Department of Economic Development,
Jobs, Transport & Resources

GPO Box 2392
Melbourne Victoria 3001 Australia
Telephone: 03 9208 3333
www.economicdevelopment.vic.gov.au
DX210292

Ref: CSEC150400

Mr Keir Delaney
Secretary
Council Committees
Parliament House,
EAST MELBOURNE VIC 3002

Dear Mr Delaney

INQUIRY INTO THE LEASE OF THE PORT OF MELBOURNE

Attached is a copy of the VicRoads report on the location and timing of rail level crossing removals, as requested by the Committee. Please note that the names of individuals have been redacted for reasons of privacy.

Yours sincerely

Richard Bolt
Secretary

5 / 10 / 2015

Strategic framework for the prioritisation of level crossings in metropolitan Melbourne

Date: 17 June 2014
Version: 1.1

keeping victorians connected

Document information

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1 Purpose

This strategic framework provides guidance on the prioritisation of road-rail level crossings in metropolitan Melbourne for removal or treatment.

The framework includes prioritisation criteria, sequencing, staging and procurement options aimed at increasing efficiencies in the removal of level crossings in future.

The framework is one of the inputs into making decisions regarding the prioritisation of level crossings for removal. The framework enables priority sites to be determined and is considered to be the first step in determining priority for removal. A detailed business case would be the next step to consider project options and whether removal is in fact the best option to address the problem at that location.

2 Background

Melbourne is forecast to grow to a city of around 7.7 million people by 2051, adding 3.4 million to today's population. As Melbourne grows, it will need to accommodate an additional 10.7 million daily person trips by 2050 on top of the 14.2 million trips today *(Source: Plan Melbourne 2014)*. This will provide additional challenges for Melbourne's transport and transit systems.

2.1 Problems

Metropolitan Melbourne has around 245 level crossings, including 178 level crossings on the electrified rail network; of those on the electrified rail network, 65 are on arterial roads. Melbourne is the only Australian city that is facing a level crossing problem of this scale, impeding on Melbourne's liveability as well as the efficiency of its transport network. A map and tables showing the locations of level crossings in metropolitan Melbourne are included in **Appendix A**.

At level crossings with larger numbers of trains and high traffic volumes of road traffic, there can be major delays and safety concerns. Level crossings cause congestion, impact productivity, increase safety risk and create barriers that limit urban renewal and disconnect communities.

Since 2000, 16 level crossings have been removed in metropolitan Melbourne and two in regional Victoria. A list of level crossings removed since 2000 is included in **Appendix B**.

Train-tram Level Crossings

Melbourne has four train-tram level crossings – Burke Road, Glen Iris; Glenferrie Road, Kooyong; Glen Huntly Road, Glen Huntly; and Riversdale Road, Camberwell.

Level crossings with tram tracks cause significant delays to trains due to the 15 km/hr speed restriction on trains. Trains and trams are delayed when there is a delay in switching the traction power supply between 'tram' to 'train' voltage.

The speed restriction increases boom gate closure times which adversely affects road users, including tram travellers. Trams must stop at the level crossings and wait for a tram signal to proceed, even when no train is present, thus increasing delays to trams and road traffic.

These level crossings incur a significant operating cost as they require a signaller to be stationed at the level crossing and increased maintenance due to high wear on the tracks.

Delays to trains and trams cause inefficient use of rolling stock. If both tram level crossings on the Glen Waverley line were eliminated, the equivalent of three trams and half a train could be used to increase services on the public transport network.

2.2 Evidence

Patronage on Melbourne's rail network has grown at unprecedented rates over the last decade and strong growth is anticipated in the years ahead. According to Public Transport Victoria's Network Development Plan – Metropolitan Rail (2012), 61 of the 208 level crossings within the Urban Growth Boundary currently carry 10 or more passenger trains/hour in the peak direction during peak periods. The number of level crossings will increase from 61 to 133 by 2032, and train frequencies at 15 of these level crossings may cause boom gates to be down majority of the time during peak hours. This will further increase congestion at and around level crossings.

Public Transport Victoria is planning to provide a 50 per cent increase in peak hour capacity within 10 years and a 130 per cent increase within 20 years on Melbourne's rail network. The implementation of new high capacity signalling on the rail network will also allow more trains to run on the network and increase delays and safety risks at level crossings. **Figure 1** shows the estimated number of trains in peak direction at level crossings (source: PTV). Maps prepared by Public Transport Victoria, showing 2014 and 2022 train volumes at level crossings, are included in **Appendix C**.

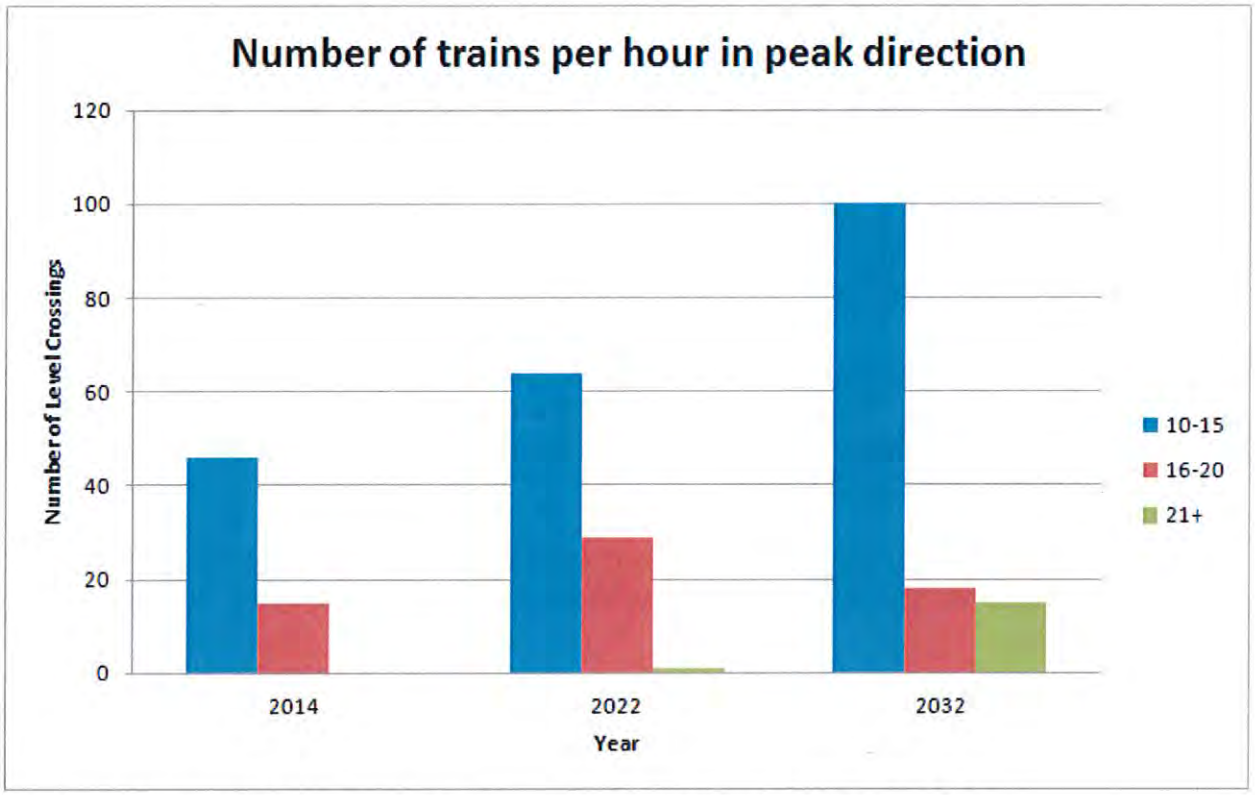


Figure 1 - Number of trains per hour in morning peak direction (Source: PTV)

2.3 Benefits

The removal of level crossings will improve transport network efficiency, reduce congestion and provide significant local and road user benefits. It will also improve access to job-rich areas across Melbourne, facilitate development, drive investment and contribute to employment growth.

Removing level crossings on arterial roads will reduce traffic and congestion on adjacent local roads and support VicRoads' SmartRoads road network operating objectives.

The removal of level crossings will also facilitate the implementation of PTV's Network Development Plan for Metropolitan Rail, to increase services and capacity of the rail network.

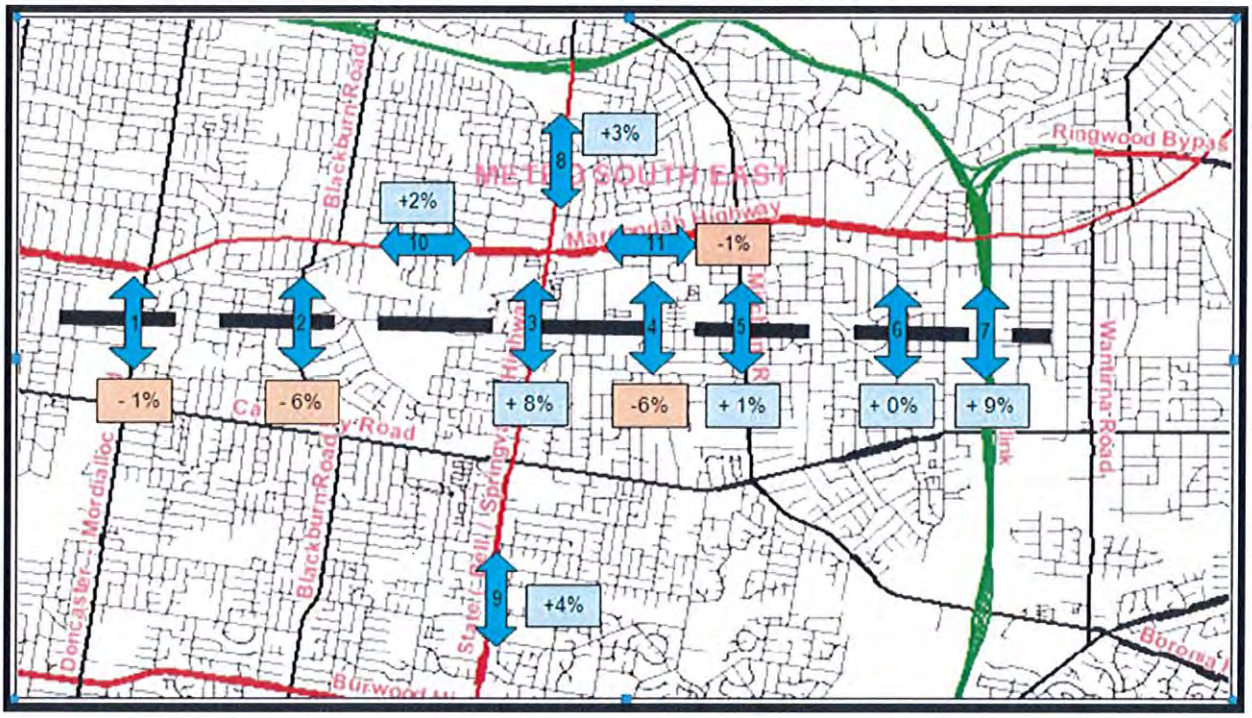
A key benefit in removing level crossing sites is improving pedestrian safety and reducing vehicle crashes. Separating rail and road and streamlining the movement of traffic will remove many of the factors that impair the safe movement of people and vehicles on the road, either directly through dangerous behaviour near the level crossings, or as a result of the excessive congestion and unpredictable traffic movements.

VicRoads is undertaking mesoscopic traffic modelling to determine the likely impacts of level crossing removals on the adjacent road network. In addition,

before and after studies are being undertaken for all current level crossing removal projects to better understand the benefits of level crossing removals.

Springvale Road, Nunawading Grade Separation – Case Study

The level crossing at Springvale Road, Nunawading, on the Belgrave-Lilydale line was removed in 2010. A traffic study undertaken as part of the grade separation project assessed the changes in traffic volumes on the surrounding road network. The outcome is illustrated in **Figure 2**.



Node	Road Name	Section	Traffic Volume Change
1	Middleborough Rd	Canterbury Rd to Maroondah Hwy	-1%
2	Blackburn Rd	Canterbury Rd to South Pde	-6%
3	Springvale Rd	Canterbury Rd to Maroondah Hwy	+8%
4	Rooks Rd	Canterbury Rd to Maroondah Hwy	-6%
5	Mitcham Rd	Canterbury Rd to Maroondah Hwy	+1%
6	Heatherdale Rd	Canterbury Rd to Maroondah Hwy	0%
7	EastLink	Canterbury Rd to Maroondah Hwy	+9%
8	Springvale Rd	Eastern Fwy to Maroondah Hwy	+3%
9	Springvale Rd	Canterbury Rd to Burwood Hwy	+4%
10	Maroondah Hwy	Surrey Rd to Springvale Rd	+2%
11	Maroondah Hwy	Springvale Rd to Rooks Rd	-1%

Figure 2 – Traffic volume changes after level crossing removal at Springvale Road, Nunawading

The removal of the level crossing has generally attracted road users to travel along Springvale Road and reduce traffic volumes on adjacent roads, typically local roads.

While traffic volume is not a direct measure of congestion, it can be broadly assumed from the Springvale Road project that local traffic redistribution will

occur and the removal of level crossings will benefit the surrounding road networks.

As part of the prioritisation assessment, a sensitivity analysis was undertaken to assess the impact of level crossing removals on the priority ranking of adjacent roads. This is further discussed in Section 4.

3 Strategies, Policies and Programs

There are a number of strategies, policies and programs which target and facilitate the removal of level crossings in Melbourne.

3.1 Strategies

Plan Melbourne *(May 2014)*

Plan Melbourne - Metropolitan Planning Strategy is the Victorian Government's vision for Melbourne to 2050. The Strategy addresses Melbourne's infrastructure, housing, employment and environmental challenges with an integrated approach to planning and development that includes land use, transport, and social and community infrastructure.

As part of improving access to job-rich areas across Melbourne and to strengthen the transport network in existing suburbs, Plan Melbourne seeks to facilitate development and drive investment through strategic removal of level crossings (Initiative 3.2.3).

Within this initiative, the short term actions are focused on:

- Investigating ways to accelerate the removal of level crossings through innovative funding arrangements
- Commencing planning and early works to remove various level crossings at priority locations
- Developing a longer-term pipeline of level-crossing-removal projects for delivery in the medium-to-long term

The longer-term pipeline of level-crossing-removal projects is the focus of this strategic framework.

Plan Melbourne also includes a number of initiatives that would benefit from the removal of level crossings. These are:

- Urban renewal opportunities associated with upgrades to transport interchanges (Initiative 1.6.1)
- Upgrading interchanges that are part of level crossing removals where appropriate (Initiative 3.2.2)
- Investigating the use of value-capture mechanisms and coordinate government efforts to facilitate development of land (Initiative 7.4.2)

Victoria – The Freight State *(August 2013)*

Victoria – The Freight State is the Victorian Freight and Logistics Plan which outlines the Government's long-term strategy to improve freight efficiency, grow productivity and better connect Victorian businesses with their markets, whether local, national or international. It is supported by a series of key directions, strategies and actions intended to provide greater certainty to the private sector and to help inform business planning and investment decisions.

A progressive program of level crossing removals in strategic corridors across metropolitan Melbourne will support the freight network.

Securing Victoria's Economy – Planning, Building, Delivering *(December 2012)*

Securing Victoria's Economy is the Victorian Government's strategy to strengthen Victoria's economic future as a leading state and a regional economic centre. The strategy outlines the key reforms the government has implemented in 2011 and 2012 and an economic action plan of more than 70 economic reforms.

