate additional passenger or freight services operating between Seymour and Shepparton.
Network and operational implications	Seymour station and yard, as presently configured, cannot accept simultaneous arrivals from both the Melbourne and Shepparton directions as there is no overrun protection at the Down (northern) end of the station. To overcome this situation, it is proposed to install a new turnout beyond the Down end of No.3 platform and connect it to the Shed Road track, together with an extension of the Stabling Road to a minimum of 160 metres in length in order to accommodate a 6-car VLocity consist or equivalent (see diagrams below). Provision of the new stabling track will eliminate the need for trains requiring short term daytime stabling to proceed across the ARTC interstate corridor in order to access the Seymour Loco depot area.
Explanatory notes	



Seymour station and yard (Down end) showing proposed alterations to permit simultaneous arrivals in each direction



Aerial photograph of Seymour station and yard (Down end) showing proposed alterations

Project high level description and scope	Seymour-Shepparton – level crossings upgrading. Involves upgrading of 32 level crossings between Seymour and Shepparton that do not meet current standards and minor adjustments to 12 existing RFR standard crossings beyond Mangalore to handle the increased speed of VLocity railcars.
Potential timing	As soon as practicable
Likely cost	\$19.5 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To enable operation of VLocity railcars between Melbourne and Shepparton. Benefits are to increase safety for road users, rail passengers and train crew when traversing the respective level crossings.
Timing implications	Required prior to VLocity railcars being allowed to operate regular passenger services between Seymour and Shepparton.
Network and operational implications	The current level crossing situation between Seymour and Shepparton is summarised in the table below. All 32 level crossings currently equipped with flashing lights only and passive protection only will require upgrading to full RFR standards before VLocity trains can operate on the corridor. The eight occupation crossings will require individual assessment and may also require additional minor treatment such as new gates with special locks or frangible gates that are permanently locked but can be forced open if necessary, e.g. by emergency services vehicles. These improvements will provide safety benefits to all road users in the areas concerned and also be of general benefit for rail freight and passenger operations.
Explanatory notes	

Level crossings Seymour to Shepparton – current protection					
Line section	RFR standard (flashing lights and booms)	Flashing lights only	Passive only (Stop or Give Way signs)	Occupation crossings (no protection)	Total number
Seymour-Mangalore	1		1		2
Mangalore-Nagambie	2	4	5	1	12
Nagambie-Murchison East	4		9	1	14
Murchison East-Toolamba	1	1	6	4	12
Toolamba-Mooroopna	1	1	5	2	9
Mooroopna-Shepparton	4				4
Totals	13	6	26	8	53

Project high level description and scope	Mangalore-Shepparton – track upgrade Class 3 to Class 2. This project involves replacement of very old 45kg/m rail between Mangalore and Murchison East with new 50kg/m rail, a minor program of sleeper replacement between Mangalore and Shepparton and miscellaneous associated works.
Potential timing	As soon as practicable
Likely cost	In the range of \$22 to \$29 million
Potential funding source	State Budget allocation (routine maintenance elements could be partly funded from V/Line’s asset management budget).
Project precursors (where applicable)	None
Purpose and benefits	To enable 130km/h operation of VLocity railcars and 115 km/h operation of locomotive hauled passenger trains between Mangalore and Shepparton. Benefits include faster trip times for passengers and improved train crew productivity and asset utilisation.
Timing implications	Operation of VLocity railcars between Seymour and Shepparton will be limited to existing speeds of 95-100 km/h until the upgrade to Class 2 standard has been undertaken.
Network and operational implications	<p>The Shepparton line is already at Class 2 standard between Seymour and Mangalore (11 km). The remaining 72 km beyond Mangalore is likely to require some attention for it to be upgraded from Class 3 to Class 2 standard, thus permitting VLocity DMUs to operate at up to 130 km/h on suitably aligned track. Based on general observation, the Mangalore to Shepparton section of track is in reasonable condition with rail joints continuously welded and sleepers, ballast and drainage also in average to good condition. Major bridge renewals and decking upgrading have recently been undertaken in the vicinity of Toolamba and Mooroopna. A number of level crossings have also been reconditioned in recent times, having been re-laid with concrete sleepers and a third rail making provision for future gauge standardisation.</p> <p>However, the rail between Mangalore and Murchison East (38 km) is very old 45 kg/m section that was cascaded from the main north-eastern line many years ago. An allowance has been made for this to be replaced with new 50 kg/m rail, including installation. Allowance has also been made for a minor tie cycle between Mangalore and Shepparton (sleeper renewal at 200/km) and track re-surfacing. A further allowance has been included for miscellaneous associated works such as drainage improvement, replacement of turnout bearers, vegetation control, localised rail grinding, etc.</p>
Explanatory notes	To the extent that future sleeper installation between Seymour and Shepparton uses concrete instead of timber sleepers, these must be of the gauge convertible type in anticipation that the Shepparton/Tocumwal and connecting lines will be converted to standard gauge in the foreseeable future.

Project high level description and scope	Seymour-Shepparton – Automatic Block Signalling to replace Train Orders safeworking system. Involves installation of a new signalling system to control all train movements between Seymour and Shepparton, remotely controlled from Melbourne. This would replace the existing manual Train Orders safeworking system which currently requires a delay for Down trains at Seymour and is relatively inflexible. The proposed system would provide for a new crossing loop at Tabilk (see separate item), allow for follow-on movements and also remotely control access to sidings at Murchison East and Mooroopna and the Echuca line junction at Toolamba.
Potential timing	As soon as practicable
Likely cost	\$10 to 14 million, excluding a new crossing loop.
Potential funding source	State Budget allocation
Project precursors (where applicable)	Suitable communications infrastructure. (This will require further investigation at the concept design stage – likely to involve managed services provided via VicTrack and Telstra).
Purpose and benefits	To improve track capacity by introducing closer headways (follow-on movements), expediting train crosses and eliminating dwell time at Seymour for Shepparton services. Benefits include capacity to run additional services and improved overall operating flexibility and efficiency.
Timing implications	The existing Train Orders system will be unable to support more than a Shepparton five trains each way service frequency.
Network and operational implications	The new remotely controlled signalling system between Seymour and Shepparton would effectively divide the line into four block sections, i.e. Seymour to Tabilk Loop, Tabilk Loop to Murchison East, Murchison-East to Toolamba and Toolamba to Shepparton, thus enabling limited follow-on movements in each direction. Apart from the proposed new Tabilk crossing loop, the system would also remotely control entry to intermediate sidings at Murchison East and Mooroopna and control the junction to the Echuca line at Toolamba. It will also interface with existing signal installations at Seymour and Shepparton.
Explanatory notes	

Project high level description and scope	Tabilk – new 1500m crossing loop. Involves construction of a new remotely controlled crossing loop near the site of the former station at Tabilk (between Mangalore and Nagambie), suitable for crossing opposing passenger trains with minimal delay and for accommodating freight trains up to 1200 metres in length.
Potential timing	As soon as practicable
Likely cost	\$14 to 19 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	Suitable communications infrastructure. (This will require further investigation at the concept design stage – likely to involve managed services provided via VicTrack and Telstra).
Purpose and benefits	To enable operation of additional passenger and freight services and enhanced ability to recover from late running. Benefits include more expeditious train crossing, reduced turnaround time at Shepparton for passenger services and considerably reduced delays to freight services when interworked with more frequent passenger services. In turn, this will substantially improve train crew productivity and asset utilisation.
Timing implications	Should be constructed concurrently with installation of a new Automatic Block Signalling system between Seymour and Shepparton. While it could be operated under the existing Train Orders safeworking system, regular delays would be encountered when trains cross at or follow-on from that location.
Network and operational implications	While it was previously proposed that the existing crossing loop at Murchison East be upgraded for this purpose, simulation of a two hour interval passenger timetable suggests that this would result in excessive turnaround times at Shepparton. Instead, it is proposed that a new 1500m long crossing loop (1700m between main line turnouts) be constructed between MP 117.4 and 119.1 near the former Tabilk station site between Avenel Road (at MP 116.837) and Tabilk-Monea Road (at MP 119.340) level crossings in the section between Mangalore and Nagambie. The site is on straight and near level track and would require minimal earthworks. When the new signalling is installed, on-time train crosses there would allow one service to pass through the loop at full speed while the opposing train could move slowly through the loop until the signals clear. The crossing loop would also have freight benefits in facilitating operation of freight trains up to 1200m in length by having clear standing room of 1200 metres plus 300 metres for signal overlap.
Explanatory notes	

Project high level description and scope	Shepparton – VLocity stabling and servicing facility. Involves provision of new overnight stabling and servicing facilities for VLocity railcars, proposed by re-purposing and upgrading the former oil company sidings at the Dookie line junction, 2.5km north of Shepparton. Includes enhanced signalling between Shepparton and Dookie Junction.
Potential timing	To be completed prior to introduction of VLocity railcars on the Shepparton line.
Likely cost	\$9 to 12 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	Seymour to Shepparton level crossings upgrading, track upgrading and signalling improvements sufficient to enable VLocity railcar operations
Purpose and benefits	To provide required security and facilities for overnight servicing and stabling of VLocity railcars at Shepparton. Benefits include more expeditious movement of trains between Shepparton station and stabling, improved security and more efficient servicing facilities. Benefits also accrue to local residents and the local economy through increased potential for commercial development in the Shepparton station precinct by virtue of locating train stabling and servicing functions in an industrial area some distance from residences.
Timing implications	Should form part of a packaged program for significant passenger service improvements on the Seymour-Shepparton corridor.
Network and operational implications	A security compound for stabling VLocity railcars and additional train crew facilities will also be needed at Shepparton. The existing Shepparton station yard is considered unsuitable for this purpose, partly because its use involves avoidable shunt manoeuvres, partly because the existing yard sidings are within 100 metres of the nearest residences where noise will likely be an issue and particularly because the property involved has potential for significant complementary commercial redevelopment. Therefore it should not be held for overnight train stabling if other acceptable alternatives exist. Accordingly, it is proposed that negotiations take place with the existing siding owner to adapt part of the former Shell oil sidings complex, some 2.5km north of Shepparton station, to provide stabling accommodation for up to 12 VLocity cars, together with the normal toilet servicing and water supply facilities required for overnight servicing of these vehicles (see diagram below). The facility would have two parallel sidings, each 180 metres in length. The estimated cost includes alterations to signalling between Shepparton station and the oil sidings, including provision for a remote controlled security gate, signalled entry and exit from the sidings, road access from Old Dookie Road and secure car parking for train crews.
Explanatory notes	