The action plan includes:

- Eliminating suburban level crossings to allow more trains while reducing road traffic congestion – the Government will address priority level crossings via ongoing budget funding as well as exploring innovative private funding options to bring forward additional level crossing elimination projects;
- Approaching the market to sound out interest in value capture opportunities and actively pursue opportunities for private investors to contribute to projects by allowing a degree of private sector value capture to help fund projects; and
- Creating opportunities for urban development on the rail network located near railway stations and other transport hubs by encouraging development over stations to help fund the grade separation of level crossings that currently cause traffic congestion and safety risks.

Network Development Plan – Metropolitan Rail *(Public Transport Victoria – December 2012)*

The Network Development Plan – Metropolitan Rail is a bottom-up, suburb-by-suburb, line-by-line, demand-led strategy for planning Melbourne's rail system over the next two to three decades. The plan is designed to:

- expand the capacity of the existing rail network to meet the growing needs of the city;
- re-design train services to maximise opportunities for seamless coordination with buses and trams; and
- extend the rail network to areas currently not served by metropolitan rail.

The plan sets out a staged approach to strengthening and securing Melbourne's rail network. The delivery of projects is dependent on Commonwealth and State Government funding.

The delivery of the plan will provide a 50 per cent increase in peak hour capacity within 10 years and a 130 per cent increase within 20 years.

The rail network's track-side signals system will be gradually replaced with new high capacity signalling to allow more trains to run on the network and Melbourne will shift to new, high capacity trains that can carry up to 1100 passengers.

3.2 Policies

State Planning Policy Framework

One of the objectives of the State Planning Policy Framework is to manage the road system to achieve integration, choice and balance by developing an efficient and safe network and making the most of existing infrastructure. The planning framework (section 18) requires the provision of grade separation at railway crossings except with the approval of the Minister for Transport.

Any new rail-road intersections created by new road or rail projects must be grade separated as part of projects.

Public Transport Guidelines for Land Use and Development (DoT 2008)

The Public Transport Guidelines for Land Use and Development was prepared by the former Department of Transport to assist decision making on statutory and strategic planning proposals for land use developments that affect public transport planning and delivery. The Guidelines is used by Public Transport Victoria to assess planning permit applications in its role as a Referral Authority.

The guidelines (section 5.3.1) state that the design of transport routes at new developments must provide for grade separation at railway crossings except with the approval of the Minister for Public Transport.

3.3 Programs

Metro Level Crossing Blitz Program – Stage 1

The Victorian Government has identified the elimination of level crossings as a priority to improve transport efficiency and to boost Melbourne's productivity. The Government has committed to remove the following ten level crossings under the Metro Level Crossing Blitz program.

- Springvale Road, Springvale (completed)
- Mitcham Road, Mitcham (completed)
- Rooks Road, Mitcham (completed)
- Main Road, St Albans (funded in 2014-15 Budget)
- Burke Road, Glen Iris (funded in 2014-15 Budget)

- North Road, Ormond (funded in 2014-15 Budget)
- Blackburn Road, Blackburn (funded in 2014-15 Budget)
- Murrumbeena Road, Murrumbeena (funded under Cranbourne-Pakenham Rail Corridor Project)
- Mountain Highway, Bayswater (planning & preconstruction)
- Scoresby Road, Bayswater (planning & preconstruction)

Metro Level Crossing Blitz Program – Stage 2

The Victorian Government has provided $20.8 million in the 2014-15 State Budget to undertake planning and development to remove an additional seven level crossings under the next stage of the Metro Level Crossing Blitz Program.

Cranbourne-Pakenham Rail Corridor Project *(March 2014)*

The Cranbourne-Pakenham Rail Corridor Project is a $2–2.5 billion rail project to transform the Pakenham and Cranbourne lines and deliver a 30 per cent capacity boost for one of Melbourne's busiest rail corridors.

The project will deliver 25 new next generation high-capacity trains, 21st century high-capacity signalling and the removal of four level crossing removals at:

- Murrumbeena Road, Murrumbeena
- Koornang Road, Carnegie
- Clayton Road, Clayton
- Centre Road, Clayton

Planning and preconstruction will commence at a further five level crossings:

- Poath Road, Murrumbeena
- Grange Road, Carnegie
- Corrigan Road, Noble Park
- Heatherton, Noble Park
- Chandler Road, Noble Park

Commonwealth Infrastructure Investment Programme

The Victorian Government's 2012 Priority Infrastructure submission to Infrastructure Australia included the following two railway level crossing related programs:

- Removing Level Crossings – a progressive program of level crossing removals in strategic corridors across metropolitan Melbourne. The 2012 submission was seeking funding for the Burke Road, Main Road, Blackburn Road, North Road, and Mountain Highway/Scoresby Road projects; and
- Dandenong Rail Capacity Program – staged construction of a series of projects along the Dandenong Rail Corridor, including priority grade separations, signalling upgrades and platform lengthening to allow the

running of more and high-capacity trains. The 2012 submission focused on grade-separation projects.

The Australian Government has contributed $151 million in the 2014-15 Federal Budget for the removal of the level crossing on Main Road in St Albans.

Land Development Opportunities

The Victorian Government supports the development of land associated with the elimination of level crossings through value-capture mechanisms. The Government is also creating opportunities for urban development on the rail network located near railway stations and other transport hubs by encouraging development over stations to help fund the grade separation of level crossings.

The initiatives are included in *Plan Melbourne – Metropolitan Planning Strategy (2014)* and *Securing Victoria's Economy – Planning, Building, Delivering (2012),* which is the Government's strategy to strengthen Victoria's economic future as a leading state and a regional economic centre.

VicRoads has investigated potential land development opportunities and revenue when developing business cases for the removal of level crossings. Work to date has indicated that except for the level crossing on Burke Road in Glen Iris, there is limited opportunity to realise a positive financial return from the development of rail land made available by level crossing removal projects.

Value capture and land development opportunities have not been considered in the prioritisation of level crossings as the benefits are generally related to sites that have a very high land value.

Whilst this framework and prioritisation does not explicitly consider land development opportunities, they will be considered through the development of project options when preparing business cases for grade separations.

4 Prioritisation of level crossings for removal

Over recent years, work has been done to analyse and prioritise level crossings on the electrified rail network in metropolitan Melbourne. Work to date has predominantly involved a road and rail network operations perspective.

The former Department of Transport, in conjunction with VicRoads, undertook an assessment of level crossings on the metropolitan electrified rail network in 2009. The purpose of the assessment was to prioritise and recommend a short list of level crossings for grade separation.

The assessment involved a four-stage multi-criteria approach and predominantly focussed on individual sites and wholly from a road and rail operations perspective. It did not consider a broader network approach and wider productivity and economic benefits from a corridor or strategic perspective. The initial prioritisation was also influenced by initial costs and BCRs, which biases the results. Whilst the multi-criteria assessment was a useful tool, it is not the sole input into prioritising level crossings for grade separation.

4.1 Current Prioritisation

VicRoads, in consultation with Public Transport Victoria and other stakeholders, has re-assessed the priority of the metropolitan level crossings for removal. A complete list of stakeholders consulted is included in **Appendix D.**

The assessment includes metropolitan level crossings on the existing electrified rail network and on lines which are expected to be electrified by 2031.

4.2 Prioritisation Criteria

Each level crossing has been assessed against a set of weighted criteria. Higher priority is given to roads with greater strategic importance. Arterial roads are given higher priority over local roads. Local roads on tram and priority bus routes are given higher priority over other local roads. The removal of level crossings based on the strategic importance of roads will maximize the efficiency of the road network.

The prioritisation criteria and recommended weightings are described below. A detailed description of the prioritisation criteria and assumptions made is included in **Appendix E**.

Strategic fit (60%)

The strategic fit criterion considers land use and transport integration by scoring sites based on their alignment with the overall road network operating objectives.

Priority is given to tram routes, priority bus routes and preferred traffic routes in accordance with VicRoads' SmartRoads Network Operating Plans. Arterial roads are given a higher score than local roads. Local roads on tram routes and priority bus routes are given a higher score than other local roads.

Level crossings within or near employment clusters, activity centres and freight and transport gateways are also given a higher score.

Economic and Environmental (25%)

The economic and environmental criterion considers benefits such as travel time savings, vehicle operating cost savings and reduction in energy consumption and emissions. Capital costs associated with the removal of level crossings have not been considered as part of the prioritisation process.

A lower boom gate closure percentage threshold for level crossings on arterial roads was used in the prioritisation assessment to give arterial roads higher priority over local roads. Level crossings on arterial roads with boom gate closure times above 25%, and local roads with boom gate closure times above 30%, during the morning peak period are ranked in the prioritisation. Level crossings with boom gate closure times below the above thresholds are not considered critical for removal at this stage, given that other network constraints are key determinants in operation at these locations.

Safety (15%)

The safety criterion considers the risk of death or injury based on Transport Safety Victoria incident data from 2003 to 2012.

4.3 Sensitivity Analysis

A sensitivity analysis has been undertaken to ensure the appropriate combination of weightings is used in the prioritisation of level crossings.

Assessments were undertaken with the economic and environmental as well as the safety criteria being weighted higher than strategic fit. Weighing the economic and environmental criteria higher (at around 60%) resulted in a much larger number of local roads ranked higher than arterial roads in priority. This is not desirable as some local roads are not strategically important but may have high levels of congestion and delays as a result of congestion at adjacent arterial road level crossings.

An assessment was also undertaken with safety criterion weighted higher (at around 60%). This resulted in many level crossings that are on important arterial roads and strategic transport routes with high boom gate closure times ranking lower as a result of fewer safety incidents. This is undesirable as it will not maximise the efficiency of the road network.

Sites with a high number of safety incidents should be investigated further to identify if there is any improvements or treatments that can be done to increase safety at and around the vicinity of the level crossings. The solution may not necessarily require a level crossing removal.

4.4 Determining the need to remove level crossings

There are many factors which influence the need to remove a level crossing that causes traffic delays. The key factors include reduction in road capacity caused by high train frequencies and high boom gate closure times, and the volume capacity of the road at the level crossing.

Reduction in Road Capacity at Level Crossings

The reduction in road capacity can be determined by calculating the number of trains that use the level crossing during peak hours and the resulting boom gate closure time. This assessment is summarised in **Table 1.**

Trains per hour in peak direction[1]	Total trains per hour[2]	Estimated number of boom gate closures per hour	Estimated reduction in road capacity (%)[3]	Consequence
7-9	9-15	9-11	25-30	• The traffic capacity of signalised intersections close to level crossings will be reduced by about a third • Traffic signals are still able to complete full cycles; however completing consecutive cycles is becoming difficult.
10-15	13-25	13-19	35-52	• The traffic capacity of signalised intersections close to level crossings will have nearly halved • Traffic signals will become increasingly unable to complete a full cycle between successive boom closures and, as a consequence, some road user movements may not be permitted for several boom openings.
16-20	20-34	20-25	56-69	• Traffic movements across level crossings will be highly restricted. • Traffic signals will become ineffective.
21+	26+	26+	73+	• Level crossings will rarely open. • Some stations besides level crossings will become inaccessible. • Risk taking by road users will increase, especially by pedestrians.

Table 1 – Consequence of boom gate closures

Note 1 – Train volumes in peak direction based on PTV's Network Development Plan – Metropolitan Rail (2012)
Note 2 – Total train volumes estimated at 1.7 times peak direction train volumes
Note 3 – Estimated reduction in road capacity based on boom gate closure times

The operation of the roads at level crossings is highly restricted and vehicles experience significant delays on roads that cross over rail lines that have high train volumes. If additional train services are operated on these lines, it may result in the road becoming almost inoperable during peak hours. If no action is taken to remove the level crossings, the capacity to be able to run additional train services and provide a higher level of service to commuters in the future is limited. **Figure 3** below shows the projected increase in boom gate closure time at level crossings.

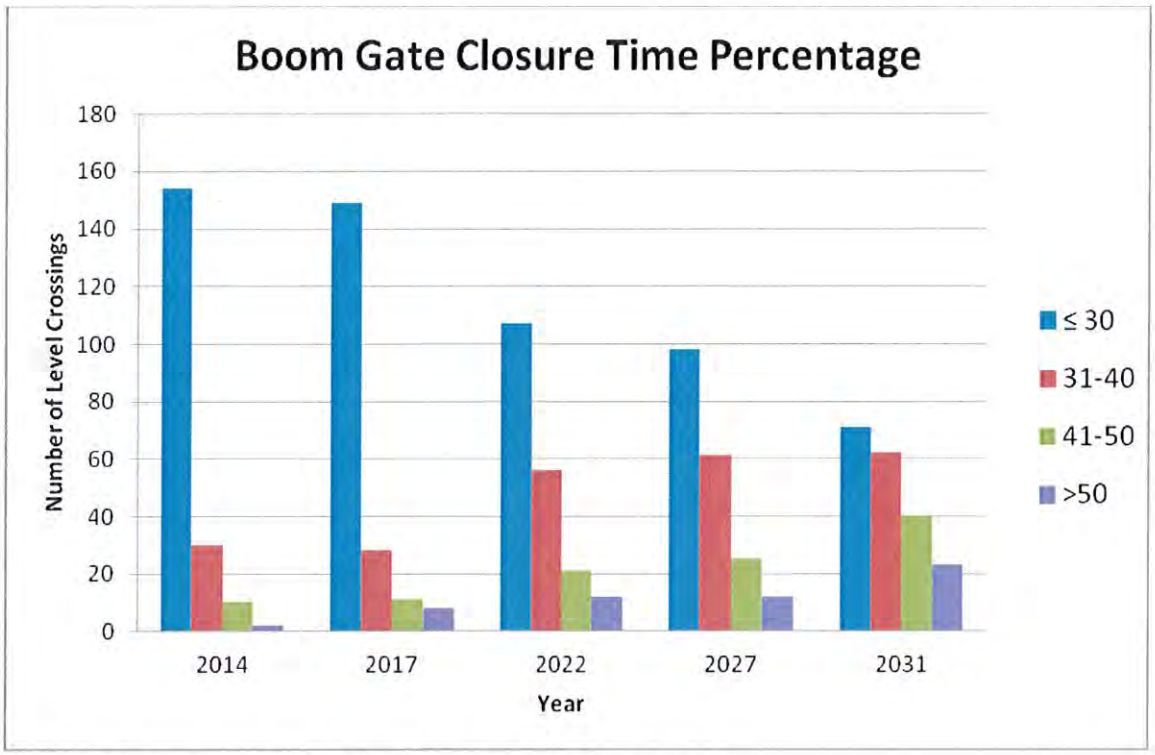


Figure 3: Estimated Boom Gate Closure Time Percentage

Boom gate closure times are affected by tram routes, location of railway stations, overlapping trains and extreme events. Boom gate closure time is an important factor in determining the need to remove a level crossing.

Generally, level crossings on arterial roads with boom gate closure times below 25% during peak hours are not considered critical for removal. Once boom gate closure times reach above 40%, traffic signals adjacent to level crossings become unable to complete a full cycle between successive boom closures and, as a consequence, some road user movements may not be permitted for several boom openings.

Road Volume Capacity

The relationship between traffic volume and road capacity at signalised intersections provides an indication of how the intersection operates and is also referred to as the degree of saturation, as described in **Table 2**.

Volume / Capacity Ratio	Definition
Less than 0.60	Uncongested operations; all queues clear in a single signal cycle.
0.60 to 0.69	Very light congestion; an occasional approach phase is fully utilised.
0.70 to 0.79	Light congestion; occasional backups on critical approaches.
0.80 to 0.89	Significant congestion on critical approaches, but intersection functional. Cars required to wait through more than one cycle during short peaks. No long-standing queues formed.
0.90 to 0.99	Severe congestion with some long-standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es).
1.00 and greater	Total breakdown, stop-and-go operation.

Table 2 - Volume / Capacity Definition

The presence of a level crossing adjacent to a signalised intersection will further reduce capacity and increase delays and at the signalised intersection.

The results from a sensitivity analysis that considered all sites on the electrified metropolitan rail network indicated that in general, once a level crossing site has a boom gate closure time greater than 40%, as well as a volume-capacity ratio greater than 0.6, the removal of the level crossing would become critical. This analysis considers level crossing sites that are independent to each other and does not consider how the removal of sites will impact the wider road network. **Figure 4** illustrates the expected volume-capacity ratio at level crossings from 2014 to 2031.

The prioritisation of level crossings for removal considers the strategic importance of the road, the capacity at which the road is operating during peak hours and the impact of the level crossing on the operation of the road.

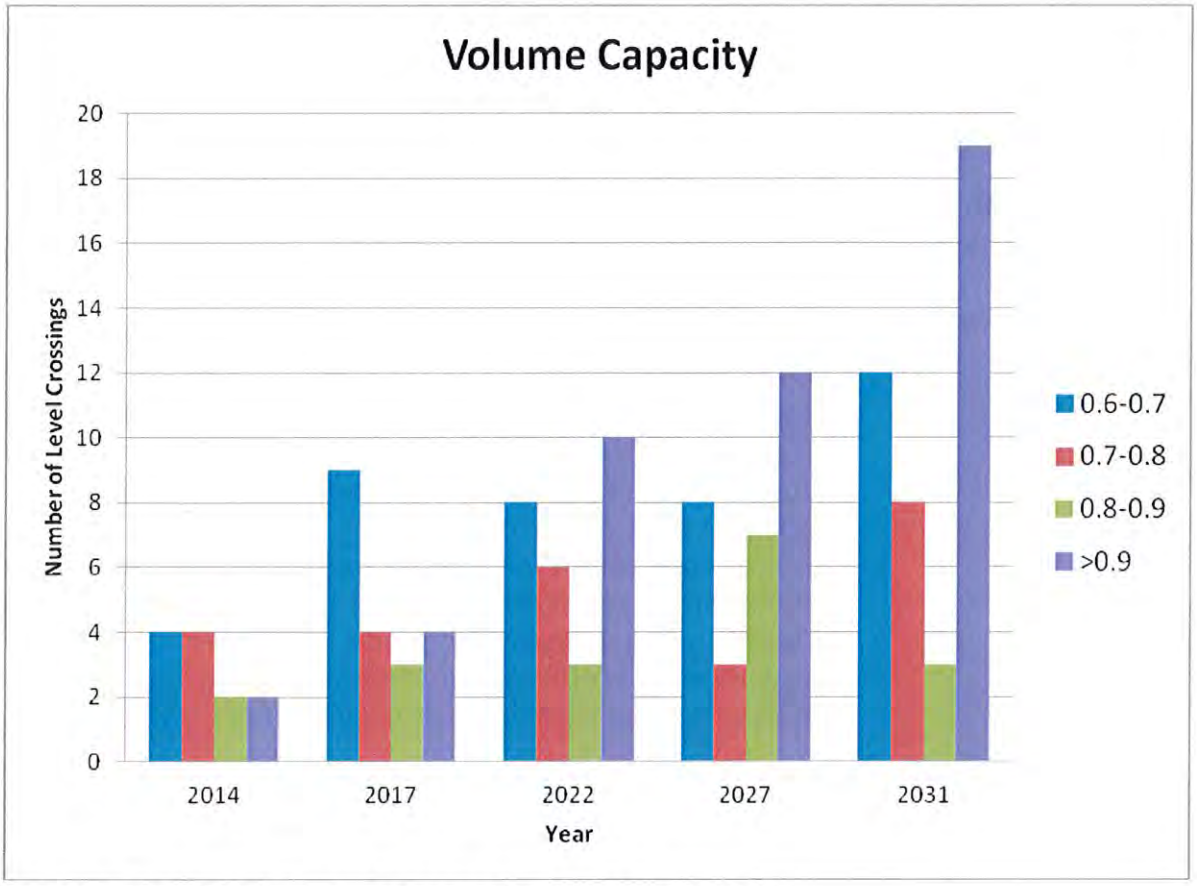


Figure 4: Expected Volume –Capacity Ratio at Level crossings

Impact of level crossing removals on adjacent level crossings

As part of the prioritisation assessment, a sensitivity analysis was undertaken to determine the effect on the priority ranking of adjacent roads from removing level crossing.

The sensitivity analysis was based on traffic redistribution patterns observed from the Springvale Road, Nunawading level crossing removal project, which generally indicated a traffic volume reduction of up to six per cent on adjacent roads once the level crossing was removed. The result of the sensitivity analysis indicates that a level crossing removal will not generally change the priority order of level crossings on adjacent roads.

In consideration of the above, this framework has given higher priority to the strategic importance of roads within the road network rather than traffic volumes or congestion levels at level crossings.

As discussed in Section 2.3 above, VicRoads is undertaking mesoscopic traffic modelling to determine the likely impacts of level crossing removals on the surrounding road network. In addition, before and after studies are being undertaken for all current level crossing removal projects to better understand

the benefits of level crossing removals. The framework and prioritisation will be further refined as more information becomes available.

4.5 Prioritisation Results / Outputs

The results of the prioritisation assessment of each level crossing site are presented and ranked as high, medium and lower in priority.

The ranking of a site is relative to other sites in any given year. Some results may show sites ranked higher in earlier years and then lower in future years as a result of the scores being normalised. This does not necessarily mean that the priority of a site would drop as it can reflect that other sites could become more critical in future years.

Arterial with boom gate closure times above 25% and local roads with boom gate closure times above 30% during the morning peak period are ranked in the prioritisation.

Sites that have no priority ranking are considered a lower priority unless they have to be removed with an adjacent priority level crossing due to close proximity.

A priority list of level crossings, based on year 2013 and 2022 traffic and train volumes, is included in **Appendix F**.

5 Sequencing and staging

Aurecon Group was engaged by VicRoads to investigate and consider sequencing, staging and procurement options for the development of this strategic framework.

5.1 Key considerations

The main objective in considering sequencing and staging options is to maximise the efficiency of level crossing removals.

Aurecon, in consultation with VicRoads and other key stakeholders, has considered options which will reduce the end-to-end process, minimise the cost of level crossing removals, and minimise impacts on commuters, businesses and the community during construction.

The analysis used prioritisation data for individual level crossing sites in Section 4 as a key input.

5.2 Options analysis

All metropolitan level crossings on the existing electrified rail network and those on lines which are expected to be electrified by 2031 are included in the investigation. The analysis considered the following:

- **Priority of individual sites (based on prioritisation in Section 4)**
- **Bundling of level crossings in close proximity**

  Bundle level crossings that have to be planned, designed and constructed together due to site constraints, close proximity or track alignments. Bundling of level crossings also considers sites that would benefit from being planned and designed together but can be constructed independently as part of a program approach.
- **Leverage other projects**

  Opportunities to incorporate the removal of level crossings with planned road duplication, rail track or operation upgrade, rail electrification, station upgrade or station land redevelopment projects.
- **Timing of the removal of level crossings**

  The timing of delivery has been assessed based on the priority ranking of each level crossing. Those that are high or medium priorities in either the 2013 or 2022 assessment are recommended for short to medium term delivery. This timeframe also includes sites that are lower in priority but essential or desirable to remove them in groupings.

  Ideally, early planning should be undertaken for the removal of level crossings in consideration of the above bundling requirements and opportunities, as well as the possibility of timing to coincide with other projects.

Further strategic traffic modelling and analysis, environment impact assessments, land acquisition and community consultation will be required to understand the complete benefits and impacts of level crossing removals on the broader network.

Further detailed analysis of the sequencing of level crossing removals is needed to understand and mitigate where possible the negative impacts caused by temporary road closures and rail occupations during construction.

Adjacent crossings could be constructed together in a package so long as construction tasks which require the closure of parallel or alternative routes are not done at the same time. This is a detailed project management issue for consideration during construction.

In relation to parallel train routes, planned sequencing takes this into account so that parallel routes do not have major construction on them at the same time, so that if there is line disruption due to construction passengers can be bussed or transferred to adjacent lines.

5.3 Outcomes

The analysis has identified priority level crossings that should be bundled and the timeframe for delivery (short-medium and long term). It has also identified priority level crossings that could be delivered as standalone projects or bundled projects through the planning, design and construction phases.

The recommended prioritisation and grouping of level crossings after the consideration of sequencing and staging options are included in **Appendix G**.

6 Procurement

Although critical to the execution of level crossing removals, the preferred procurement method should not be the primary driver of the prioritisation strategy. However, knowledge of procurement options is an important factor in selecting the optimal delivery groupings since it has a significant impact on schedules, costs, risk and opportunity management, stakeholder influence and client management effort.

Grouping level crossing sites with a similar form of construction or level of complexity can drive supply chain and procurement efficiencies.

6.1 Potential procurement options

For the purpose of consideration of options, procurement and contracting methodologies have been identified based on a wide range of variables, generally related to risk and opportunity management.

A list of procurement options for the removal of level crossings is included in **Appendix H**.

6.2 Selecting the procurement method

The procurement methodology should be selected to support and enhance the defined program and project benefits. As outlined in the procurement options, each procurement method has strengths, weaknesses and characteristics which will suit various projects depending on competing priorities and project outcomes.

The most appropriate procurement method should be selected based on the characteristics of the project and the selected project option during the development of project business case. Ultimately, the project option should drive the procurement method.

The National Public Private Partnership Policy Guidelines requires that all government infrastructure projects with a capital value exceeding $50 million should be considered for delivery as a PPP. However, it is important to note that the likely cost of each project(s) may impact on the procurement method selected.

The Department of Treasury and Finance's High Value High Risk guidelines will also need to be applied depending on the results of the options assessment and development stage. This should be conducted during the development of the Business Case(s), which will provide an outline of which procurement method is likely to be employed for the particular project(s).

7 References

- Network Development Plan – Metropolitan Rail *(PTV 2012)*
- Plan Melbourne *(DTPLI 2014)*
- Prioritisation of metropolitan level crossings for grade separation *(DoT & VicRoads 2009)*

8 Attachment

Appendix A – Location of level crossings in metropolitan Melbourne (map & detailed list)

Appendix B – Metropolitan level crossings removed since 2000

Appendix C – 2014 and 2022 train volumes at level crossings (source: PTV)

Appendix D – Stakeholders list

Appendix E – Prioritisation criteria and assumptions

Appendix F – Priority level crossings (based on individual sites)

Appendix G – Priority level crossings (based on sequencing and staging)

Appendix H – Procurement options

Appendix A - Location of level crossings in metropolitan Melbourne

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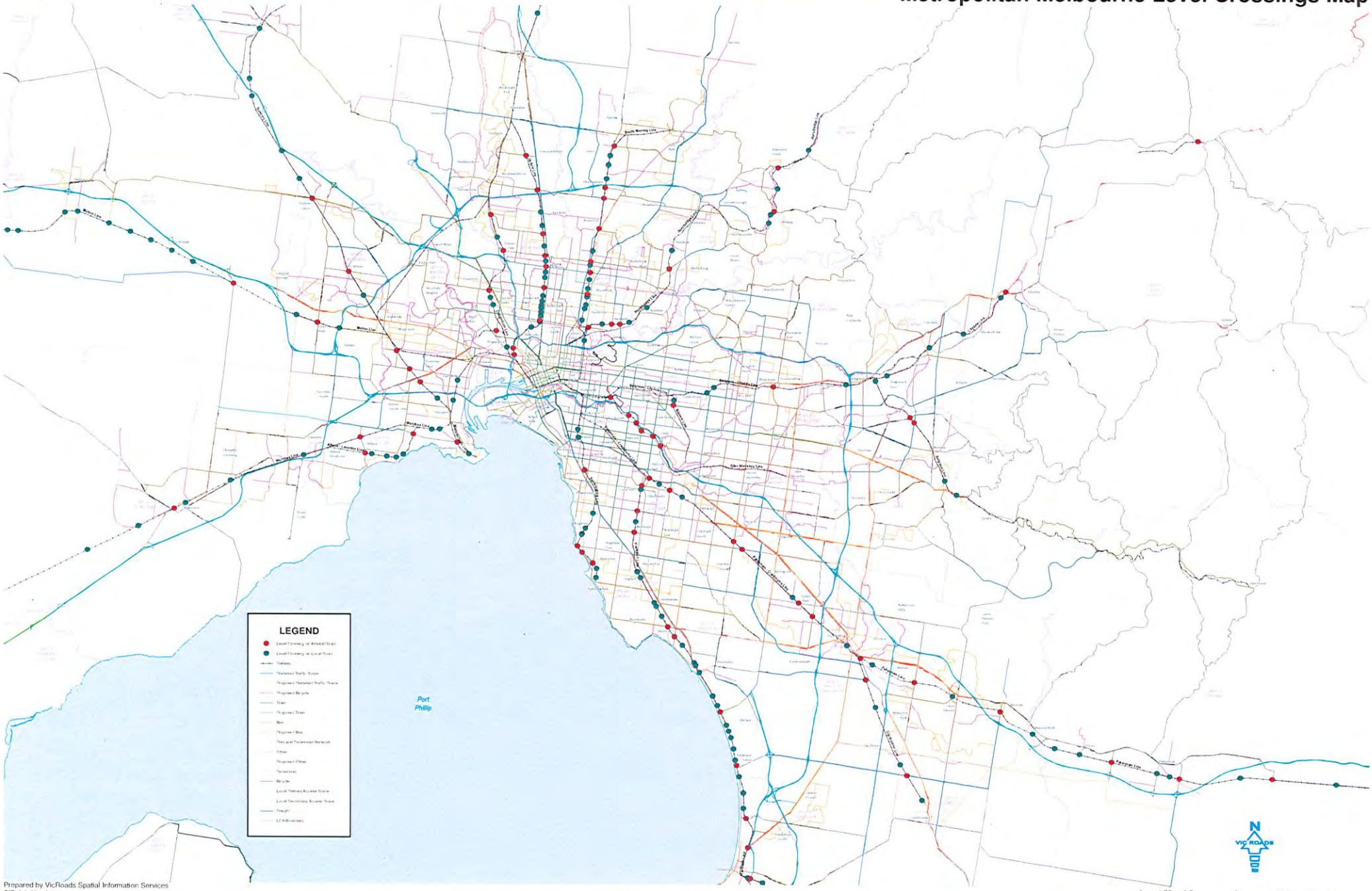
Metropolitan Melbourne Level Crossings Map



Prepared by VicRoads Spatial Information Services
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Level Crossings in Metropolitan Melbourne - Electrified Network (2014)