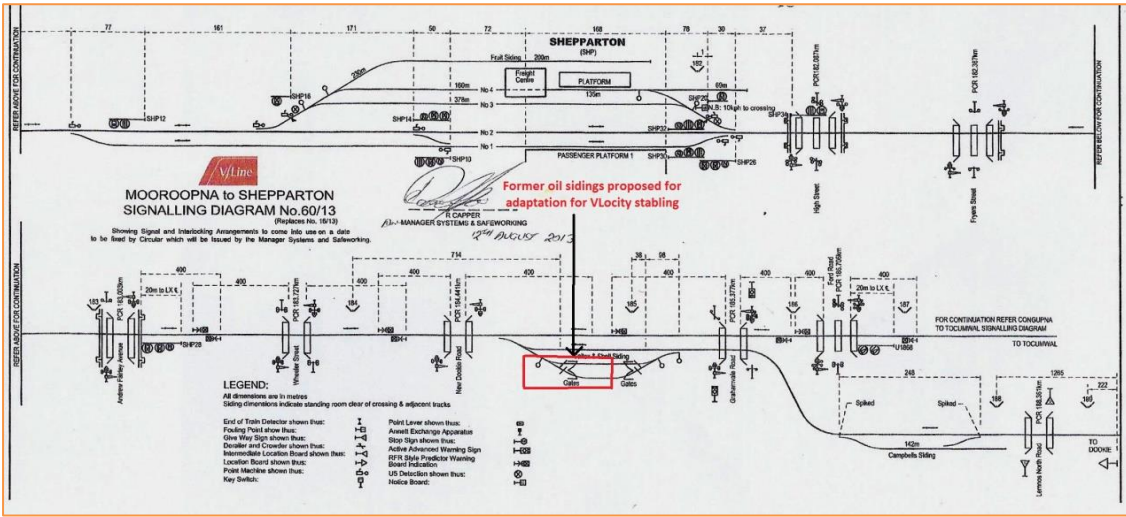


Diagram showing location of proposed VLocity stabling sidings 2.5km north of Shepparton station



Location of proposed VLocity stabling sidings north of Shepparton Station



Entrance to Oil Company sidings to be re-used for VLocity stabling – line to Tocumwal to the left, Dookie to the right

Project high level description and scope	Shepparton – expanded train crew facilities. Involves provision of new or expanded train crew facilities and amenities to support additional train crew required to operate additional passenger services between Melbourne and Shepparton.
Potential timing	Two options – if provided at Shepparton station – as soon as practicable If provided at new stabling sidings – to be integrated with new sidings project.
Likely cost	Approximately \$1 million
Potential funding source	State budget allocation
Project precursors (where applicable)	If provided at Shepparton station – none. If provided at new stabling sidings – commitment to program of works to permit VLocity operations to Shepparton.
Purpose and benefits	To accommodate additional train crew required to operate additional passenger services between Melbourne and Shepparton. Benefits include improved staff amenities and increased secure car parking for train crews.
Timing implications	Necessary to support additional Shepparton line services whenever introduced.
Network and operational implications	As above
Explanatory notes	

Project high level description and scope	Craigieburn to Seymour – provision of Automatic Block signalling. Involves provision of new signalling system to replace existing outmoded Double Line Block safeworking system. Includes TPWS (Train Protection and Warning System) overlay.
Potential timing	As soon as practicable
Likely cost	Approximately \$25 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To permit operation of more frequent services (including express passenger and freight services) between Melbourne, Seymour and Shepparton. Benefits include enhanced safety and increased overall operating flexibility and efficiency.
Timing implications	Needs to be in place prior to commencement of additional Shepparton passenger services operated by VLocity railcars, particularly if some of these are express services interspersed with Seymour stopping services.
Network and operational implications	The existing manual Double Line Block safeworking system is inflexible and can only operate when block stations are staffed. When all such stations are manned, minimum headways for follow-on movements are approximately 20 minutes for passenger services and up to 30 minutes for freight trains. For satisfactory interspersing of express and stopping trains, general minimum headways of around 10 minutes and nearer to 5 minutes on the approach to Seymour are required. Closer headways may also be required between Craigieburn and Wallan to accommodate additional services in that line section and in anticipation of future electrification.
Explanatory notes	Current Double Block line sections between Craigieburn and Seymour are: <ul style="list-style-type: none"> • Craigieburn-Wallan • Wallan-Kilmore East • Kilmore East-Broadford • Broadford-Dysart (Dysart-Seymour single line is controlled from Seymour) This is the last remaining example of manual Double Line Block working in Australia.



Old Double Line Block safeworking instrument similar to those still in use between Craigieburn and Seymour

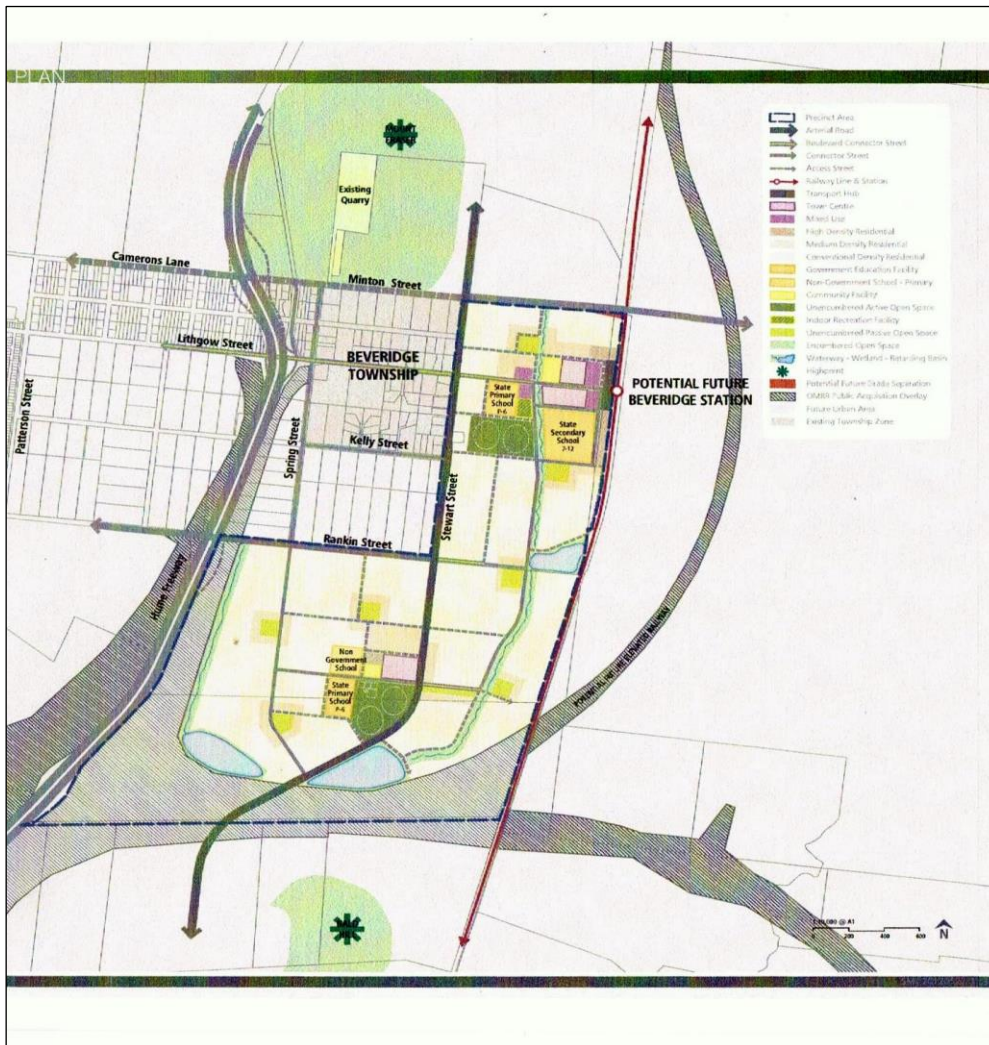
Project high level description and scope	Interim Wallan turnback facility – involves provision of track and signalling alterations
Potential timing	As soon as practicable - will be required by 2021
Likely cost	\$5 million (using turnouts relocated from Donnybrook)
Potential funding source	State Budget allocation
Project precursors (where applicable)	Additional commuter car parking at Wallan
Purpose and benefits	To allow introduction of additional services between Southern Cross and Wallan to meet burgeoning demand from stations (existing and proposed) beyond the electrified area at Craigieburn. Benefits include reduced overcrowding, improved service frequency and improved rolling stock utilisation.
Timing implications	Early requirement to enable additional services to operate between Southern Cross and Wallan. However, additional peak period train paths will be challenging to secure pending completion of Upfield diversion project. Will ultimately be replaced by Wallan Interchange facility when Craigieburn-Wallan electrification project is implemented.
Network and operational implications	Short term installation is compatible with existing locally operated Double Line Block safeworking system at Wallan or future new signalling system between Craigieburn and Seymour. Will enable operation of additional shoulder and off-peak services between Southern Cross and Wallan however additional peak period train paths may be unavailable pending completion of Upfield diversion project.
Explanatory notes	