No	Line	Road Name	Suburb	Road Type	Network in 2014	Melway Ref.
1	Caulfield - Dandenong	Grange Road	Caulfield East	Arterial	Electrified	68 G2
2		Koornang Road	Carnegie	Local	Electrified	68 J4
3		Murrumbeena Road	Murrumbeena	Arterial	Electrified	69 A5
4		Poath Road	Hughesdale	Local	Electrified	69 D6
5		Clayton Road	Clayton	Arterial	Electrified	79 C2
6		Centre Road	Clayton	Arterial	Electrified	79 E4
7		Corrigan Road	Noble Park	Local	Electrified	80 D12
8		Heatherton Road	Noble Park	Arterial	Electrified	89 E1
9		Chandler Road	Noble Park	Arterial	Electrified	89 H4
10	Frankston	Neerim Road	Caulfield East	Arterial	Electrified	68 F4
11		Glen Huntly Road	Glen Huntly	Local	Electrified	68 E5
12		North Road	Ormond	Arterial	Electrified	68 E8
13		McKinnon Road	McKinnon	Local	Electrified	68 E10
14		Centre Road	Bentleigh	Arterial	Electrified	68 D12
15		Wickham Road	Highett	Local	Electrified	77 E7
16		Highett Road	Highett	Local	Electrified	77 E9
17		Park Road	Cheltanham	Local	Electrified	86 H1
18		Charman Road	Cheltenham	Local	Electrified	86 J2
19		Latrobe Street	Cheltenham	Local	Electrified	86 J4
20		Balcombe Road	Mentone	Arterial	Electrified	87 A7
21		Warrigal Road	Parkdale	Arterial	Electrified	87 B7
22		Parkers Road	Parkdale	Local	Electrified	87 C9
23		McDonald Street	Mordiallic	Local	Electrified	87 F12
24		Bear Street	Mordialloc	Local	Electrified	92 F1
25		Station Street	Aspendale	Local	Electrified	92 F2
26		Lincoln Parade	Aspendale	Local	Electrified	92 J6
27		Lochiel Avenue	Edithvale	Local	Electrified	92 K8
28		Edithvale Road	Edithvale	Arterial	Electrified	92 K9
29		Swanpool Avenue	Chelsea	Local	Electrified	93 B12
30		Chelsea Road	Chelsea	Local	Electrified	97 B1
31		Argyle Avenue	Chelsea	Local	Electrified	97 B2
32		Bondi Road	Bonbeach	Local	Electrified	97 C4
33		Station Street	Bonbeach	Local	Electrified	97 C6
34		Station Street	Carrum	Arterial	Electrified	97 C7
35		Eel Race Road	Carrum	Local	Electrified	97 D9
36		Armstrongs Road	Seaford	Local	Electrified	97 E12
37		Station Street	Seaford	Local	Electrified	99 D3
38		Seaford Road	Seaford	Arterial	Electrified	99 E5
39		Overton Road	Seaford	Local	Electrified	99 F10
40	Glen Waverley	Madden Grove	Burnley	Arterial	Electrified	2H J11
41		Glenferrie Road	Kooyong	Arterial	Electrified	59 C3
42		Toorak Road	Kooyong	Arterial	Electrified	59 E4
43		Tooronga Road	Malvern	Arterial	Electrified	59 F6
44		Burke Road	Glen Iris	Arterial	Electrified	59 H7
45		High Street	Glen Iris	Arterial	Electrified	59 J9
46	Belgrave	Union Road	Surrey Hills	Local	Electrified	46 H11
47		Mont Albert Road	Mont Albert	Local	Electrified	46 J10
48		Blackburn Road	Blackburn	Arterial	Electrified	47 K10
49		Heatherdale Road	Ringwood	Local	Electrified	49 D9
50		Bedford Road	Ringwood	Local	Electrified	49 K9
51		Mountain Highway	Bayswater	Arterial	Electrified	64 F3
52		Scoresby Road	Bayswater	Arterial	Electrified	64 G4
53		Alpine Street	Ferntree Gully	Local	Electrified	74 C3
54		Railway Avenue	Ferntree Gully	Local	Electrified	74 E5
55	Alamein	Prospect Hill Road	Camberwell	Local	Electrified	46 B12
56		Riversdale Road	Camberwell	Arterial	Electrified	60 B1
57	Craigieburn	Macaulay Road	Kensington	Local	Electrified	2T K5
58		Puckle Street	Moonee Ponds	Local	Electrified	84A B3
59		Park Street	Moonee Ponds	Local	Electrified	28 G6
60		Buckley Street	Essendon	Arterial	Electrified	28 G4
61		Gaffney Street	Pascoe Vale	Arterial	Electrified	16 K9
62		Devon Road	Pascoe Vale	Local	Electrified	16 H7
63		Glenroy Road	Glenroy	Arterial	Electrified	16 G2

Level Crossings in Metropolitan Melbourne - Electrified Network (2014)

No	Line	Road Name	Suburb	Road Type	Network in 2014	Melway Ref.
64		Arden Street	North Melbourne	Local	Electrified	2A C8
65		Macaulay Road	North Melbourne	Local	Electrified	2A C5
66		Poplar Road	Parkville	Local	Electrified	29 E11
67		Park Street	Parkville	Local	Electrified	29 G10
68		Brunswick Road	Brunswick	Arterial	Electrified	29 G10
69		Union Street	Brunswick	Local	Electrified	29 G9
70		Dawson Street	Brunswick	Local	Electrified	29 G8
71		Albert Street	Brunswick	Local	Electrified	29 G8
72		Victoria Street	Brunswick	Local	Electrified	29 G7
73		Hope Street	Brunswick	Local	Electrified	29 G6
74		Albion Street	Brunswick	Local	Electrified	29 G5
75	Upfield	Moreland Road	Brunswick	Arterial	Electrified	29 G4
76		Reynard Street	Coburg	Local	Electrified	29 H2
77		Munro Street	Coburg	Local	Electrified	29 H1
78		Bell Street	Coburg	Arterial	Electrified	17 H12
79		O'Hea Street	Coburg	Local	Electrified	17 H11
80		Gaffney Street	Coburg North	Arterial	Electrified	17 G10
81		Bakers Road	Coburg North	Local	Electrified	17 G8
82		Boundary Road	Hadfield	Arterial	Electrified	17 G6
83		Fawkner Cemetery Entrance	Hadfield	Local	Electrified	17 G4
84		Box Forest Road	Hadfield	Local	Electrified	17 G2
85		Camp Road	Campbellfield	Arterial	Electrified	7 F10
86		Barry Road	Campbellfield	Arterial	Electrified	7 D4
87		Ramsden Street	Clifton Hill	Local	Electrified	2C J2
88		Westgarth Street	Northcote	Arterial	Electrified	30 E11
89		Victoria Road	Northcote	Local	Electrified	30 H10
90		Station Street	Fairfield	Arterial	Electrified	30 K10
91		Grange Road	Alphington	Arterial	Electrified	31 B10
92		Yarralea Street	Alphington	Local	Electrified	31 D10
93		Marshall Street	Ivanhoe	Local	Electrified	31 G7
94	Hurstbridge	Lower Plenty Road	Rosanna	Arterial	Electrified	20 A12
95		Ruthven Street	Macleod West	Local	Electrified	20 A9
96		Diamond Street	Eltham	Local	Electrified	21 K4
97		Railway Road	Eltham	Local	Electrified	21 K2
98		Wattletree Road	Eltham	Arterial	Electrified	22 A2
99		Allendale Road	Eltham	Local	Electrified	12 A10
100		Main Hurstbridge Rd	Diamond Creek	Arterial	Electrified	12 A6
101		Wilson Road	Wattle Glen	Local	Electrified	12 G3
102		Charles Street	Northcote	Local	Electrified	30 D10
103		Arthurton Road	Northcote	Local	Electrified	30 E8
104		Beavers Road	Thornbury	Local	Electrified	30 E7
105		Woolton Avenue	Thornbury	Local	Electrified	30 E6
106		Normanby Avenue	Thornbury	Arterial	Electrified	30 E5
107		Hutton Street	Thornbury	Local	Electrified	30 F4
108		Oakover Road	Preston	Local	Electrified	30 F2
109		Bell Street	Preston	Arterial	Electrified	30 F1
110	South Morang	Cramer Street	Preston	Local	Electrified	18 F12
111		Murray Road	Preston	Arterial	Electrified	18 F11
112		Regent Street	Reservoir	Local	Electrified	18 F9
113		High Street	Reservoir	Arterial	Electrified	18 H5
114		Keon Parade	Reservoir	Arterial	Electrified	8 J11
115		Settlement Road	Thomastown	Arterial	Electrified	8 J9
116		Heyington Avenue	Thomastown	Local	Electrified	8 J8
117		Station Street	Lalor	Local	Electrified	8 J5
118		Paschke Crescent	Lalor	Local	Electrified	8 K4
119		Childs Road	Epping	Arterial	Electrified	9 A2
120		Furlong Road	St Albans	Local	Electrified	26 C5
121		Main Road	St Albans	Arterial	Electrified	26 A1
122		Melton Hwy	Taylors Lakes	Arterial	Electrified	3 C11
123	Sunbury	Calder Park Dr	Calder Park	Local	Electrified	3 A8
124		Holden Rd	Diggers Rest	Local	Electrified	354 H3
125		Old Calder Hwy	Diggers Rest	Local	Electrified	352 C5
126		Watsons Rd	Diggers Rest	Local	Electrified	352 B2
127		Station St	Sunbury	Local	Electrified	382 D5

Level Crossings in Metropolitan Melbourne - Electrified Network (2014)

No	Line	Road Name	Suburb	Road Type	Network in 2014	Melway Ref.
128	Werribee	Anderson Street	Yarraville	Local	Electrified	42 A9
129		Hudsons Road	Spotswood	Local	Electrified	41 K12
130		Champion Road	Williamstown North	Local	Electrified	55 H6
131		Maddox Road	Williamstown North	Local	Electrified	55 F6
132		Maidstone Street	Altona	Arterial	Electrified	54 C7
133		Aviation Road	Laverton	Local	Electrified	53 B10
134		Old Geelong Road	Hoppers Crossing	Local	Electrified	206 H3
135		Cherry Street	Werribee	Local	Electrified	205 K7
136	Pakenham	Webster Street	Dandenong	Local	Electrified	90 D9
137		Sth Gippsland Hwy	Dandenong South	Arterial	Electrified	90 G11
138		Progress Street	Dandenong South	Local	Electrified	95 J1
139		Hallam South Road	Hallam	Arterial	Electrified	96 G4
140		Webb Street	Narre Warren	Local	Electrified	110 D6
141		Clyde Road	Berwick	Arterial	Electrified	111D9
142		Station Street	Beaconsfield	Local	Electrified	131 J1
143		Brunt Road	Officer	Local	Electrified	214 C4
144		Officer South Road	Officer	Local	Electrified	214 H5
145		Cardinia Road	Pakenham	Arterial	Electrified	215 D6
146		McGregor Road	Pakenham	Local	Electrified	317 C8
147		Main Street	Pakenham	Local	Electrified	216 E9
148		Racecourse Road	Pakenham	Arterial	Electrified	317 G9
149	Cranbourne	Greens Road	Dandenong South	Arterial	Electrified	95 H3
150		Abbotts Road	Lyndhurst	Local	Electrified	95 K8
151		Evans Road	Lyndhurst	Local	Electrified	129 D7
152		Thompsons Road	Cranbourne West	Arterial	Electrified	129 E9
153		Camms Road	Cranbourne	Local	Electrified	133 H1
154	Lilydale	Dublin Road	Ringwood East	Local	Electrified	50 B8
155		Coolstore Road	Croydon	Local	Electrified	50 K3
156		Manchester Road	Mooroolbark	Local	Electrified	37 F12
157		Melba Avenue	Lilydale	Local	Electrified	38 C6
158		Maroondah Hwy	Lilydale	Arterial	Electrified	38 D4
159	Sandringham	Greville Street	Prahran	Local	Electrified	58 D6
160		Union Street	Windsor	Local	Electrified	58 D7
161		Glen Eira Road	Ripponlea	Arterial	Electrified	67 E1
162		Bay Street	Brighton	Local	Electrified	67 G9
163		Church Street	Brighton	Local	Electrified	67 E12
164		New Street/Dendy Street	Brighton	Local	Electrified	76 D1
165		South Road	Brighton	Arterial	Electrified	76 D3
166		New Street	Hampton	Local	Electrified	76 D4
167		Hampton Street	Hampton	Arterial	Electrified	76 F6
168		Linacre Road	Hampton	Local	Electrified	76 G7
169		Abbott Street	Sandringham	Local	Electrified	76 G9
170	Laverton	Kororoit Creek Road	Altona	Arterial	Electrified	55 C6
171		Civic Parade	Seaholme	Local	Electrified	55 A10
172		Millers Road	Seaholme	Local	Electrified	54 K11
173		Pier Street	Altona	Local	Electrified	54 H11
174		Grieve Parade	Altona	Local	Electrified	54 E10
175		Maidstone Street	Altona	Arterial	Electrified	54 D10
176	Williamstown	Ferguson Street	Williamstown	Arterial	Electrified	56 A8
177		Giffard Street	Williamstown	Local	Electrified	56 C10
178	Flemington Racecourse	Ascot Vale Road	Ascot Vale	Arterial	Electrified	28 J12

Notes:

Part of Cranbourne-Pakenham Rail Corridor Project - work anticipated to start in 2015 and complete by 2019

Level crossings currently funded for removal under Metro Level Crossing Blitz Program - expected to be removed by 2017

Planing and Preconstruction Stage

Level crossings on Mitcham and Rooks Road in Mitcham, Springvale Road in Springvale and Anderson Roads in Sunshine were removed in 2014

No. Of level crossings on Arterial Roads =	65
No. Of level crossings on Local Roads (including Local Access) =	113
TOTAL =	178

Level Crossings in Metropolitan Melbourne - Non Electrified Network (2014)

No	Line	Road Name	Suburb	Road Type	Network in 2014	Melway Ref.
1	Frankston (Baxter)	Clarendon St	Frankston	Local	Non-Electrified*	102 F4
2		Moorooduc Hwy	Frankston	Arterial	Non-Electrified*	102 F4
3		Hillcrest Road	Frankston	Local	Non-Electrified*	102 H5
4		Robinsons Road	Frankston	Local	Non-Electrified*	103 C11
5		Golf Links Road	Baxter	Local	Non-Electrified*	107 C1
6	Melton (Ballarat)	Fitzgerald Road	Sunshine West/Ardeer	Arterial	Non-Electrified*	25 J11
7		Mt Derrimut Road	Deer Park	Local	Non-Electrified*	25 E10
8		Robinsons Road	Deer Park	Arterial	Non-Electrified*	25 A9
9		Hopkins Road	Rockbank	Local	Non-Electrified*	357 J3
10		Troups Road	Rockbank	Local	Non-Electrified*	355 A11
11		Leakes Road	Rockbank	Local	Non-Electrified*	344 G9
12		Paynes Road	Rockbank	Local	Non-Electrified*	344 D7
13		Mt Cottrell Road	Melton South	Local	Non-Electrified*	343 K6
14		Ferris Road	Melton South	Local	Non-Electrified*	343 F4
15		Exford Road	Melton South	Local	Non-Electrified*	342 K2
16		Coburns Road	Melton	Local	Non-Electrified	342 G2
17		Telephone Road	Exford	Local	Non-Electrified	341 J6
18		Staughton Siding	Parwan	Private access	Non-Electrified	341 G5
19	Upfield (Wallan)	Visy Industries	Campbellfield	Private access	Non-Electrified	180 B10
20		Cliffords Road	Somerton	Local	Non-Electrified	180 B8
21		Summerhill Road	Wollert	Local	Non-Electrified*	387 F2
22		Donnybrook Road	Donnybrook	Arterial	Non-Electrified*	367 J6
23		Beveridge Road	Beveridge	Local	Non-Electrified*	X910 L11
24	Sunbury	Williamsons Road	Sunbury	Local	Non-Electrified	363 A1
25	Werribee (Wyndham Vale)	Werribee Street	Werribee	Arterial	Non-Electrified*	205 H8
26		Galvin Road	Werribee	Local	Non-Electrified*	205 A11
27	V-Line	Oakview Lane (formerly Mount Ararat Road South)	Nar Nar Goon	Local	Non-Electrified	318 H9
28		Nar Nar Goon Road	Nar Nar Goon	Arterial	Non-Electrified	319 D9
29		Tynong Road	Tynong	Local	Non-Electrified	320 F10
30		Railway Ave (Nr Hillbrick Road)	Garfield	Local	Non-Electrified	X912 S6
31		Hope St (Nr Bunyip Station)	Bunyip	Local	Non-Electrified	X912 T6
32		Manor Road	Little River	Local	Non-Electrified	243 B4
33		Edgars Road	Little River	Local	Non-Electrified	200 D4
34	Stony Point (Diesel Service	Baxter-Tooradin Road	Baxter	Arterial	Diesel	107 B4
35		Frankston-Flinders Road	Baxter	Arterial	Diesel	107 B7
36		Eramosa Road	Somerville	Local	Diesel	107 E12
37		Park Lane	Somerville	Local	Diesel	148 F2
38		Bungower Road	Somerville	Local	Diesel	148 F4
39		Mornington-Tyabb	Tyabb	Arterial	Diesel	148 H10
40		Western Port Highway	Hastings	Arterial	Diesel	154 H5
41		Kippes Lane	Hastings	Local	Diesel	155 B6
42		Kippes Lane	Hastings	Local	Diesel	155 B6
43		Frankston-Flinders Road	Hastings	Arterial	Diesel	154 H5
44		Hodgins Road	Hastings	Local	Diesel	154 H10
45		Cool Store Road	Hastings	Local	Diesel	154 H10
46		High Street	Hastings	Local	Diesel	154 H11
47		Reid Parade	Hastings	Local	Diesel	164 G1
48		Stony Point Road	Bittern	Local	Diesel	164 G5
49		Urquhart Crescent	Bittern	Local	Diesel	16, F8
50		Disney Street	Hmas Cerberus	Local	Diesel	164 H11
51		Park Road	Hmas Cerberus	Local	Diesel	195 A3