New crossover required for Interim Wallan Turnback facility

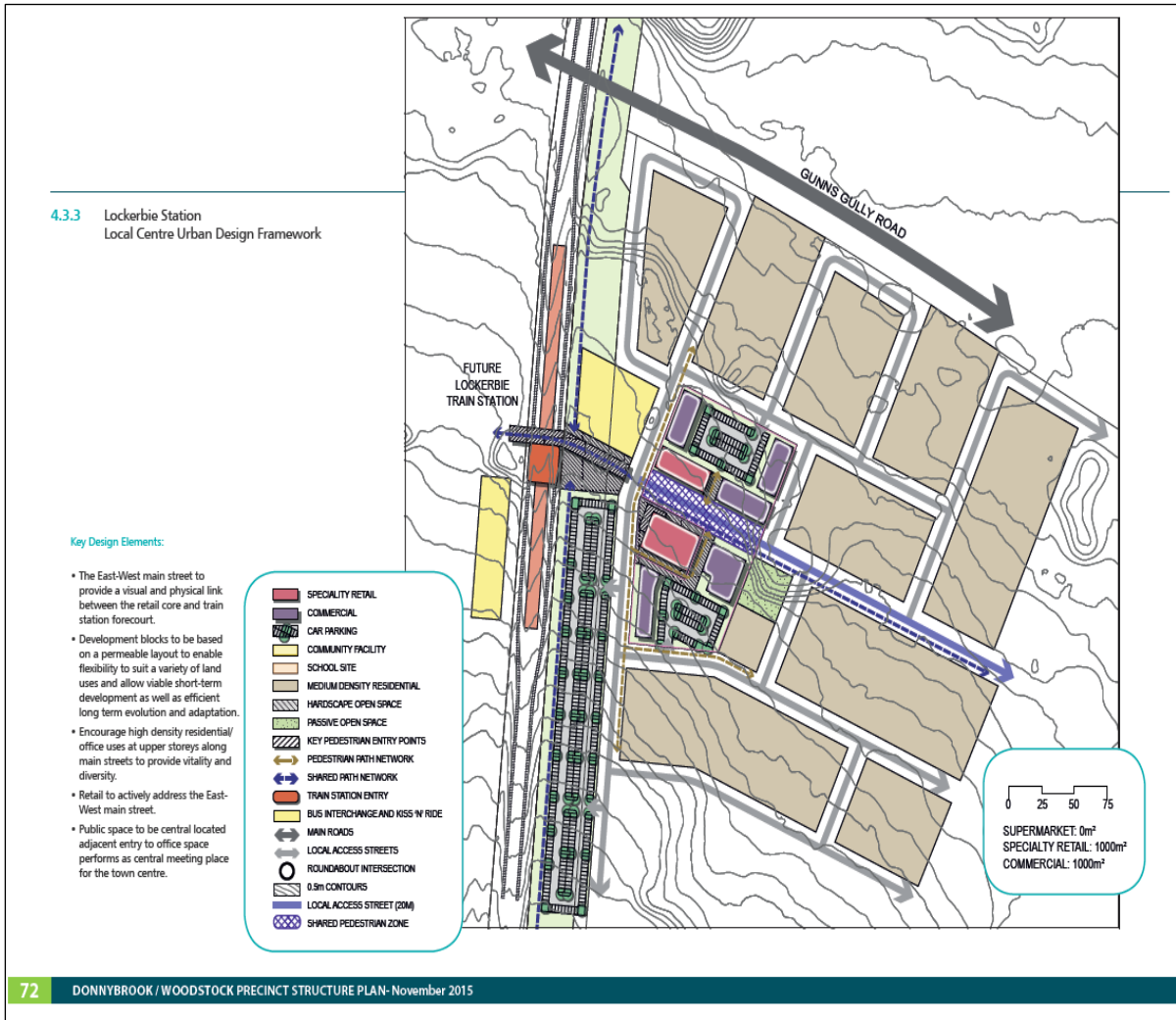
Project high level description and scope	Wallan and Donnybrook – station upgrading. Expansion of car parking at Wallan and Donnybrook, extension of Donnybrook Up platform to 160m length and miscellaneous passenger facility improvements.
Potential timing	Funded in 2017/18 State Budget allocations – construct during 2018
Likely cost	Approximately \$20 million, including property acquisition at Donnybrook
Potential funding source	State budget allocation
Project precursors (where applicable)	Property acquisition at Donnybrook
Purpose and benefits	To improve commuter car parking capacity and passenger amenity at stations in high patronage growth areas. Benefits are potentially increased rail market share, reduced station dwell time (for Melbourne-bound passengers joining at Donnybrook) and generally improved customer satisfaction.
Timing implications	Commuter car parks at both stations currently overflowing. Currently proposed car parking expansions likely to be fully utilised within a short period.
Network and operational implications	Donnybrook Up platform currently only 50 metres in length, resulting in only the first two carriages on most trains having platform access. To be increased to 160 metres to conform with the general standard on most regional lines.
Explanatory notes	Donnybrook car parking – proposed increase 120 spaces currently to approx. 250. Wallan car parking – proposed increase 281 spaces to approximately 400.

Project high level description and scope	Beveridge – new station. Involves construction of a new twin platform station approximately 600m south of the Beveridge Road level crossing between Donnybrook and Wallan. DDA compliance will require a new subway or a combination of a footbridge, ramps and lifts.
Potential timing	Uncertain – depends upon timing of adjacent major property development
Likely cost	\$30 to \$80 million depending on scope
Potential funding source	Developer contributions plus State Budget allocation
Project precursors (where applicable)	Additional demand is likely to require additional services from Wallan which cannot be provided during peak periods until the Upfield diversion project is in place.
Purpose and benefits	To meet expected travel demand in a high growth area. Benefits are potentially increased rail market share and generally improved customer satisfaction.
Timing implications	As above
Network and operational implications	An additional station stop will add approximately 2 minutes to overall trip times of stopping services operating between Southern Cross and Wallan. Construction of this station will be disruptive as one or more tracks will need to be relocated over a distance of some 500 metres to accommodate the additional platform/s.
Explanatory notes	



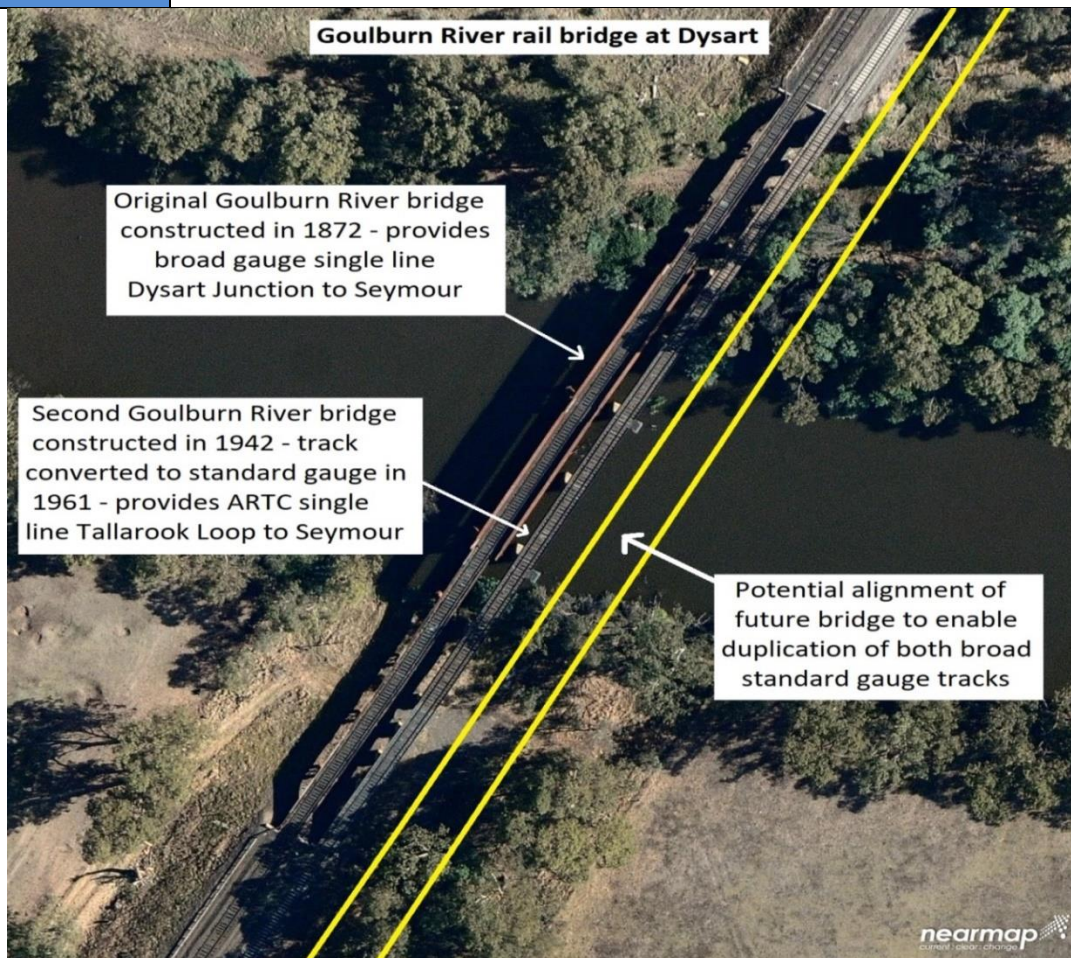
Site of new Beveridge Station as shown in Lockerbie North Precinct Structure Plan

Project high level description and scope	Lockerbie – new station. Involves construction of a new twin platform station approximately 3km north of Donnybrook Station between Donnybrook and Wallan. DDA compliance will require a new subway or a combination of a footbridge, ramps and lifts.
Potential timing	Uncertain – depends upon timing of adjacent major property development
Likely cost	\$30 to \$80 million depending on scope
Potential funding source	Developer contributions plus State Budget allocation
Project precursors (where applicable)	Additional demand is likely to require additional services from Wallan which cannot be provided during peak periods until the Upfield diversion project is in place.
Purpose and benefits	To meet expected travel demand in a high growth area. Benefits are potentially increased rail market share and generally improved customer satisfaction.
Timing implications	As above
Network and operational implications	An additional station stop will add approximately 2 minutes to overall trip times of stopping services operating between Southern Cross and Wallan. Construction of this station will be disruptive as one or more tracks will need to be relocated over a distance of some 500 metres to accommodate the additional platform/s.
Explanatory notes	

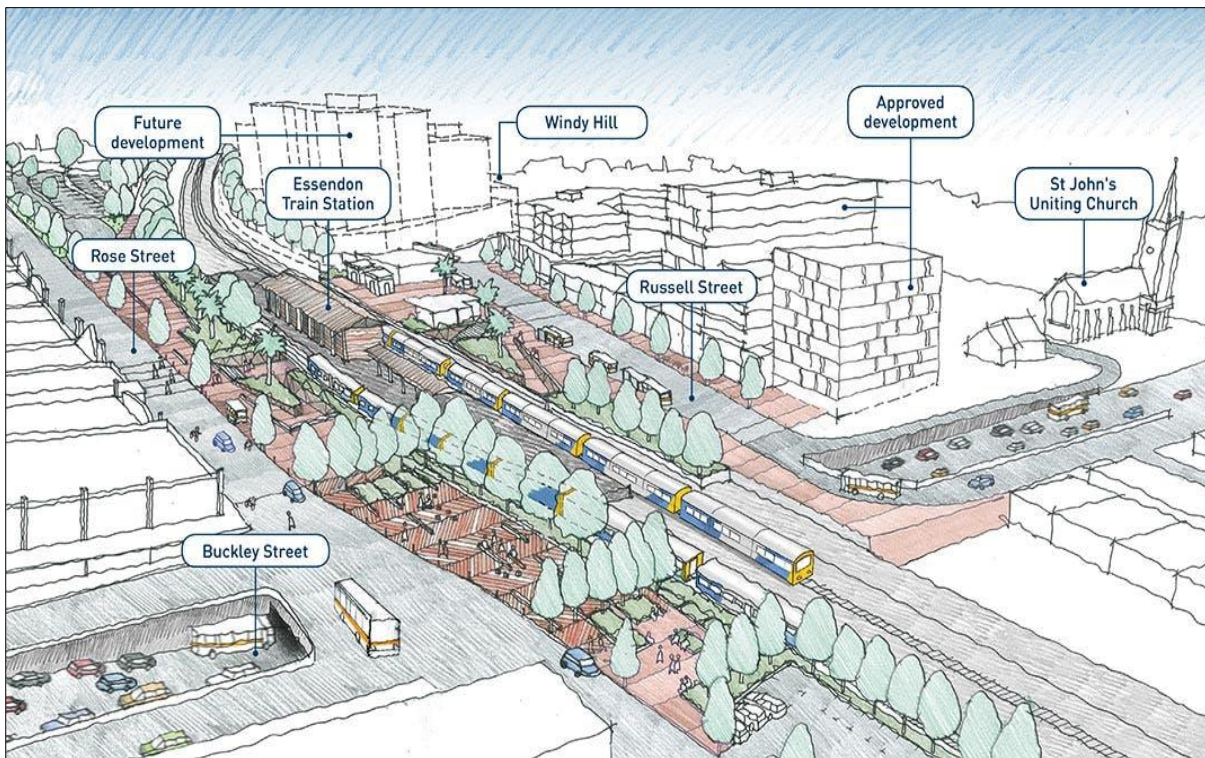


Location of proposed new Lockerbie Station as shown in the Donnybrook/Woodstock Precinct Structure Plan

Project high level description and scope	Dysart-Seymour – duplication of Goulburn River bridge. Potential scheme is to construct a second double track bridge for the ARTC standard gauge interstate corridor and re-convert the 1942 bridge for use by regional passenger services
Potential timing	Likely to be required within 10 years
Likely cost	\$50 million
Potential funding source	State Budget allocation and Commonwealth equity contribution to ARTC
Project precursors (where applicable)	None
Purpose and benefits	To improve overall corridor capacity and enhance service reliability. Benefits include ability to operate more frequent services on the Seymour corridor and elimination of an operational bottleneck that can degrade service reliability.
Timing implications	This 4km short section of single line between Dysart and Seymour has the potential to become an operational bottleneck given expected opening of the Melbourne-Brisbane Inland Railway in 2024 and anticipated additional Melbourne to Seymour and Shepparton passenger services from around 2021 onwards.
Network and operational implications	As above.
Explanatory notes	This project is complementary to proposed Seymour track and signalling alterations and Craigieburn-Seymour provision of Automatic Block Signalling projects detailed previously.



Project high level description and scope	Essendon – Buckley Street level crossing removal. Involves lowering of Buckley Street to provide a three lane underpass under the railway at Essendon Station without changing the grade line of the railway.
Potential timing	Due for completion 2019
Likely cost	\$100+ million
Potential funding source	State Budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To eliminate a road traffic bottleneck and safety hazard for road users and pedestrians. Benefits are expected to be reduced traffic delays, enhanced safety for road and rail users, improved access for rail passengers and general improvement of the surrounding urban environment.
Timing implications	Needs to be coordinated with Glenroy Road, Glenroy grade separation project to minimise train service disruptions during construction.
Network and operational implications	Works will facilitate construction and operation of separate Essendon Station turnback facility.
Explanatory notes	



Artist's impression of proposed grade separation at Buckley Street, Essendon

Project high level description and scope	Essendon – turnback facility. Involves re-arrangement of Essendon station track layout and signalling and extension of Platform 1 for re-use as the through platform for Metro trains from Craigieburn to the CBD.
Potential timing	Planned for 2024 to coincide with Melbourne Metro completion
Likely cost	Approximately \$40 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To improve overall network capacity and resilience. Benefits include reduced overcrowding through better balancing of passenger loading on the Craigieburn corridor and improved reliability through reduced station dwell time and enhanced ability to recover from unplanned delays.
Timing implications	Operation of Essendon as a terminating and originating station is an integral part of the Melbourne Metro Operations Plan, anticipated for introduction between 2024 and 2026.
Network and operational implications	Essendon “short starter” services are to be introduced to balance passenger loadings on Craigieburn line services. High passenger demand growth north of Essendon coupled with significant property densification occurring inbound from Essendon means that most peak trains are already full by Essendon to the extent that shorter journey passengers could not otherwise be accommodated.
Explanatory notes	

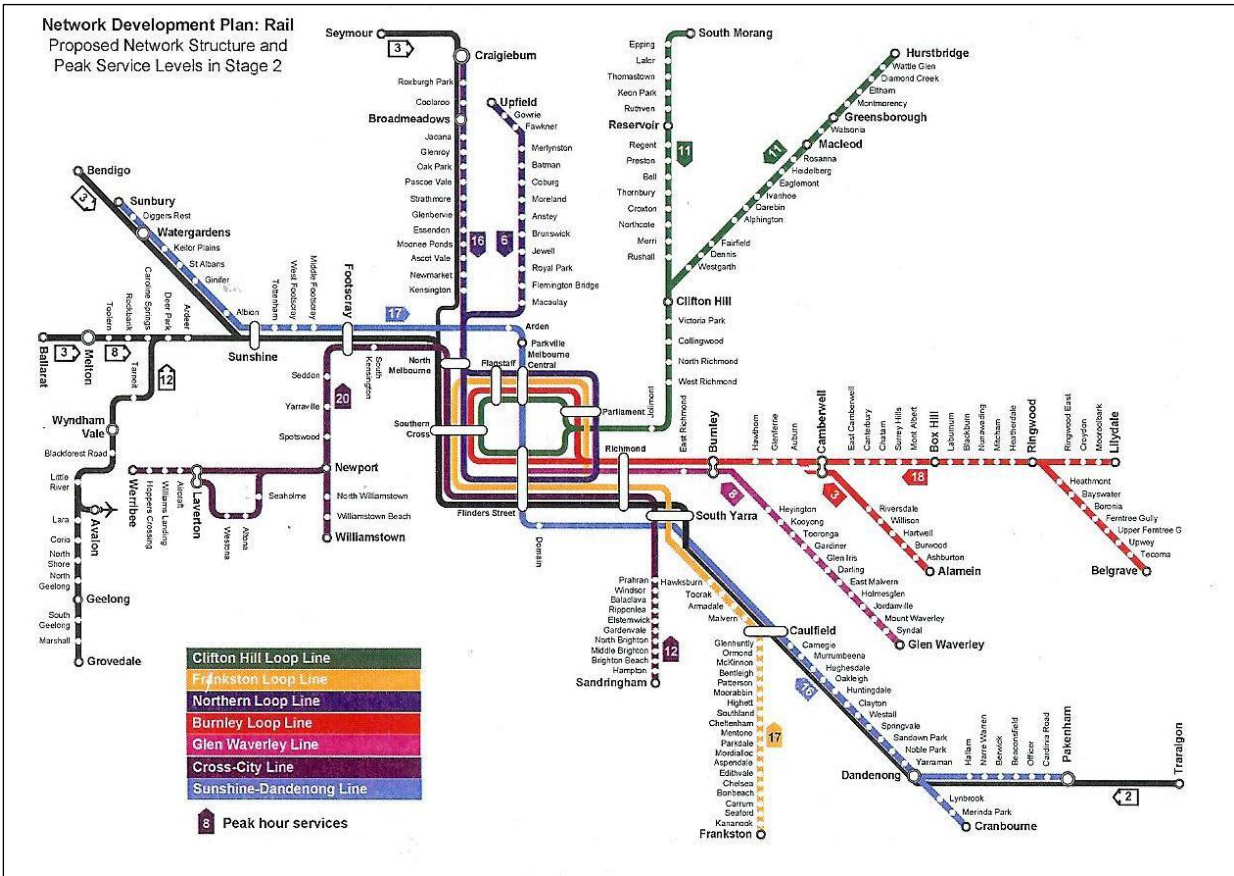
Project high level description and scope	Glenroy – Glenroy Road level crossing removal. This is a significant project as it will involve lowering the railway through Glenroy by about 8 metres and building a new station at the lower level some 200 metres closer to Melbourne than at present.
Potential timing	Scheduled for completion in 2019
Likely cost	Around \$150-180 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To eliminate a road traffic bottleneck and safety hazard for road users and pedestrians and provide modern station facilities. Benefits are expected to be reduced traffic delays, enhanced safety for road and rail users, improved amenity and access for rail passengers and general improvement of the surrounding urban environment.
Timing implications	Needs to be coordinated with Buckley Street, Essendon grade separation project to minimise train service disruptions during construction.
Network and operational implications	The nature of this project will require significant disruptions to normal services during construction. This could be minimised by constructing a temporary station and tracks in the present car park area but it is not known at the present time whether this, or an extended shutdown of the line is the preferred approach.
Explanatory notes	