Level Crossings in Metropolitan Melbourne - Non Electrified Network (2014)

No	Line	Road Name	Suburb	Road Type	Network in 2014	Melway Ref.
52	Others	Brunel Street	South Kingsville	Local	non-electrified	41 G12
53		Francis Street	Brooklyn	Arterial	non-electrified	41 D9
54		Somerville Road	Brooklyn	Arterial	non-electrified	41 B7
55		Somerville Road	Brooklyn	Arterial	non-electrified	41 B7
56		Sunshine Road	Sunshine	Arterial	non-electrified	40 K3
57		East of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A C11
58		East of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A C11
59		West of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A B11
60		West of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A B11
61		East of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A B/C 12
62		West of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A B12
63		West of Moonee Ponds Creek	Port Melbourne	Private access	non-electrified	2A B12
64		Dock Link Road	West Melbourne	Port of Melbourne	non-electrified	2T C/D12
65		Dock Link Road	West Melbourne	Port of Melbourne	non-electrified	2T D10
66		Private Access	West Melbourne	Port of Melbourne	non-electrified	2T C10
67		Appleton Dock Road	West Melbourne	Port of Melbourne	non-electrified	42 H8

Notes: * expected to be electrified by 2031 according to PTV Network Development Plan for Metropolitan Rail (2012)

No. of level crossings on Arterial Roads = 15

No. of level crossings on Local Roads (including private access and Port of Melbourne) = 52

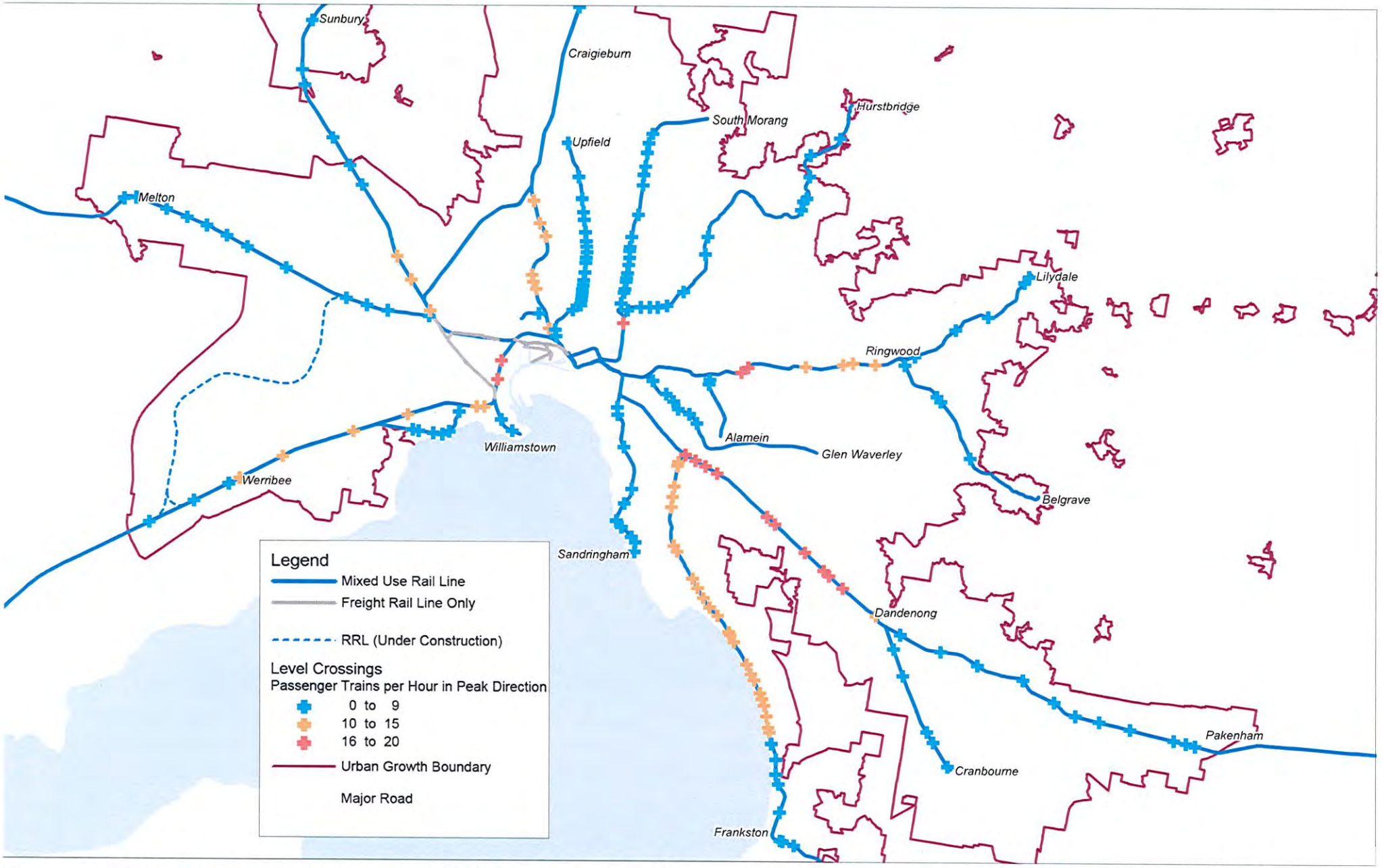
TOTAL = 67

Appendix B - Metropolitan level crossings removed since 2000

	LINE	ROAD	LOCATION	DATE REMOVED
1	Cranbourne	Western Port Highway	Lyndhurst	March 2000
2	Cranbourne-Pakenham	Westall Road	Clayton South	Sept 2000
3	Pakenham	Cranbourne-Narre Warren Road	Narre Warren	Oct 2004
4	Upfield	Somerton Road	Somerton	2007
5	Belgrave-Lilydale	Middleborough Road	Box Hill	Jan 2007
6	Sunbury	Taylors Road	Keilor Downs	Oct 2008
7	Port/Dock (Freight only)	Footscray Road	Docklands	March 2009
8	Port/Dock (Freight only)	Appleton Dock Road	Docklands	April 2009
9	Port/Dock (Freight only)	Enterprize Road	Docklands	April 2009
10	Belgrave-Lilydale	Springvale Road	Nunawading	Jan 2010
11	Werribee	Kororoit Creek Road	Altona	March 2011
12	Melton	Anderson Road (south of Forrest St)	Sunshine	Jan 2014
13	Belgrave-Lilydale	Mitcham Road	Mitcham	Jan 2014
14	Belgrave-Lilydale	Rooks Road	Mitcham	Feb 2014
15	Cranbourne-Pakenham	Springvale Road	Springvale	April 2014
16	Sunbury	Anderson Road (near King Edward Avenue)	Sunshine	May 2014

Appendix C - 2014 and 2022 train volumes at level crossings

(Source: PTV – Network Development Plan, Metropolitan Rail)



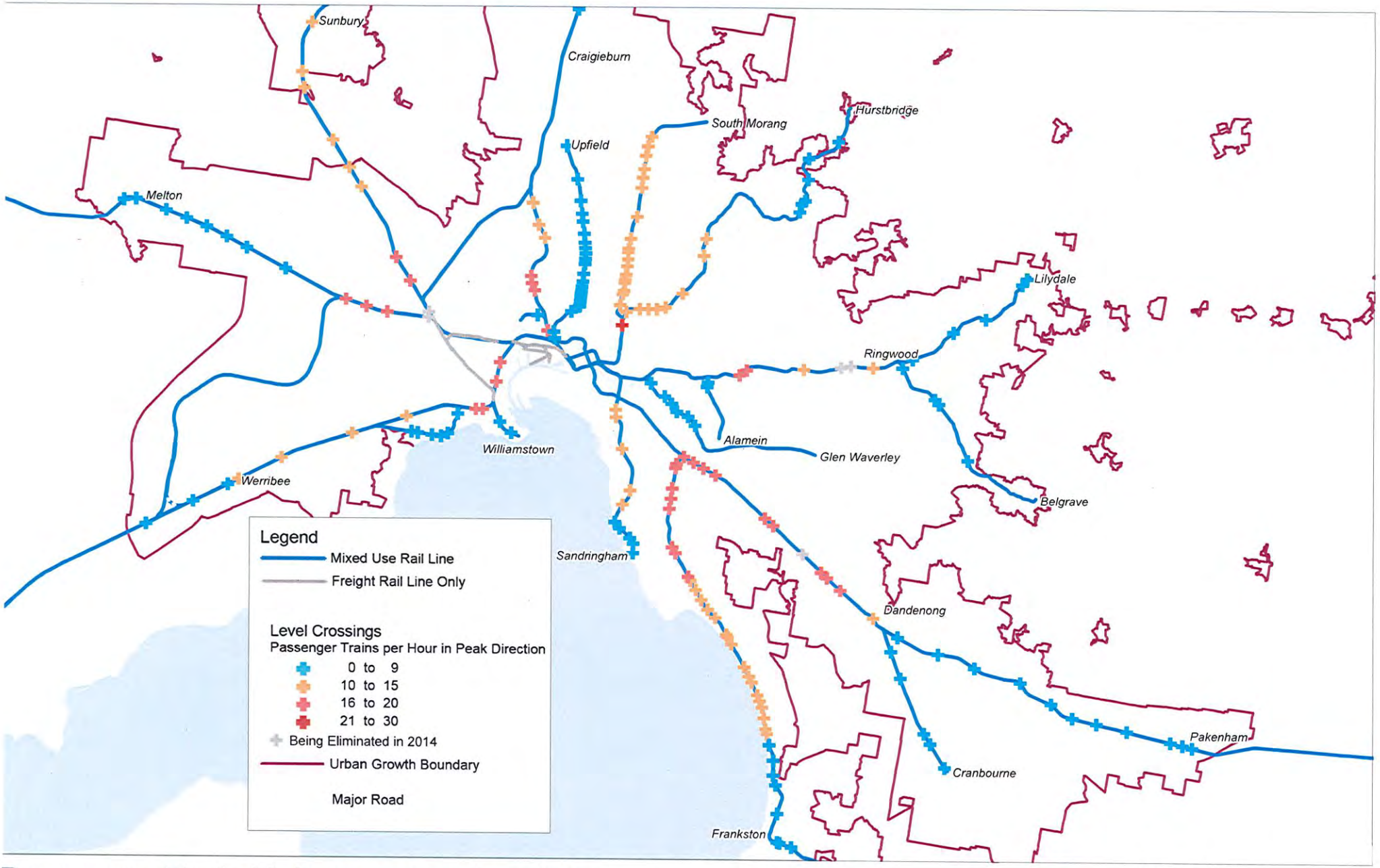
Passenger Train Volumes over Level Crossings - 2014

NORTH

PUBLIC TRANSPORT VICTORIA

Revision Date: 13/2/2014

MapRef: 789-5-1



Passenger Train Volumes over Level Crossings - 2022

NORTH

PUBLIC TRANSPORT VICTORIA PT

Revision Date: 13/2/2014

MapRef: 789-6-1

Appendix D - Stakeholder list

This strategic framework has been developed in partnership and consultation with the following organisations and stakeholders.

Organisation	Name	Position
Department of Premier and Cabinet		
Department of Treasury and Finance		
Department of Transport, Planning and Local Infrastructure		
Metropolitan Planning Authority (MPA)		
Public Transport Victoria		
VicTrack		
VicRoads	Various	- Metropolitan North West Region - Metropolitan South East Region - Strategy & Planning

Appendix E - Prioritisation criteria used and assumptions

Level Crossing Prioritisation Criteria

The prioritisation criteria have been developed to perform a relative appraisal of each level crossing site on the existing electrified rail network and on lines expected to be electrified by 2031.

The performance indicators are calculated from available data and then 'normalised' to a score on a scale of 0 to10 before being weighted. The overall appraisal score for each site was calculated by applying the weightings shown in **Table E1**.

Criteria	Objective	Performance Indicator	Weightings
Strategic fit	Align with road network operating objectives. Within or near employment clusters, activity centres, freight and transport gateways.	VicRoads SmartRoads road use hierarchy/priorities. Arterial roads over local roads. Local roads on priority bus routes over other local roads. Alignment with Plan Melbourne and other government strategies.	60%
Economic and Environmental	Maximise transport economic benefits. Maximise environmental benefits.	Travel Time Savings (vehicles, trains & trams). Vehicle Operating Cost Savings. Reduce energy consumption and emissions.	25%
Safety	Reduce risk of death or injury	Weighted Transport Safety Victoria (TSV) incident history	15%

Table E1: *Overview of Prioritisation Criteria*

Sensitivity checks have been undertaken to verify the appropriateness of criteria weightings before finalising the prioritisation.

Strategic Fit (60%)

The objective is to support land use and transport integration. Priority is given to tram routes, priority bus routes and preferred traffic routes in accordance with VicRoads' SmartRoads network operating plans. Arterial roads are given a higher score than local roads. Local roads on tram routes and priority bus routes are given a higher score than other local roads.

Level crossings within or near employment clusters, activity centres and freight and transport gateways are also given a higher score. The indicators used in this assessment are detailed in **Table E2**. The scores used for strategic fit are shown in **Table E3**.

Objective	Indicator	Description
Align with road network operating objectives	VicRoads SmartRoads road use hierarchy/priorities.	Priority is given to preferred public transport routes and preferred traffic routes.
Within or near employment clusters, activity centres, freight and transport gateways.	Alignment with Plan Melbourne and other government strategies.	Priority is given to level crossings within or near National Employment Clusters, Metropolitan Activity Centres, Urban Growth Zones, freight centres and transport gateways.

Table E2: Strategic Fit Criteria

Description	Points
Preferred Traffic Route + Tram Route	6
Preferred Traffic Route + Priority Bus Route	5
Preferred Traffic Route	3
Tram Route	3
Priority Bus Route	2
Arterial Road	1
Within or near National Employment Cluster / Metropolitan Activity Centre	1
Within or near Urban Growth Zone	1
Within or near Freight and Transport Gateway	1

Table E3: Strategic Fit Score

Economic and Environmental (25%)

The economic and environmental objective is to maximise the transport economic and environmental benefits. Capital costs associated with the removal of level crossings have not been considered as part of the prioritisation process.

Arterial roads with boom gate closure times above 25% during the morning peak periods and local roads with boom gate closure times above 30% during the morning peak period are included in the prioritisation.

The indicators used in this assessment are detailed in **Table E4**.