Glenroy Station and Glenroy Road level crossing

The railway is to be lowered through this area and re-located approximately 200 metres towards Melbourne (to the right in the picture and with new platforms beneath the present level crossing)

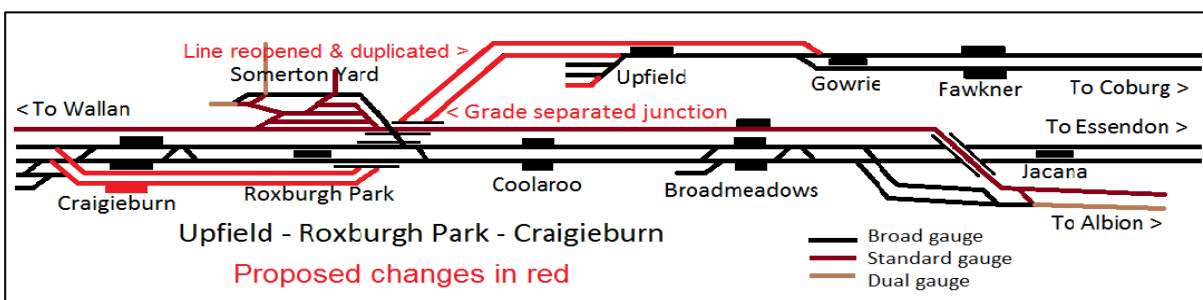
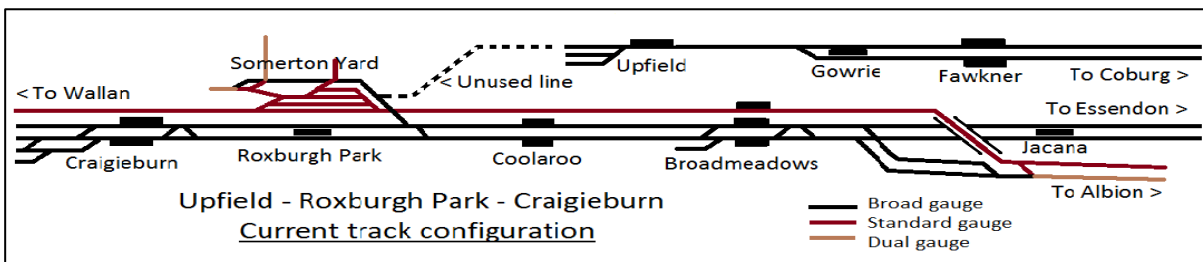
Project high level description and scope	Melbourne Metro completion. At its heart, the Melbourne Metro (MM) project involves construction of 9km of twin tunnels from South Kensington to South Yarra to connect the present Sunbury and Dandenong rail corridors via five new stations at Arden, Parkville, CBD North CBD South and Domain. There are also various peripheral works in other corridors.
Potential timing	Nominal completion is by 2026, however all present programming is based on a target for actual completion by 2024.
Likely cost	Estimated at \$10.9 billion.
Potential funding source	Presently from State Budget allocations, although a Commonwealth Government contribution is still possible.
Project precursors (where applicable)	Caulfield-Dandenong-Cranbourne/Pakenham corridor upgrading project, including new rolling stock and a major train stabling and maintenance facility at Pakenham East are major pre-requisites for the MM project. Others are new train stabling facilities at Kananook (near Frankston) and at Calder Park.
Purpose and benefits	To untangle the central core of the metropolitan rail network and significantly increase capacity on key rail corridors, including those serving high growth areas. Benefits include much improved service levels on multiple rail corridors, the ability to operate longer and higher capacity trains and improved reliability across the network. Also improves overall public transport access and attractiveness and provides significant development opportunities around new underground stations.
Timing implications	Much of the existing network linked to the Northern and Caulfield city underground loop lines are operating at or near full capacity, with the majority of these lines also serving Melbourne's major growth areas. This also applies to the Werribee corridor. Significant relief by way of providing more than a very small number of additional peak period services will not be possible until both Sunbury and Dandenong line services are removed from the city underground loop.
Network and operational implications	Completion of the MM project will result in a substantial re-configuration of the metro network and services. The result will be significant additional capacity, both on the Sunbury-Dandenong/Cranbourne/Pakenham corridor, but also on the Sandringham, Frankston, Upfield, Craigieburn, Williamstown and Werribee lines, with the latter potentially extended to Wyndham Vale. In addition, it will also accommodate extension of metro electrified services to Melton (and possibly Bacchus Marsh), which will connect into the main MM corridor at Sunshine. In turn, this will open up additional capacity on the Regional Rail Link lines serving Wyndham Vale, Geelong, Ballarat and Bendigo. The enhanced MM corridor will also provide capacity for the proposed extension of the Cranbourne line to Clyde.
Explanatory notes	There are a number of peripheral projects which are included in the overall MM funding package. These include: <ul style="list-style-type: none"> • Additional terminating platform at Sandringham • Cheltenham turnback facility • Essendon turnback facility • A third platform at West Footscray • Gowrie turnback facility • Platform extensions at nominated stations Middle Footscray to Sunbury • Traction power upgrading South Kensington to Sunbury



Melbourne's rail network after completion of Melbourne Metro as shown in PTV's 2012 Network Development Plan

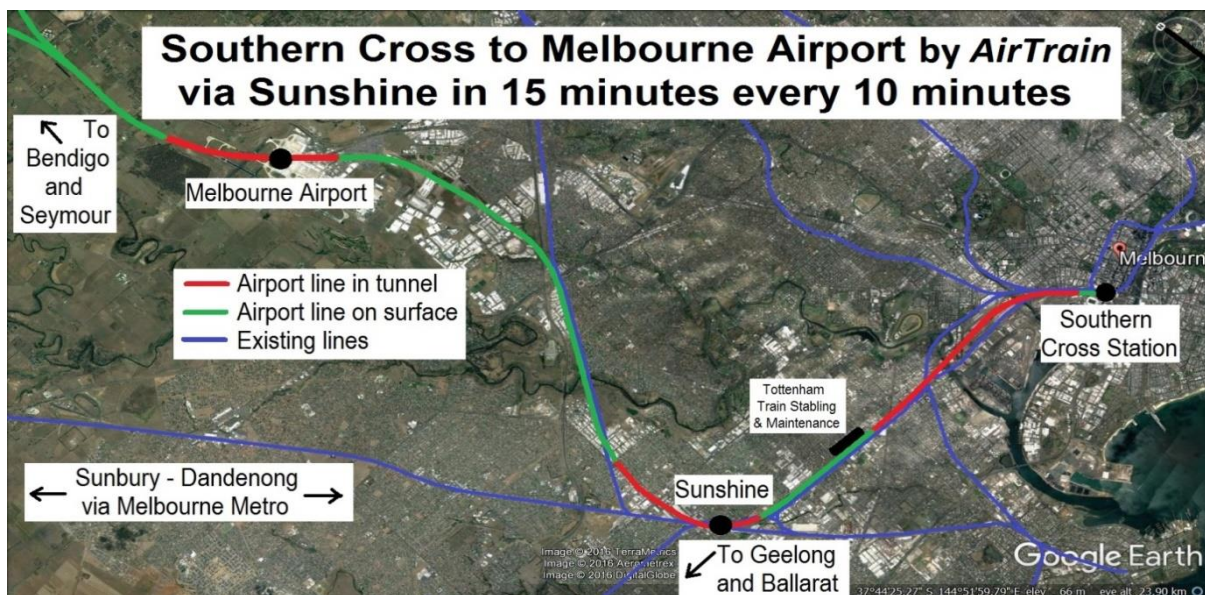
Project high level description and scope	<p>Upfield line diversion comprising:</p> <ul style="list-style-type: none"> Signalling upgrading North Melbourne-Upfield for express services Gowrie-Upfield duplication Relocation of Upfield stabling facilities Upfield-Roxburgh Park rehabilitation and duplication Roxburgh Park –grade separated junction Roxburgh Park – Craigieburn quadruplication Craigieburn – additional platforms <p>This is a complex project which, in the first instance, is designed to provide regional trains to and from Seymour and Shepparton with both existing and potentially additional peak period train paths between Southern Cross and Craigieburn. The drivers for this project are that:</p> <ul style="list-style-type: none"> (i) substantially increased metro services will be operating on the Craigieburn line post completion of the Melbourne Metro project, effectively crowding out capacity to support regional services via Broadmeadows and Essendon; (ii) rapid growth in patronage from stations between Donnybrook and Wallan will require the introduction of “short starter” trains from Wallan by 2021; (iii) additional services are proposed for progressive introduction to/from both Seymour and Shepparton <p>This project is also a precursor to the Craigieburn to Wallan electrification project* with Wallan electric services to also operate via Upfield. This will also require electrification of the rehabilitated tracks between Upfield and Roxburgh Park.</p>
Potential timing	Highly desirable by 2023 and no later than MM opening between 2024 and 2026.
Likely cost	\$600-700 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	None
Purpose and benefits	To enable retention and growth in availability of train paths for north-eastern regional services. Benefits include capacity for additional services, faster running for north-eastern regional services through the metropolitan area and improved passenger facilities at Craigieburn.
Timing implications	Considered essential for implementation prior to, or at least concurrent with Melbourne Metro project commissioning.
Network and operational implications	When Melbourne Metro opens, the Upfield corridor will have only 6 trains per hour, thus enabling additional regional services to obtain train paths. This will provide a suitable interim solution until Wallan electrification eventuates. Opening of the Upfield diversion will require all regional trains to stop at Craigieburn in lieu of Broadmeadows to provide suitable interchange with metro services.
Explanatory notes	* Currently anticipated timeline for Wallan electrification is around 2030.

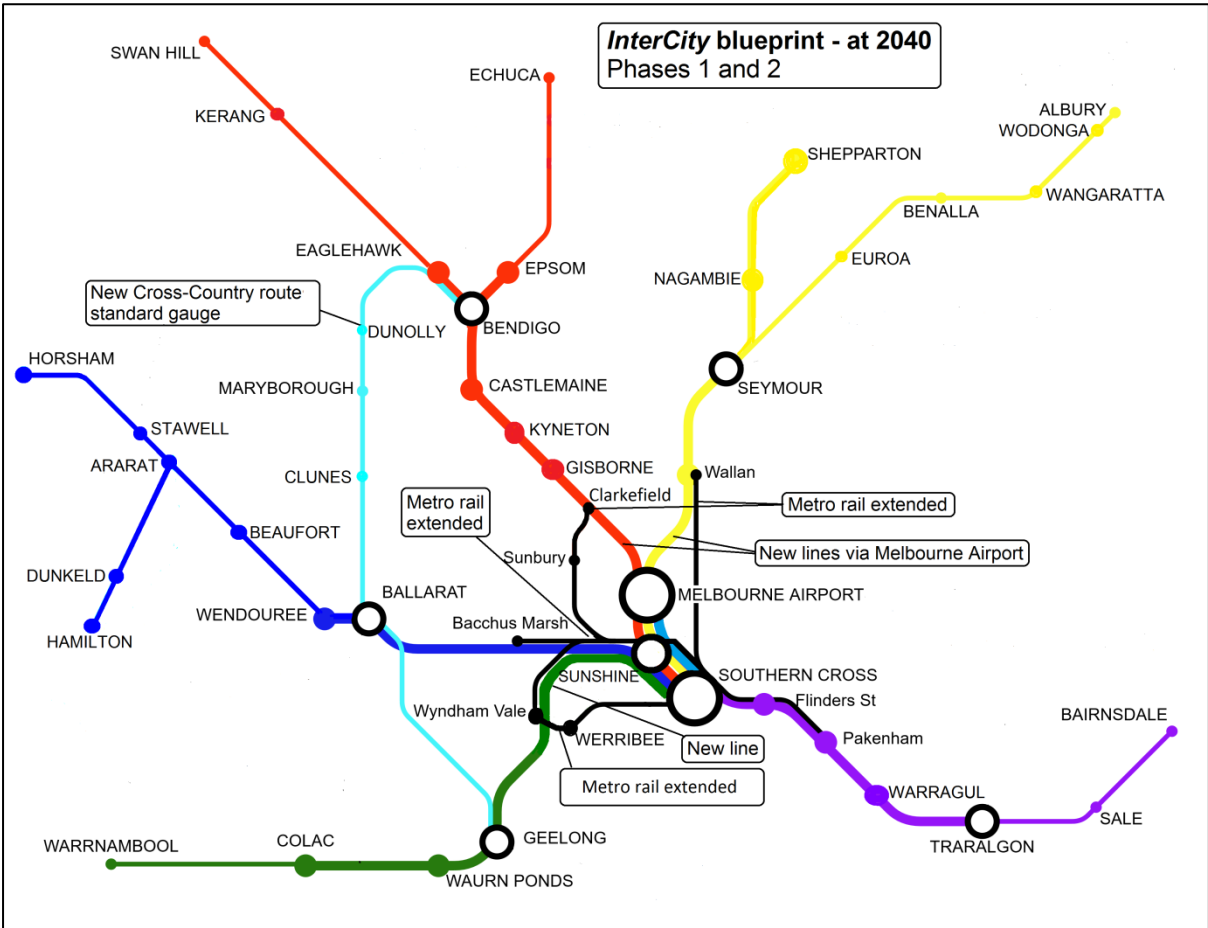
Diagrams of the current arrangements between Craigieburn, Broadmeadows and Upfield and the proposed reconfiguration are shown below.



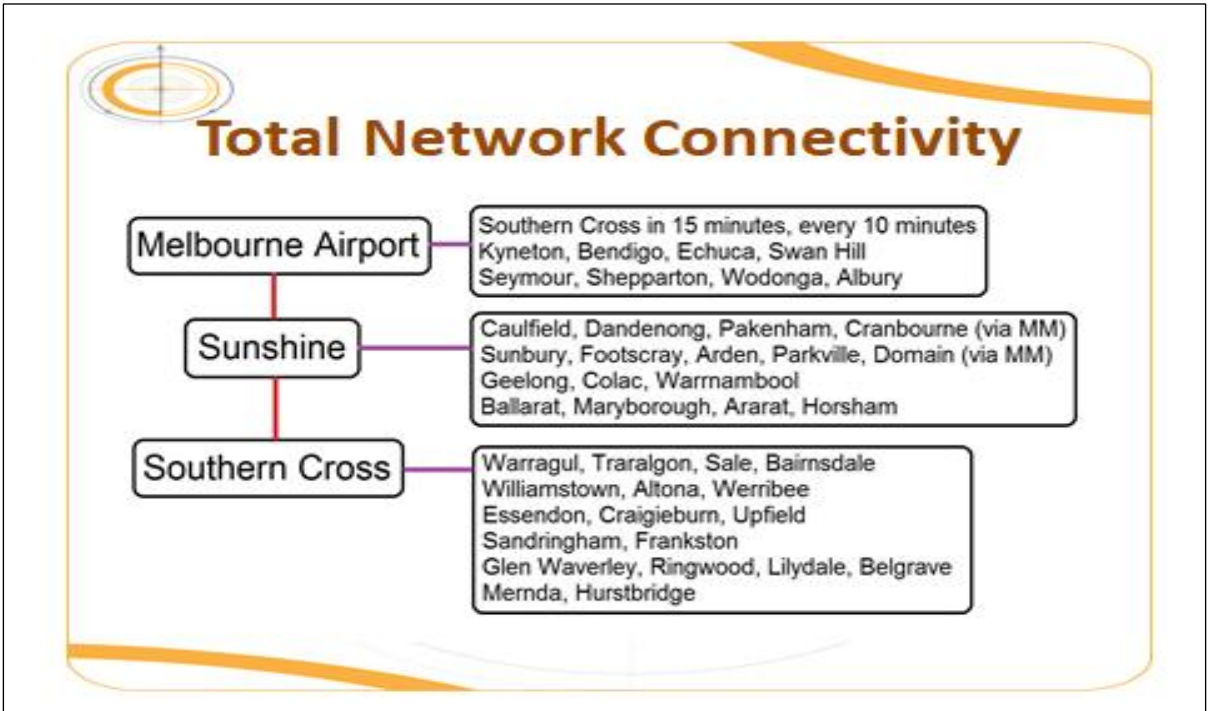
Project high level description and scope	Craigieburn – Wallan electrification. Involves extension of 1500 vDC overhead traction infrastructure from Upfield to Roxburgh Park and from Craigieburn to Wallan to enable introduction of metropolitan train services on these line sections. Includes construction of several electrical sub-stations en route and additional platforms and train stabling facilities at Wallan.
Potential timing	Around 2030
Likely cost	Approximately \$500 million, excluding rolling stock.
Potential funding source	State Budget allocations
Project precursors (where applicable)	New stations at Lockerbie and Beveridge
Purpose and benefits	To provide required capacity to accommodate high levels of patronage increase from growth areas in Melbourne’s north. Benefits include provision of essential public transport infrastructure for residents of Melbourne’s outer northern suburbs and capacity to provide services to meet forecast demand.
Timing implications	Ideally, this project should coincide with completion of the proposed link from Wallan to the CBD via Melbourne Airport.
Network and operational implications	Wallan metro services are planned to operate via Upfield to and from the CBD, while services to and from Craigieburn will continue to operate via Essendon and Broadmeadows. If the diversion of north-eastern regional trains via Melbourne Airport has not been achieved prior to implementation of Wallan electrification, these services will face the same challenges of achieving a satisfactory passage through the metropolitan area via Upfield as will be the case via Broadmeadows when the Melbourne Metro project is commissioned.
Explanatory notes	