Objective	Indicator	Description
Maximise transport economic benefits	Travel Time Savings	A combination of estimated boom gate closure time percentage (BCTP) and road traffic volume-to-capacity relation (v/c ratio) is used as an indicator for congestion and resulting delays at the level crossings. It is difficult to directly measure delay at all level crossings. Road traffic volume is used as a proxy for the number of travellers affected by congestion at the respective level crossing. At tram-train level crossings, an estimate was made of the savings from removing the need for the crossings to be manned. There is currently a requirement for a crossing attendant to be present to switch the voltage of the overhead power lines, control check points that would derail a tram if it were to approach the crossing when unsafe, and operate tram signals which advise tram drivers when it is safe to enter the crossing. Trams and trains are also required to travel at a reduced speed at tram-train level crossings.
	Vehicle Operating Cost Savings	The travel time savings indicator is considered as a proxy for vehicle operating cost savings.
Maximise environmental Benefits	Reduce energy consumption and emissions	The travel time savings indicator is considered as a proxy for environmental benefits.

Table E4: Economic & Environmental Criteria

The assessment is based on the following:

- Road traffic volume
    - Based on VITM for the morning peak hours between 7am to 9am.
- Road volume-capacity criticality
    - Road traffic volume.
    - Road capacity is based on the number of traffic lanes and complexity of the approaches to the level crossing, e.g. if adjacent intersections are signalised.

      A capacity reduction factor of 0.52 was applied to signalised intersections. The main reason for this reduction is due to the requirement for train clearance phases to clear any queuing vehicles from the tracks. This was derived from an analysis of eight signalised intersections on the Dandenong rail corridor.
- Train volumes
    - Based on peak direction train volumes in PTV's Network Development Plan for Metropolitan Rail for the morning peak hours between 7am to 9am.
    - Two-way train volumes estimated at 1.7 times peak direction train volumes.
- Estimated boom gate closure times
    - Based on average closure time per train.
    - Different average closure times used for level crossings on tram routes, level crossings located next to stations and level crossings located in mid-block.
    - Does not consider extreme events.
- Delays
    - Analysis considered delays at train-tram level crossings where trains must slow to 15 km/hr, resulting in an average delay of around 74 seconds (PTV 2009).

    - Analysis considered delays for road users that have to stop when boom gates are closed. This delay is approximately equal to the average boom gate closure time plus 10 seconds for acceleration / deceleration.

    - The realistic calculation of delays requires the knowledge of the exact volume and capacity values for individual level crossings. For this assessment, delays are determined using boom gate closure times, traffic volume and volume/capacity ratio.

Safety (15%)

The objective is to reduce the risk of death or injury. Potential safety benefits due to grade separation were quantified based on the corresponding accident history. Incidents recorded over a 10-year period from 2003 to 2012 were used for the assessment.

The indicator used in this assessment is detailed in **Table E5**.

Objective	Indicator	Description
Reduce risk of death or injury	Weighted Transport Safety Victoria (TSV) incident history	An accident figure is derived from TSV data spanning a ten year period (2003 – 2012). The safety analysis focused on records showing the following incident types: Fatality, Serious Injury, Collision (Person), Collision (Vehicle), Near Miss (Person), Near Miss (Vehicle). The total safety score is normalised by scaling pro rata between 0 and 10.

Table E5: Safety Criteria

The scores used for the safety criteria are:

- Fatality (10 points)
- Serious injury (10 points)
- Collision (person) (5 Points)
- Collision (vehicle) (5 Points)
- Near miss (person) (5 Points)
- Near miss (vehicle) (2 Points)

Overall Scores

The total score for each site was calculated by multiplying the normalised scores for strategic, economic & environmental and safety criteria by the corresponding weightings (60%/25%/15%).

VicRoads has undertaken sensitivity checks to ensure appropriate scorings and weightings are used in the assessment.

Assumptions

The following assumptions have been made for the prioritisation assessment:

- Assessment is based on 7am to 9am weekday traffic and train volumes.
- Peak direction train volumes are based on PTV's Network Development Plan – Metropolitan Rail (December 2012).
- Two-way train volume equals 1.7 times peak direction train volume.
- Road traffic volumes are based on the Victorian Integrated Traffic Model (VITM).
- Boom gate closure times are estimated average closure times. Extreme events have not been considered.
- At un-signalised intersections, the base capacity used for a traffic lane crossing the railway tracks is 1,800 vehicles/hour.
- At signalised intersections linked to level crossings, the base capacity used for a traffic lane crossing the railway tracks is 900 vehicles/hour, i.e. around 50% of un-signalised intersections (not applicable at low train frequency level crossings). This reduction is based on a previous analysis of eight level crossings on the Dandenong Rail Corridor.
- Safety criteria are based on Transport Safety Victoria (TSV) data between 2003 and 2012.
- Level crossings with estimated boom gate closure of 25% or less on arterial roads and 30% or less on local roads are not ranked.

Appendix F – Priority level crossings (based on individual sites)

Priority Level Crossing based on Individual Site Assessment only
(based on train and traffic volumes in 2013)

			Strategic Fit Analysis (60%)					Economic and Environmental Analysis (25%)						Safety Analysis (15%)			Priority
Line	Road Name	Suburb	Road Type	National Employment Clusters (NEC) and Metropolitan Activity Centres (MAC)	SmartRoads Road Use Hierarchy	Total Strategic Fit Analysis points	Total Strategic Fit Analysis score (normalised)	No of trains 2 way 7-9am Mon -Fri	Estimated Boom Closure Time Percentage BCTP (%)	Estimated Traffic volume v (7-9am)	Volume/Capacity ratio Note 3	Total Economic and Environmental Analysis points	Total Economic and Environmental Analysis score (normalised)	Safety Assessment (Fatalities, Serious Injuries / Collisions / Near Misses)	Total Safety Analysis Points	Total Safety Analysis score (normalised)	Priority Note 4
Caulfield - D'nong	Grange Road	Caulfield East	Arterial		General traffic route	1	2	49	37	2,018	0.42	2.55	3	(0 / 6 / 40)	116	9	Medium
	Poath Road	Hughesdale	Local	Within or near NEC	Priority bus route	3	5	49	46	1,523	0.75	4.21	4	(0 / 0 / 6)	30	2	High
	Corrigan Road	Noble Park	Local			0	0	49	31	1,665	0.32	1.34	1	(0 / 1 / 5)	18	1	Lower
	Heatherton Road	Noble Park	Arterial		General traffic route	1	2	49	46	3,274	0.80	9.70	10	(1 / 3 / 25)	90	7	High
	Chandler Road	Noble Park	Arterial	Within or near MAC	Priority bus route	4	7	49	33	2,128	0.42	2.41	2	(0 / 1 / 17)	54	4	High
Frankston (Baxter)	Neerim Road	Caulfield East	Arterial		Priority bus route	3	5	36	27	1,521	0.28	0.92	1	(0 / 0 / 1)	2	0	Medium
	Glen Huntly Road	Glen Huntly	Local		Priority tram route	3	5.0	36	60	1,096	0.38	2.33	2.4	(0 / 0 / 13)	59	4.6	High
	McKinnon Road	McKinnon	Local			0	0	36	35	1,100	0.23	0.71	1	(1 / 2 / 14)	81	6	Lower
	Centre Road	Bentleigh	Arterial		Priority bus route	3	5	36	31	1,562	0.31	1.23	1	(2 / 2 / 21)	129	10	High
	Wickham Road	Highett	Local			0	0	36	35	800	0.17	0.38	0	(0 / 2 / 5)	26	2	Lower
	Highett Road	Highett	Local			0	0	36	34	985	0.21	0.56	1	(0 / 1 / 7)	37	3	Lower
	Park Road	Cheltanham	Local		Priority bus route	2	3	36	33	1,778	0.37	1.74	2	(0 / 0 / 3)	9	1	Medium
	Charman Road	Cheltenham	Local		Priority bus route	2	3	36	30	1,836	0.37	1.65	2	(1 / 2 / 24)	95	7	High
	Latrobe Street	Cheltenham	Local			0	0	36	27	700	0.13	0.20	0	(0 / 0 / 0)	0	0	
	Balcombe Road	Mentone	Arterial		Priority bus route	3	5	36	33	2,183	0.23	1.32	1	(0 / 1 / 7)	38	3	High
	Warrigal Road	Parkdale	Arterial		General traffic route	1	2	36	25	2,300	0.42	1.97	2	(0 / 0 / 8)	19	1	
	Parkers Road	Parkdale	Local			0	0	36	35	400	0.09	0.10	0	(0 / 0 / 4)	17	1	Lower
	McDonald Street	Mordiallic	Local			0	0	36	35	2,500	0.53	3.75	4	(0 / 0 / 2)	4	0	Lower
	Bear Street	Mordialloc	Local			0	0	36	35	980	0.21	0.58	1	(0 / 0 / 5)	19	1	Lower
	Station Street	Aspendale	Local			0	0	36	27	2,340	0.43	2.20	2	(1 / 1 / 2)	22	2	
	Lincoln Parade	Aspendale	Local			0	0	36	35	2,340	0.48	3.16	3	(0 / 0 / 0)	0	0	Lower
	Lochiel Avenue	Edithvale	Local			0	0	36	35	250	0.05	0.04	0	(0 / 0 / 7)	20	2	Lower
	Edithvale Road	Edithvale	Arterial		General traffic route	1	2	36	35	1,900	0.39	2.08	2	(1 / 1 / 5)	40	3	Medium
	Swanpool Avenue	Chelsea	Local			0	0	36	27	2,340	0.22	1.14	1	(1 / 1 / 2)	22	2	
	Chelsea Road	Chelsea	Local			0	0	36	35	1,100	0.22	0.70	1	(1 / 1 / 10)	44	3	Lower
	Argyle Avenue	Chelsea	Local			0	0	36	27	900	0.16	0.32	0	(0 / 1 / 16)	37	3	
	Bondi Road	Bonbeach	Local			0	0	36	35	1,400	0.29	1.13	1	(0 / 0 / 6)	21	2	Lower
	Station Street	Bonbeach	Local			0	0	36	27	1,500	0.27	0.90	1	(0 / 1 / 7)	22	2	
	Station Street	Carrum	Arterial		General traffic route	1	2	36	35	980	0.27	0.74	1	(0 / 0 / 5)	13	1	Lower
	Eel Race Road	Carrum	Local			0	0	36	27	506	0.05	0.05	0	(0 / 0 / 11)	49	4	
	Armstrongs Road	Seaford	Local			0	0	36	27	506	0.10	0.11	0	(0 / 0 / 2)	7	1	
	Station Street	Seaford	Local			0	0	36	35	450	0.18	0.23	0	(0 / 0 / 10)	47	4	Lower
	Seaford Road	Seaford	Arterial		General traffic route	1	2	36	27	2,597	0.47	2.70	3	(0 / 0 / 5)	25	2	Lower
	Overton Road	Seaford	Local	Within or near MAC		1	2	36	27	1,312	0.24	0.69	1	(2 / 3 / 10)	64	5	
	Clarendon St	Frankston	Local	Within or near MAC		1	2	3	3		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Mooroduc Hwy	Frankston	Arterial	Within or near MAC	Preferred traffic route	5	8	3	3	9,051	0.43	0.81	1	(0 / 0 / 0)	0	0	
	Hillcrest Road	Frankston	Local			0	0	3	3		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Robinsons Road	Frankston	Local			0	0	3	3		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Golf Links Road	Baxter	Local			0	0	3	3	603	0.09	0.01	0	(0 / 0 / 0)	0	0	
Glen Waverley	Madden Grove	Burnley	Arterial		Preferred traffic route	4	7	24	29	3,505	0.66	5.39	6	(0 / 0 / 11)	34	3	High
	Glenferrie Road	Kooyong	Arterial		Priority tram route	4	7	24	38	1,998	0.43	3.00	3	(0 / 0 / 2)	10	1	High
	Toorak Road	Kooyong	Arterial		General traffic route	1	2	24	18	3,730	0.49	2.64	3	(0 / 1 / 4)	13	1	
	Tooronga Road	Malvern	Arterial		General traffic route	1	2	24	23	3,085	0.28	1.62	2	(0 / 0 / 7)	26	2	
	High Street	Glen Iris	Arterial		General traffic route	1	2	24	19	3,731	0.62	3.66	4	(0 / 1 / 8)	27	2	
Belgrave	Union Road	Surrey Hills	Local	Within or near MAC	Priority bus route	3	5	58	51	2,038	0.58	4.96	5	(0 / 0 / 8)	22	2	High
	Mont Albert Road	Mont Albert	Local	Within or near MAC	General traffic route	1	2	58	40	1,705	0.40	2.20	2	(0 / 0 / 1)	2	0	Lower
	Heatherdale Road	Ringwood	Local	Within or near MAC		1	2	48	42	1,778	0.42	2.53	3	(0 / 0 / 20)	94	7	Medium
	Bedford Road	Ringwood	Local	Within or near MAC		1	2	20	15	1,700	0.28	0.59	1	(0 / 0 / 6)	18	1	
	Mountain Highway	Bayswater	Arterial		General traffic route	1	2	20	20	5,852	0.34	3.17	3	(1 / 2 / 8)	51	4	
	Scoresby Road	Bayswater	Arterial		Preferred traffic route	4	7	20	20	2,954	0.49	2.34	2	(0 / 0 / 2)	7	1	
	Alpine Street	Ferntree Gully	Local		Priority bus route	2	3	20	20	900	0.30	0.44	0	(1 / 1 / 2)	25	2	
	Railway Avenue	Ferntree Gully	Local			0	0	20	20	311	0.05	0.03	0	(0 / 0 / 0)	0	0	
Alamein	Prospect Hill Road	Camberwell	Local		Priority bus route	2	3	10	10	2,414	0.37	0.72	1	(0 / 0 / 2)	4	0	
	Riversdale Road	Camberwell	Arterial		Priority tram route	4	7	10	17	3,409	0.29	1.64	2	(0 / 0 / 1)	5	0	
Craigieburn	Macaulay Road	Kensington	Local	Within or near MAC	Priority bus route	3	5	32	29	2,223	0.43	2.24	2	(0 / 0 / 7)	23	2	
	Puckle Street	Moonee Ponds	Local			0	0	32	31	1,700	0.66	2.87	3	(0 / 0 / 4)	17	1	Lower
	Park Street	Moonee Ponds	Local		General traffic route	1	2	32	24	900	0.17	0.29	0	(0 / 0 / 0)	0	0	
	Buckley Street	Essendon	Arterial		Priority bus route	2	3	32	29	2,689	0.50	3.15	3	(0 / 0 / 3)	9	1	Medium
	Gaffney Street	Pascoe Vale	Arterial		General traffic route	1	2	32	31	1,483	0.30	1.14	1	(0 / 0 / 14)	61	5	Medium
	Devon Road	Pascoe Vale	Local			0	0	32	30	1,800	0.36	1.56	2	(0 / 3 / 0)	15	1	
	Glenroy Road	Glenroy	Arterial	Within or near MAC	General traffic route	2	3	32	30	2,444	0.47	2.76	3	(0 / 1 / 13)	37	3	Medium
Melton	Fitzgerald Road	Sunshine West/Ardeer	Local	Within or near NEC		1	2	17	13	1,800	0.37	0.68	1	(0 / 0 / 0)	0	0	
	Mt Derrimut Road	Deer Park	Arterial		Priority bus route	3	5	17	17	2,500	0.54	1.87	2	(0 / 0 / 0)	0	0	
	Robinsons Road	Deer Park	Local		Preferred traffic route	3	5	17	13	1,750	0.28	0.50	1	(0 / 0 / 0)	0	0	
	Hopkins Road	Rockbank	Arterial		General traffic route	1	2	17	13	1,000	0.16	0.17	0	(0 / 0 / 0)	0	0	
	Troups Road	Rockbank	Local			0	0	17	13	1,000	0.16	0.17	0	(0 / 0 / 0)	0	0	
	Leakes Road	Rockbank	Local			0	0	17	17	500	0.08	0.06	0	(0 / 0 / 0)	0	0	
	Paynes Road	Rockbank	Local			0	0	17	13		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Mt Cottrell Road	Melton South	Local			0	0	17	13		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Ferris Road	Melton South	Local			0	0	17	13		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Exford Road	Melton South	Local			0	0	17	19	1,500	0.49	1.14	1	(0 / 0 / 0)	0	0	
Upfield (Wallan)	Arden Street	North Melbourne	Local	Within or near NEC		1	2	10	8	2,295	0.35	0.50	1	(0 / 0 / 0)	0	0	
	Macaulay Road	North Melbourne	Local	Within or near NEC	Priority bus route	3	5	10	10	2,223	0.34	0.61	1	(0 / 0 / 1)	5	0	
	Poplar Road	Parkville	Local	Within or near NEC		1	2	10	10	320	0.05	0.01	0	(0 / 0 / 1)	2	0	
	Park Street	Parkville	Local			0	0	10	10	1,843	0.28	0.42	0	(0 / 1 / 4)	19	1	
	Brunswick Road	Brunswick	Arterial		General traffic route	1	2	10	8	2,237	0.42	0.62	1	(0 / 3 / 2)	22	2	
	Union Street	Brunswick	Local			0	0	10	10	1,500	0.12	0.14	0	(0 / 0 / 4)	17	1	
	Dawson Street	Brunswick	Local		Priority bus route	2	3	10	11	1,948	0.35	0.61	1	(0 / 1 / 1)	7	1	
	Albert Street	Brunswick	Local			0	0	10	10	325	0.05	0.01	0	(0 / 0 / 1)	2	0	
	Victoria Street	Brunswick	Local		Priority bus route	2	3	10	10	1,037	0.08	0.07	0	(0 / 0 / 0)	0	0	
	Hope Street	Brunswick	Local			0	0	10	10	1,200	0.19	0.18	0	(0 / 0 / 0)	0	0	
	Albion Street	Brunswick	Local			0	0	10	10	770	0.12	0.07	0	(0 / 0 / 1)	2	0	
	Moreland Road	Brunswick	Arterial		Priority bus route	3	5	10	10	2,300	0.34	0.63	1	(0 / 0 / 5)	13	1	
	Reynard Street	Coburg	Local			0	0	10	8	682	0.10	0.04	0	(0 / 0 / 1)	2	0	
	Munro Street	Coburg	Local			0	0	10	10	700	0.11	0.06	0	(1 / 2 / 2)	27	2	
	Bell Street	Coburg	Arterial		Preferred traffic route	4	7	10	9	4,694	0.38	1.23	1	(2 / 2 / 8)	58	4	
	O'Hea Street	Coburg	Local			0	0	10	8	1,445	0.22	0.20	0	(0 / 0 / 3)	6	0	
	Gaffney Street	Coburg North	Arterial		Priority bus route	3	5	10	9	2,673	0.42	0.83	1	(0 / 0 / 3)	12	1	
	Bakers Road	Coburg North	Local			0	0	10	8	1,000	0.15	0.09	0	(0 / 0 / 2)	4	0	
	Boundary Road	Hadfield	Arterial		General traffic route	1	2	10	10	2,450	0.38	0.75	1	(0 / 0 / 0)	0	0	
	Fawkner Cemetery Entrance	Hadfield	Local			0	0	10	10	278	0.04	0.01	0	(0 / 0 / 2)	10	1	
	Box Forest Road	Hadfield	Local			0	0	10	8	2,057	0.31	0.40	0	(0 / 0 / 4)	8	1	
	Camp Road	Campbellfield	Arterial	Within or near MAC	Priority bus route	4	7	10	7	3,726	0.28	0.60	1	(4 / 3 / 17)	89	7	
	Barry Road	Campbellfield	Arterial	Within or near MAC	Priority bus route	4	7	10	8	3,325	0.25	0.53	1	(0 / 0 / 5)	25	2	
	Summerhill Road	Wollert	Local			0	0	5	5		0.00	0.00	0	(0 / 0 / 0)	0	0	
	Donnybrook Road	Donnybrook	Arterial		General traffic route	1	2	5	5	774	0.11	0.04	0	(0 / 0 / 0)	0	0	
	Beveridge Road	Beveridge	Local			0	0	5	5		0.00	0.00	0	(0 / 0 / 0)	0	0	