Project high level description and scope	Southern Cross – Melbourne Airport railway. The <i>AirTrain</i> proposal illustrated below developed by the Rail Futures Institute involves a new dedicated heavy rail corridor between Southern Cross and Melbourne Airport with a single intermediate station at Sunshine. Underground sections in twin tunnels would be between Southern Cross and West Footscray, between Sunshine and North Sunshine and through Melbourne Airport with underground stations at Sunshine and at the Airport. Other sections would be at grade or on elevated structures. Stabling and servicing facilities for trains using the Airport Railway corridor would be provided at Tottenham.
Potential timing	Late 2020s
Likely cost	\$6 billion
Potential funding source	Combination of State and Commonwealth Budget allocations and private sector financing
Project precursors (where applicable)	None
Purpose and benefits	To provide a high quality and future proofed link from the CBD to Melbourne Airport fully segregated from the metropolitan network, with capacity to also accommodate regional and future high speed services and with comprehensive network connectivity. Benefits include rapid access from the CBD to the Airport, good connectivity with all metro and regional lines and potential removal of regional trains from two metro corridors with benefits to both.
Timing implications	Principal drivers are ongoing and projected rapid growth in passenger throughput at Melbourne Airport and expected absorption of increased Tullamarine Freeway capacity within 5-10 years.
Network and operational implications	The proposed Southern Cross to Melbourne Airport corridor is planned as a dedicated railway operated fully independently from the metropolitan network. The corridor would subsequently be extended from the Airport to connect to the Bendigo line at Clarkefield and the north-eastern lines at Wallan, enabling regional services on these corridors to be integrated with the proposed frequent CBD to Melbourne Airport shuttle services. This will have an aggregate requirement to operate 14 trains per hour in each direction. In addition, the corridor would be engineered to support the future operation of up to 4 High Speed Trains per hour in each direction between Melbourne, Canberra and Sydney.



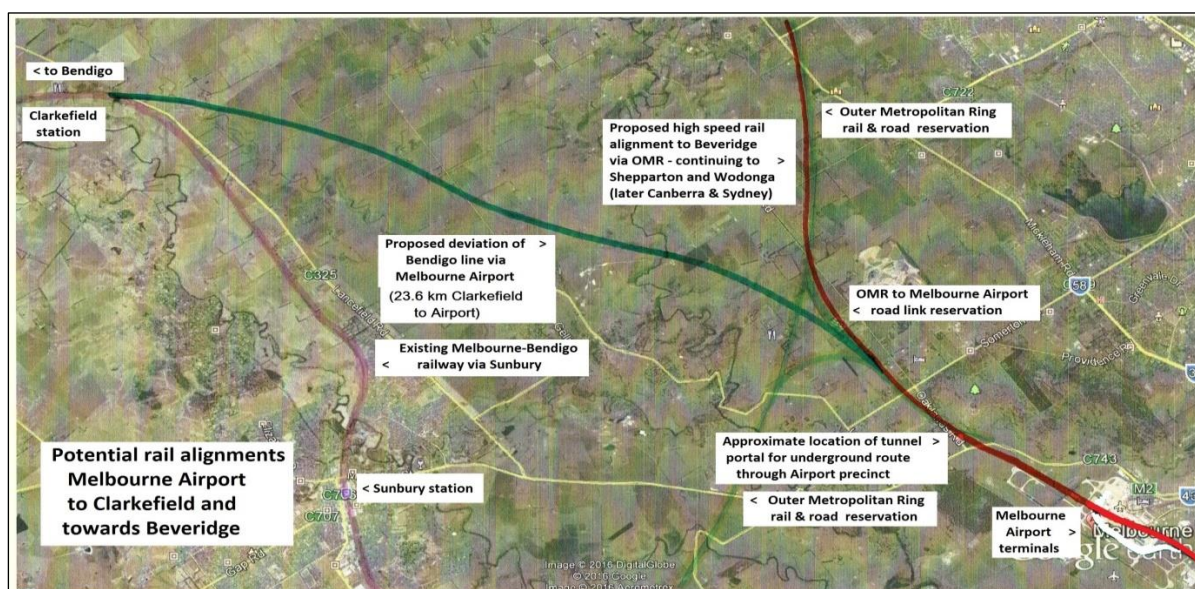


Rail Futures Institute *InterCity* proposal showing Bendigo and north-eastern corridors via Melbourne Airport

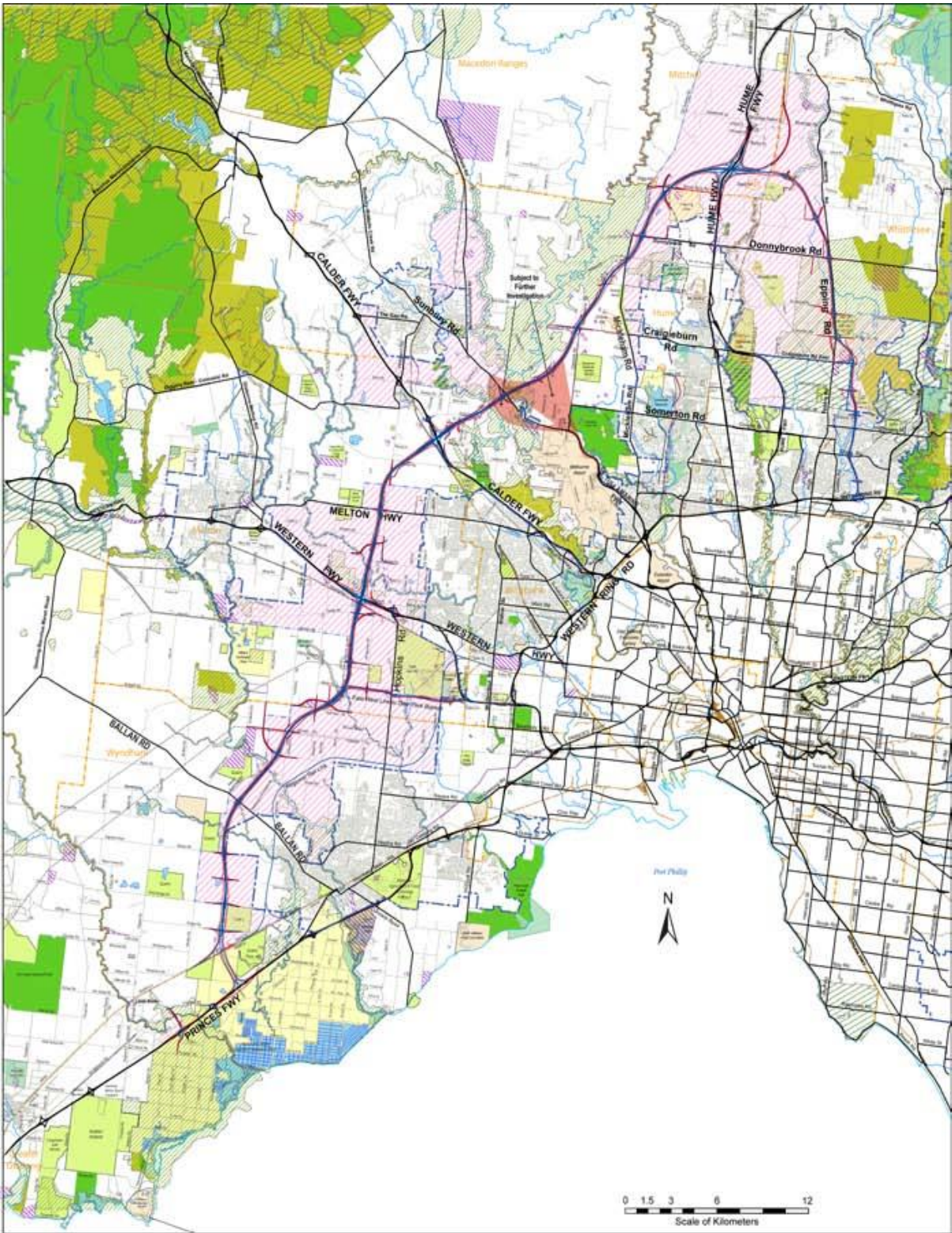


Slide showing overall rail network connectivity from proposed Melbourne Airport line

Project high level description and scope	Melbourne Airport – Oaklands Junction link. This is a new 4.5km section of railway that will be needed to connect the northern end of the underground corridor through Melbourne Airport with the Outer Metropolitan Ring (OMR) reservation in the vicinity of Oaklands Junction, thereby creating the required corridor for north-eastern and future High Speed Trains to be linked to Melbourne via Melbourne Airport. Portion of this corridor will also be used for Bendigo line trains connecting with the existing Bendigo rail corridor at Clarkefield. It is also likely to be partly co-located with proposed road connection between Melbourne Airport and the OMR.
Potential timing	Early 2030s.
Likely cost	Approximately \$300 million
Potential funding source	State and/or Commonwealth Budget allocations – also some prospect of private sector financing involvement
Project precursors (where applicable)	Corridor identification and protection and CBD to Melbourne Airport rail link
Purpose and benefits	Provides essential connection between Melbourne Airport and new corridors linking to the Bendigo and north eastern lines. Benefits come from a greenfield high speed specific purpose corridor designed to minimise journey time and provide long term future proofed capacity to accommodate foreseeable demand.
Timing implications	VicRoads had sought to provide a Public Acquisition Overlay (PAO) over the proposed road connection between Melbourne Airport and the OMR (Hume Planning Amendment C190) however notwithstanding Planning Panel support, the Amendment was refused by the Minister. The proposal needs to be re-visited ASAP, but this time in conjunction with the proposed rail connection. Once the proposed CBD to Melbourne Airport link has been funded and is in implementation mode, there will be substantial advantages in progressing implementation of this section of the corridor as an early subsequent stage.
Network and operational implications	This project, in conjunction with the Melbourne Airport rail link and the OMR connection to Wallan will result in all north-eastern regional services being removed from the metropolitan network, thus freeing up additional paths for metro trains and facilitating trip time reductions for regional services.