Priority Level Crossing based on Individual Site Assessment only (based on train and traffic volumes in 2013)

			Strategic Fit Analysis (60%)					Economic and Environmental Analysis (25%)						Safety Analysis (15%)			Priority
Line	Road Name	Suburb	Road Type	National Employment Clusters (NEC) and Metropolitan Activity Centres (MAC)	SmartRoads Road Use Hierarchy	Total Strategic Fit Analysis points	Total Strategic Fit Analysis score (normalised)	No of trains 2 way 7-9am Mon -Fri	Estimated Boom Closure Time Percentage BCTP (%)	Estimated Traffic volume v (7-9am)	Volume/Capacity ratio Note 3	Total Economic and Environmental Analysis points	Total Economic and Environmental Analysis score (normalised)	Safety Assessment (Fatalities, Serious Injuries / Collisions / Near Misses)	Total Safety Analysis Points	Total Safety Analysis score (normalised)	Priority Note 4
Hurstbridge	Ramsden Street	Clifton Hill	Local			0	0	49	48	250	0.13	0.12	0	(0 / 0 / 7)	20	2	Lower
	Westgarth Street	Northcote	Arterial		Priority bus route	3	5	27	26	1,300	0.25	0.70	1	(0 / 0 / 0)	0	0	Medium
	Victoria Road	Northcote	Local		Priority bus route	2	3	27	26	1,300	0.25	0.69	1	(0 / 1 / 2)	12	1	
	Station Street	Fairfield	Arterial		General traffic route	1	2	27	25	2,115	0.26	1.15	1	(0 / 0 / 13)	41	3	Lower
	Grange Road	Alphington	Arterial		Preferred traffic route	4	7	27	19	3,218	0.53	2.56	3	(0 / 3 / 6)	33	3	
	Yarralea Street	Alphington	Local			0	0	27	26	400	0.08	0.06	0	(0 / 0 / 2)	10	1	
	Marshall Street	Ivanhoe	Local		Priority bus route	2	3	27	26	1,300	0.16	0.46	0	(0 / 0 / 1)	2	0	
	Lower Plenty Road	Rosanna	Arterial	Within or near NEC	Priority bus route	4	7	27	23	3,299	0.57	3.46	4	(0 / 0 / 8)	34	3	
	Ruthven Street	Macleod West	Local	Within or near NEC		1	2	27	26	2,133	0.40	1.85	2	(0 / 0 / 4)	14	1	
	Diamond Street	Eltham	Local			0	0	7	7	700	0.13	0.05	0	(0 / 0 / 1)	5	0	
	Railway Road	Eltham	Local			0	0	7	5	345	0.05	0.01	0	(0 / 0 / 0)	0	0	
	Wattletree Road	Eltham	Arterial		Priority bus route	3	5	7	5	2,800	0.41	0.48	0	(1 / 1 / 1)	20	2	
	Allendale Road	Eltham	Local			0	0	7	5	1,300	0.19	0.10	0	(0 / 0 / 1)	5	0	
	Main Hurstbridge Rd	Diamond Creek	Arterial		General traffic route	1	2	7	7	2,473	0.71	0.94	1	(0 / 0 / 1)	5	0	
	Wilson Road	Wattle Glen	Local			0	0	7	7	1,200	0.18	0.12	0	(0 / 0 / 1)	2	0	
South Morang	Charles Street	Northcote	Local			0	0	22	21	565	0.10	0.10	0	(0 / 0 / 3)	6	0	
	Arthurton Road	Northcote	Local		Priority bus route	2	3	22	21	1,579	0.28	0.77	1	(0 / 1 / 5)	15	1	
	Beavers Road	Thornbury	Local			0	0	22	21	315	0.06	0.03	0	(0 / 0 / 3)	6	0	
	Woolton Avenue	Thornbury	Local			0	0	22	21	200	0.04	0.01	0	(0 / 0 / 1)	2	0	
	Normanby Avenue	Thornbury	Arterial		Priority bus route	3	5	22	17	1,579	0.26	0.56	1	(0 / 0 / 1)	5	0	
	Hutton Street	Thornbury	Local			0	0	22	21	400	0.07	0.05	0	(0 / 0 / 6)	18	1	
	Oakover Road	Preston	Local			0	0	22	17	1,800	0.30	0.73	1	(1 / 1 / 1)	20	2	
	Bell Street	Preston	Arterial		Preferred traffic route and priority bus route	6	10	22	21	7,799	0.46	5.97	6	(0 / 0 / 14)	43	3	
	Cramer Street	Preston	Local			0	0	22	21	1,631	0.14	0.41	0	(0 / 1 / 5)	18	1	
	Murray Road	Preston	Arterial		Priority bus route	3	5	22	21	2,306	0.39	1.58	2	(0 / 0 / 8)	25	2	
	Regent Street	Reservoir	Local			0	0	22	21	1,200	0.11	0.22	0	(0 / 1 / 5)	18	1	
	High Street	Reservoir	Arterial	Within or near NEC	Priority bus route	4	7	22	21	4,703	0.80	6.57	7	(0 / 4 / 23)	99	8	
	Keon Parade	Reservoir	Arterial		Priority bus route	3	5	22	21	2,021	0.17	0.60	1	(1 / 2 / 12)	56	4	
	Settlement Road	Thomastown	Arterial		General traffic route	1	2	22	17	1,143	0.24	0.38	0	(0 / 2 / 4)	24	2	
	Heylington Avenue	Thomastown	Local			0	0	22	21	700	0.12	0.15	0	(0 / 0 / 2)	7	1	
	Station Street	Lalor	Local			0	0	22	17	501	0.08	0.05	0	(0 / 2 / 6)	31	2	
	Paschke Crescent	Lalor	Local			0	0	22	21	1,056	0.00	0.00	0	(0 / 0 / 5)	16	1	
	Childs Road	Epping	Arterial	Within or near MAC	General traffic route	2	3	22	17	2,551	0.43	1.47	2	(0 / 0 / 5)	16	1	
Sunbury	Furlong Road	St Albans	Local	Within or near NEC		1	2	34	27	1,454	0.53	1.73	2	(3 / 2 / 12)	73	6	
	Melton Hwy	Taylors Lakes	Arterial		Priority bus route	3	5	20	26	4,860	0.50	5.10	5	(0 / 0 / 2)	10	1	High
	Calder Park Dr	Calder Park	Local		Preferred traffic route	3	5	20	15	700	0.11	0.10	0	(0 / 0 / 1)	5	0	
	Holden Rd	Diggers Rest	Local			0	0	20	15	800	0.13	0.13	0	(0 / 0 / 1)	2	0	
	Old Calder Hwy	Diggers Rest	Local			0	0	20	20	463	0.08	0.06	0	(0 / 0 / 6)	18	1	
	Watsons Rd	Diggers Rest	Local			0	0	20	15	100	0.02	0.00	0	(0 / 0 / 0)	0	0	
	Station St	Sunbury	Local			0	0	20	20	2,100	0.18	0.62	1	(0 / 0 / 1)	2	0	
Werribee (Wyndham Vale)	Anderson Street	Yarraville	Local	Within or near MAC		1	2	51	50	753	0.21	0.63	1	(2 / 3 / 8)	69	5	Lower
	Hudsons Road	Spotswood	Local			0	0	51	47	700	0.18	0.49	1	(0 / 0 / 7)	23	2	Lower
	Champion Road	Williamstown North	Local			0	0	43	32	1,000	0.20	0.53	1	(1 / 1 / 2)	22	2	Lower
	Maddox Road	Williamstown North	Local			0	0	43	32	800	0.16	0.34	0	(0 / 1 / 5)	21	2	Lower
	Maidstone Street	Altona	Arterial		General traffic route	1	2	32	24	1,976	0.36	1.42	1	(0 / 1 / 4)	16	1	
	Aviation Road	Laverton	Local			0	0	32	36	1,800	0.19	1.02	1	(0 / 0 / 6)	21	2	Lower
	Old Geelong Road	Hoppers Crossing	Local			0	0	32	28	2,351	0.44	2.37	2	TBC	0	0	
	Cherry Street	Werribee	Local	Within or near NEC		1	2	32	35	2,459	1.00	6.93	7	(1 / 1 / 22)	83	6	High
	Werribee Street	Werribee	Arterial	Within or near NEC	General traffic route	2	3	14	15	3,000	0.47	1.66	2	(0 / 0 / 3)	9	1	
	Galvin Road	Werribee	Local			0	0	14	15		0.00	0.00	0	(0 / 0 / 0)	0	0	
Pakenham	Webster Street	Dandenong	Local	Both		1	2	41	30	400	0.04	0.04	0	(1 / 2 / 18)	83	6	Lower
	Sth Gippsland Hwy	Dandenong South	Arterial	Both	Priority bus route	4	7	26	16	4,963	0.41	2.64	3	(0 / 5 / 30)	88	7	
	Progress Street	Dandenong South	Local	Within or near NEC		1	2	26	19	700	0.12	0.13	0	(0 / 0 / 4)	8	1	
	Hallam South Road	Hallam	Arterial	Within or near MAC	Priority bus route	4	7	26	21	2,812	0.31	1.46	2	(0 / 1 / 10)	49	4	
	Webb Street	Narre Warren	Local	Within or near MAC	Priority bus route	3	5	26	25	1,700	0.31	1.08	1	(0 / 0 / 6)	18	1	
	Clyde Road	Berwick	Arterial	Within or near MAC	Priority bus route	4	7	26	24	2,318	0.40	1.80	2	(0 / 0 / 4)	17	1	
	Station Street	Beaconsfield	Local			0	0	26	25	1,200	0.22	0.54	1	(0 / 1 / 2)	15	1	
	Brunt Road	Officer	Local			0	0	26	19	200	0.03	0.01	0	(0 / 0 / 0)	0	0	
	Officer South Road	Officer	Local		Preferred traffic route	3	5	26	25	36	0.01	0.00	0	(0 / 0 / 3)	6	0	
	Cardinia Road	Pakenham	Arterial		General traffic route	1	2	26	19	2,326	0.20	0.73	1	(0 / 2 / 3)	22	2	
	McGregor Road	Pakenham	Local			0	0	26	19	1,703	0.29	0.76	1	(0 / 0 / 6)	24	2	
	Main Street	Pakenham	Local			0	0	26	25	600	0.11	0.13	0	(0 / 0 / 3)	12	1	
	Racecourse Road	Pakenham	Arterial		General traffic route	1	2	7	5	1,859	0.27	0.21	0	(0 / 0 / 0)	0	0	
Cranbourne	Greens Road	Dandenong South	Arterial	Within or near NEC	Preferred traffic route	5	8	15	12	4,088	0.26	0.98	1	(2 / 1 / 11)	50	4	
	Abbotts Road	Lyndhurst	Local	Within or near NEC		1	2	15	12	3,285	0.52	1.59	2	(4 / 2 / 2)	54	4	
	Evans Road	Lyndhurst	Local		Priority bus route	2	3	15	12	600	0.09	0.05	0	(0 / 0 / 3)	6	0	
	Thompsons Road	Cranbourne West	Arterial		Preferred traffic route	4	7	15	15	1,642	0.13	0.27	0	(1 / 1 / 6)	33	3	
	Camms Road	Cranbourne	Local		Priority bus route	2	3	15	15	1,500	0.24	0.44	0	(0 / 0 / 1)	5	0	
Lilydale	Dublin Road	Ringwood East	Local	Within or near MAC		1	2	20	20	1,658	0.55	1.48	2	(0 / 0 / 1)	5	0	
	Coolstore Road	Croydon	Local			0	0	20	20	1,000	0.17	0.28	0	(1 / 1 / 3)	30	2	
	Manchester Road	Mooroolbark	Local			0	0	20	20	2,500	0.42	1.68	2	(0 / 0 / 2)	4	0	
	Melba Avenue	Lilydale	Local			0	0	20	15	361	0.06	0.03	0	(0 / 0 / 0)	0	0	
	Maroondah Hwy	Lilydale	Arterial		Priority bus route	3	5	20	21	3,280	0.29	1.62	2	(0 / 0 / 2)	7	1	
Sandringham	Greville Street	Prahran	Local			0	0	26	25	300	0.06	0.03	0	(0 / 0 / 17)	73	6	
	Union Street	Windsor	Local			0	0	26	25	259	0.05	0.02	0	(0 / 0 / 5)	19	1	
	Glen Eira Road	Ripponlea	Arterial		General traffic route	1	2	26	25	1,597	0.29	0.95	1	(0 / 0 / 3)	6	0	
	Bay Street	Brighton	Local		Priority bus route	2	3	26	25	300	0.06	0.03	0	(0 / 0 / 11)	37	3	
	Church Street	Brighton	Local			0	0	26	25	200	0.04	0.01	0	(0 / 1 / 7)	40	3	
	New Street/Dendy Street	Brighton	Local		Priority bus route	2	3	26	25	1,004	0.18	0.36	0	(0 / 0 / 4)	8	1	
	South Road	Brighton	Arterial			1	2	26	19	800	0.07	0.09	0	(0 / 0 / 1)	2	0	
	New Street	Hampton	Local														
	Hampton Street	Hampton	Arterial		General traffic route	1	2	26	25	1,514	0.28	0.85	1	(0 / 0 / 3)	15	1	
	Linacre Road	Hampton	Local			0	0	26	19	100	0.02	0.00	0	(0 / 0 / 0)	0	0	
	Abbott Street	Sandringham	Local			0	0	26	26	548	0.10	0.12	0	(0 / 0 / 1)	5	0	
Laverton (Altona)	Kororoit Creek Road	Altona	Arterial		General traffic route	1	2	10	8	3,494	0.52	1.13	1	(0 / 0 / 5)	22	2	
	Civic Parade	Seaholme	Local			0	0	10	10	2,800	0.43	0.97	1	(0 / 0 / 2)	7	1	
	Millers Road	Seaholme	Local		Priority bus route	2	3	10	10	100	0.01	0.00	0	(0 / 0 / 0)	0	0	
	Pier Street	Altona	Local		Priority bus route	2	3	10	10	1,000	0.15	0.12	0	(0 / 0 / 1)	5	0	
	Grieve Parade	Altona	Local			0	0	10	10	320	0.05	0.01	0	(0 / 0 / 3)	12	1	
	Maidstone Street	Altona	Arterial		General traffic route	1	2	10	10	1,593	0.12	0.16	0	(0 / 0 / 6)	21	2	
Williamstown	Ferguson Street	Williamstown	Arterial		Priority bus route	3	5	9	6	3,494	0.26	0.47	0	(1 / 1 / 2)	25	2	
	Giffard Street	Williamstown	Local			0	0	9	8	500	0.08	0.03	0	(0 / 0 / 1)	2	0	
Flemington Racecourse	Ascot Vale Road	Flemington	Arterial														