Project high level description and scope	Oaklands Junction – Wallan link (via OMR). The reserved Outer Metropolitan Ring corridor has been designed to accommodate multiple road lanes and up to four rail lines – nominally two for passenger and two for freight services. The two passenger rail lines would provide the essential connection between Oaklands Junction and Wallan to be used by all north-eastern trains and future interstate High Speed Trains (HSTs)
Potential timing	Early 2030s
Likely cost	Approximately \$700 million
Potential funding source	State and/or Commonwealth Budget allocations – also some prospect of private sector financing involvement
Project precursors (where applicable)	CBD to Melbourne Airport rail link, Melbourne Airport to Oaklands Junction rail link, Craigieburn-Wallan electrification and the Wallan interchange facility
Purpose and benefits	Completes essential connection between Oaklands Junction and Wallan utilising the reserved OMR corridor. Benefits come from a greenfield high speed specific purpose corridor designed to minimise journey time and provide long term future proofed capacity to accommodate foreseeable demand.
Timing implications	To make the full north-eastern regional passenger services work effectively, Craigieburn to Wallan electrification and the Wallan interchange facility need to also be in place so that efficient regional/metropolitan rail network connectivity is provided.
Network and operational implications	This project, in conjunction with the Melbourne Airport rail link and the Airport to Oaklands Junction connection will result in all north-eastern regional services being removed from the metropolitan network, thus freeing up additional paths for metro trains and facilitating trip time reductions for regional services.
Explanatory notes	See map of overall proposed OMR alignment on next page



Legend

OMR & E6 Corridor	Environmental Significance Overlay	Public Conservation & Resource
Urban Growth Boundary	Vegetation Protection Overlay	Public Park & Recreation
Public Acquisition - Roads	Commonwealth Land	Rural Conservation
Heritage Overlay	Municipal Boundary	Special Use
GAA Investigation Area		Public Use

Note: Planning Scheme Overlays Data June 08. Simplified overlay descriptions for clarity purposes.

**Outer Metropolitan Ring / E6 Transport Corridor
Recommended Option
Figure S1**

Overview of proposed Outer Metropolitan Ring road and rail corridor
 (Proposed connections between the OMR and Melbourne Airport are in the pink shaded area)

Project high level description and scope	Wallan Interchange facility and train stabling. This project would be designed to provide the essential passenger interface between regional and metropolitan services once north-eastern regional services are diverted via Melbourne Airport and metropolitan electrified services are extended from Craigieburn to Wallan. It is envisaged that the facility would provide easy cross-platform interchange between these services. It would also provide major park and ride and bus interchange facilities together with a train stabling depot for metropolitan trains.
Potential timing	Around 2030
Likely cost	Around \$150 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	Needs to be concurrent with Craigieburn-Wallan electrification
Purpose and benefits	To provide a high standard passenger interchange between metropolitan regional services once Wallan electrification is in place. Benefits include enhanced passenger amenity and seamless connections between metro and regional services, enabling regional services to operate non-stop from Wallan via Upfield or subsequently, Melbourne Airport.
Timing implications	The facility will be required once electrification is extended to Wallan, irrespective of the timing of the diversion of regional trains via Melbourne Airport.
Network and operational implications	Once electrification is extended to Wallan, it is expected that north-eastern trains will stop there for interchange with metro services, irrespective of whether regional trains are diverted via the Airport or, at that stage, continue to operate via Craigieburn and Upfield. In addition, Wallan electrification will necessitate provision of a train stabling facility while the expected population growth in Wallan will justify a major park and ride facility and bus interchange.
Explanatory notes	

Project high level description and scope	Wallan – Seymour track upgrade Class 2 to Class 1 using gauge convertible sleepers. This project is to bring the Wallan-Seymour broad gauge corridor to a full Class 1 standard for the operation of VLocity railcars and future regional trains to operate at 160km/h, consistent with other regional trunk corridors. The scope of work will involve formation and ballast rectification, new gauge convertible concrete sleepers and new 60kg/m continuously welded rail. The project should also include minor alignment improvements to eliminate or reduce speed restrictions on curves and improved security of the rail corridor.
Potential timing	Mid to late 2020s
Likely cost	Approximately \$120 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	Replacement of Double Line Block safeworking with Automatic Block Signalling system
Purpose and benefits	To provide robust, low maintenance track with long term capacity to accommodate all regional passenger services, initially at up to 160km/h and engineered for eventual 200km/h operation, subject to curvature limits. Benefits include reduced trip times, smoother ride and enhanced general safety and security along the rail corridor.
Timing implications	Must be in place ahead of proposed gauge conversion and diversion of north-eastern regional services via Melbourne Airport
Network and operational implications	In conjunction with new signalling, will reduce train running times resulting in capacity increases in terms of additional train path availability on the corridor. Reduced trip times will also improve train crew productivity and asset utilisation.
Explanatory notes	

Project high level description and scope	Wallan – Seymour – Shepparton standard gauge conversion. Assuming prior installation of gauge convertible concrete sleepers between Wallan and Seymour, this project involves repositioning of rails to provide standard (1435mm) instead of broad gauge (1600mm) track. It also involves associated conversion of track through level crossings, passenger platforms and on bridges, and of turnouts. It will also involve track alterations at Seymour enable Albury line trains to access the former broad gauge tracks between Wallan and Seymour.
Potential timing	Early 2030s
Likely cost	Approximately \$90 million assuming adequate preparatory works are undertaken as part of the upgrading of these line sections including prior installation of gauge convertible concrete sleepers between Wallan and Seymour as part of Class 1 track upgrade project.
Potential funding source	State and Commonwealth Budget allocations
Project precursors (where applicable)	Wallan-Seymour track upgrading to Class 1 and Seymour-Shepparton track upgrading to Class 2 and new signalling Wallan to Seymour.
Purpose and benefits	To further integrate the State and national standard gauge networks and for consistency with the proposed Melbourne Airport rail link, Melbourne-Brisbane Inland Railway and future HSR. Benefits include increased rail freight efficiency and competitiveness and seamless service potential for freight and passenger operations across state borders.
Timing implications	Must be coordinated with implementation of diversion of regional trains at Wallan to operate via Melbourne Airport. Earlier conversion would require all Seymour and Shepparton passenger services to utilise the ARTC interstate line south of Seymour and thus be diverted to run via the ARTC interstate corridor between Southern Cross and Seymour, resulting in almost certain severe performance degradation. Must also be coordinated with gauge conversion of the Shepparton-Tocumwal and desirably, the Toolamba-Echuca-Deniliquin line sections which conversely, would result in all freight services being diverted to the ARTC corridor to the south of Seymour.
Network and operational implications	Will improve utilisation of the former broad gauge tracks between Wallan and Seymour by virtue of adding Albury regional services to that corridor. Conversely, removal of Albury passenger services south of Seymour will open up additional paths for freight services on the ARTC interstate corridor between Melbourne and Seymour.
Explanatory notes	Critical that this project be undertaken to coincide with diversion of north eastern passenger services via Melbourne Airport – there are significant downsides for Shepparton passenger services if undertaken earlier.

Project high level description and scope	Shepparton – Tocumwal and (if reopened) Shepparton-Dookie standard gauge conversion. This project involves repositioning of rails to provide standard (1435mm) instead of broad gauge (1600mm) track. It also involves associated conversion of track through level crossings, passenger platforms and on bridges, and of turnouts. Some structural modifications may also be needed to the Murray River bridge at Tocumwal.
Potential timing	Early 2030s
Likely cost	Approximately \$40 million (\$50 million if Shepparton-Dookie included)
Potential funding source	State and Commonwealth Budget allocations
Project precursors (where applicable)	Wallan-Seymour track upgrading to Class 1 and Seymour-Shepparton track upgrading to Class 2 and new signalling Wallan to Seymour.
Purpose and benefits	To further integrate the State and national standard gauge networks and for consistency with the proposed Melbourne Airport rail link, Melbourne-Brisbane Inland Railway and future HSR. Benefits include increased rail freight efficiency and competitiveness and seamless service potential for freight and passenger operations across state borders.
Timing implications	As for Wallan-Seymour-Shepparton gauge conversion
Network and operational implications	Will result in Tocumwal (and Dookie if reopened) freight services being diverted to the ARTC interstate corridor south of Seymour.
Explanatory notes	Critical that this project be undertaken to coincide with diversion of north eastern passenger services via Melbourne Airport – there are significant downsides for Shepparton passenger services if undertaken earlier.

Project high level description and scope	Toolamba – Echuca – Deniliquin standard gauge conversion. This project involves repositioning of rails to provide standard (1435mm) instead of broad gauge (1600mm) track. It also involves associated conversion of track through level crossings, passenger platforms and on bridges, and of turnouts. Unless (or until) the Melbourne-Bendigo-Echuca corridor is converted to standard gauge, will require the provision of dual gauge trackwork in Echuca Yard.
Potential timing	Early 2030s
Likely cost	Approximately \$50 million
Potential funding source	State Budget allocation
Project precursors (where applicable)	Wallan-Seymour-Shepparton and Shepparton-Tocumwal gauge conversion.
Purpose and benefits	To further integrate the State and national standard gauge networks and for consistency with the proposed Melbourne Airport rail link, Melbourne-Brisbane Inland Railway and future HSR. Benefits include increased rail freight efficiency and competitiveness and seamless service potential for freight and passenger operations across state borders.
Timing implications	Similar to Wallan-Seymour-Shepparton and Shepparton-Tocumwal gauge conversion except that, if delayed, broad gauge trains would still be able to access the Echuca-Deniliquin line via Bendigo – unless (or until) the Melbourne-Bendigo-Echuca corridor is also converted to standard gauge.
Network and operational implications	Will result in Echuca/Deniliquin freight services being diverted to the ARTC interstate corridor south of Seymour.
Explanatory notes	