Summary Table		
Arterial Boom Gate >25% Local Boom Gate >30%		
Priority	Arterial Roads	Local Roads
High	7	5
Medium	7	2
Lower	3	21

NOTES:

1. Including all level crossings on the existing electrified network and proposed electrified network by 2031 according to PTV Network Development Plan for Metro Rail (2012)
2. Planning and Preconstruction Stage.
3. Volume/Capacity (V/C) ratio considers traffic volumes, number of traffic lanes and adjacent signalised intersections.
4. Only level crossings with boom gate closure time greater than 25% (arterial) and 30% (local) are ranked. High priority = overall score at least 3.5; Medium priority = overall score between 2 and 3.5; Lower priority = overall score less than 2

Priority Level Crossing based on Individual Site Assessment Only
(based on traffic and train volumes in 2022)

			Strategic Fit Analysis (60%)					Economic and Environmental Analysis (25%)						Safety Analysis (15%)			Priority
Line	Road Name	Suburb	Road Type	National Employment Clusters (NEC) and Metropolitan Activity Centres (MAC)	SmartRoads Road Use Hierarchy	Total Strategic Fit Analysis points	Total Strategic Fit Analysis score (normalised)	No of trains 2 way 7-9am Mon -Fri	Estimated Boom Closure Time Percentage BCTP (%)	Estimated Traffic volume v (7-9am)	Volume/Capacity ratio Note 3	Total Economic and Environmental Analysis points	Total Economic and Environmental Analysis score (normalised)	Safety Assessment (Fatalities, Serious Injuries / Collisions / Near Misses)	Total Safety Analysis Points	Total Safety Analysis score (normalised)	Priority Note 4
Caulfield - D'nong	Grange Road	Caulfield East	Arterial		General traffic route	1	2	58	43	2,209	0.52	2.35	2	(0 / 6 / 40)	116	9	Medium
	Poath Road	Hughesdale	Local	Within or near NEC	Priority bus route	3	5	58	53	1,523	0.87	3.41	4	(0 / 0 / 6)	30	2	High
	Corrigan Road	Noble Park	Local			0	0	58	36	1,665	0.35	1.01	1	(0 / 1 / 5)	18	1	Lower
	Heatherton Road	Noble Park	Arterial		General traffic route	1	2	58	53	3,637	1.04	9.70	10	(1 / 3 / 25)	90	7	High
	Chandler Road	Noble Park	Arterial	Within or near MAC	Priority bus route	4	7	58	39	2,128	0.46	1.82	2	(0 / 1 / 17)	54	4	High
Frankston (Baxter)	Neerim Road	Caulfield East	Arterial		Priority bus route	3	5	49	37	1,611	0.34	0.98	1	(0 / 0 / 1)	2	0	Medium
	Glen Huntly Road	Glen Huntly	Local		Priority tram route	3	5	49	82	1,096	0.85	3.67	4	(0 / 0 / 13)	59	5	High
	McKinnon Road	McKinnon	Local			0	0	49	48	1,100	0.29	0.73	1	(1 / 2 / 14)	81	6	Lower
	Centre Road	Bentleigh	Arterial		Priority bus route	3	5	49	43	1,731	0.42	1.48	2	(2 / 2 / 21)	129	10	High
	Wickham Road	Highett	Local			0	0	49	48	800	0.21	0.39	0	(0 / 2 / 5)	26	2	Lower
	Highett Road	Highett	Local			0	0	49	47	985	0.26	0.56	1	(0 / 1 / 7)	37	3	Lower
	Park Road	Cheltanham	Local		Priority bus route	2	3	49	45	1,839	0.47	1.86	2	(0 / 0 / 3)	9	1	Medium
	Charman Road	Cheltenham	Local		Priority bus route	2	3	34	29	2,318	0.45	1.45	1	(1 / 2 / 24)	95	7	
	Latrobe Street	Cheltenham	Local			0	0	34	26	1,000	0.19	0.23	0	(0 / 0 / 0)	0	0	
	Balcombe Road	Mentone	Arterial		Priority bus route	3	5	34	31	2,183	0.22	0.73	1	(0 / 1 / 7)	38	3	High
	Warrigal Road	Parkdale	Arterial		General traffic route	1	2	34	24	2,400	0.44	1.19	1	(0 / 0 / 8)	19	1	
	Parkers Road	Parkdale	Local			0	0	34	33	500	0.10	0.08	0	(0 / 0 / 4)	17	1	Lower
	McDonald Street	Mordiallic	Local			0	0	34	33	2,600	0.54	2.23	2	(0 / 0 / 2)	4	0	Lower
	Bear Street	Mordialloc	Local			0	0	34	33	1,054	0.22	0.37	0	(0 / 0 / 5)	19	1	Lower
	Station Street	Aspendale	Local			0	0	34	26	2,340	0.42	1.21	1	(1 / 1 / 2)	22	2	
	Lincoln Parade	Aspendale	Local			0	0	34	33	2,340	0.47	1.73	2	(0 / 0 / 0)	0	0	Lower
	Lochiel Avenue	Edithvale	Local			0	0	34	33	958	0.19	0.29	0	(0 / 0 / 7)	20	2	Lower
	Edithvale Road	Edithvale	Arterial		General traffic route	1	2	34	33	2,100	0.42	1.40	1	(1 / 1 / 5)	40	3	Lower
	Swanpool Avenue	Chelsea	Local			0	0	34	26	2,340	0.22	0.63	1	(1 / 1 / 2)	22	2	
	Chelsea Road	Chelsea	Local			0	0	34	33	1,300	0.26	0.54	1	(1 / 1 / 10)	44	3	Lower
	Argyle Avenue	Chelsea	Local			0	0	34	26	900	0.16	0.18	0	(0 / 1 / 16)	37	3	
	Bondi Road	Bonbeach	Local			0	0	34	33	1,500	0.30	0.71	1	(0 / 0 / 6)	21	2	Lower
	Station Street	Bonbeach	Local			0	0	34	26	1,583	0.28	0.55	1	(0 / 1 / 7)	22	2	
	Station Street	Carrum	Arterial		General traffic route	1	2	34	33	1,440	0.38	0.88	1	(0 / 0 / 5)	13	1	Lower
	Eel Race Road	Carrum	Local			0	0	24	18	525	0.04	0.02	0	(0 / 0 / 11)	49	4	
	Armstrongs Road	Seaford	Local			0	0	24	18	525	0.09	0.04	0	(0 / 0 / 2)	7	1	
	Station Street	Seaford	Local			0	0	24	23	534	0.19	0.11	0	(0 / 0 / 10)	47	4	
	Seaford Road	Seaford	Arterial		General traffic route	1	2	24	18	2,597	0.42	0.95	1	(0 / 0 / 5)	25	2	
	Overton Road	Seaford	Local	Within or near MAC		1	2	24	18	1,856	0.30	0.48	0	(2 / 3 / 10)	64	5	
	Clarendon St	Frankston	Local	Within or near MAC		1	2	3	3			0.00	0	(0 / 0 / 0)	0	0	
	Mooroodue Hwy	Frankston	Arterial	Within or near MAC	Preferred traffic route	5	8	3	3	6,776	0.32	0.27	0	(0 / 0 / 0)	0	0	
	Hillcrest Road	Frankston	Local			0	0	3	3			0.00	0	(0 / 0 / 0)	0	0	
	Robinsons Road	Frankston	Local			0	0	3	3	900	0.13	0.01	0	(0 / 0 / 0)	0	0	
	Golf Links Road	Baxter	Local			0	0	3	3	1,452	0.21	0.04	0	(0 / 0 / 0)	0	0	
Glen Waverley	Madden Grove	Burnley	Arterial		Preferred traffic route	4	7	26	31	3,505	0.68	3.51	4	(0 / 0 / 11)	34	3	High
	Glenferrie Road	Kooyong	Arterial		Priority tram route	4	7	26	41	3,599	0.82	7.73	8	(0 / 0 / 2)	10	1	High
	Toorak Road	Kooyong	Arterial		General traffic route	1	2	26	19	4,115	0.54	2.07	2	(0 / 1 / 4)	13	1	
	Tooronga Road	Malvern	Arterial		General traffic route	1	2	26	25	3,085	0.28	1.05	1	(0 / 0 / 7)	26	2	
	High Street	Glen Iris	Arterial		General traffic route	1	2	26	21	3,731	0.63	2.36	2	(0 / 1 / 8)	27	2	
Belgrave	Union Road	Surrey Hills	Local	Within or near MAC	Priority bus route	3	5	60	53	2,038	0.60	3.11	3	(0 / 0 / 8)	22	2	High
	Mont Albert Road	Mont Albert	Local	Within or near MAC	General traffic route	1	2	60	41	1,705	0.40	1.37	1	(0 / 0 / 1)	2	0	Lower
	Heatherdale Road	Ringwood	Local	Within or near MAC		1	2	49	43	1,778	0.43	1.58	2	(0 / 0 / 20)	94	7	Medium
	Bedford Road	Ringwood	Local	Within or near MAC		1	2	20	15	1,700	0.28	0.35	0	(0 / 0 / 6)	18	1	
	Mountain Highway	Bayswater	Arterial		General traffic route	1	2	20	20	7,476	0.43	3.02	3	(1 / 2 / 8)	51	4	
	Scoresby Road	Bayswater	Arterial		Preferred traffic route	4	7	20	20	3,027	0.50	1.45	1	(0 / 0 / 2)	7	1	
	Alpine Street	Ferntree Gully	Local		Priority bus route	2	3	20	20	1,000	0.33	0.32	0	(1 / 1 / 2)	25	2	
	Railway Avenue	Ferntree Gully	Local			0	0	20	20	318	0.06	0.02	0	(0 / 0 / 0)	0	0	
Alamein	Prospect Hill Road	Camberwell	Local		Priority bus route	2	3	10	10	2,414	0.37	0.43	0	(0 / 0 / 2)	4	0	
	Riversdale Road	Camberwell	Arterial		Priority tram route	4	7	10	17	3,409	0.29	2.73	3	(0 / 0 / 1)	5	0	
Craigieburn	Macaulay Road	Kensington	Local	Within or near MAC	Priority bus route	3	5	56	50	2,712	0.75	4.86	5	(0 / 0 / 7)	23	2	High
	Puckle Street	Moonee Ponds	Local			0	0	56	55	1,700	1.00	4.45	5	(0 / 0 / 4)	17	1	Lower
	Park Street	Moonee Ponds	Local		General traffic route	1	2	56	42	900	0.22	0.40	0	(0 / 0 / 0)	0	0	Lower
	Buckley Street	Essendon	Arterial		Priority bus route	2	3	56	50	2,689	0.71	4.60	5	(0 / 0 / 3)	9	1	Medium
	Gaffney Street	Pascoe Vale	Arterial		General traffic route	1	2	46	45	1,792	0.45	1.73	2	(0 / 0 / 14)	61	5	Medium
	Devon Road	Pascoe Vale	Local			0	0	46	42	1,800	0.43	1.59	2	(0 / 3 / 0)	15	1	Lower
	Glenroy Road	Glenroy	Arterial	Within or near MAC	General traffic route	2	3	46	42	2,444	0.57	2.82	3	(0 / 1 / 13)	37	3	Medium
Melton	Fitzgerald Road	Sunshine West/Ardeer	Local	Within or near NEC		1	2	46	34	2,000	0.54	1.76	2	(0 / 0 / 0)	0	0	Lower
	Mt Derrimut Road	Deer Park	Arterial		Priority bus route	3	5	46	46	2,750	0.91	5.58	6	(0 / 0 / 0)	0	0	High
	Robinsons Road	Deer Park	Local		Preferred traffic route	3	5	46	34	1,975	0.42	1.34	1	(0 / 0 / 0)	0	0	Medium
	Hopkins Road	Rockbank	Arterial		General traffic route	1	2	31	23	2,000	0.36	0.80	1	(0 / 0 / 0)	0	0	
	Troups Road	Rockbank	Local			0	0	31	23	650	0.12	0.08	0	(0 / 0 / 0)	0	0	
	Leakes Road	Rockbank	Local			0	0	31	30	1,250	0.25	0.44	0	(0 / 0 / 0)	0	0	
	Paynes Road	Rockbank	Local			0	0	31	23	800	0.14	0.13	0	(0 / 0 / 0)	0	0	
	Mt Cottrell Road	Melton South	Local			0	0	31	23	1,050	0.19	0.22	0	(0 / 0 / 0)	0	0	
	Ferris Road	Melton South	Local			0	0	31	23	1,350	0.24	0.36	0	(0 / 0 / 0)	0	0	
	Exford Road	Melton South	Local			0	0	31	34	2,350	0.95	3.65	4	(0 / 0 / 0)	0	0	Lower
Upfield (Wallan)	Arden Street	North Melbourne	Local	Within or near NEC		1	2	19	14	2,295	0.37	0.58	1	(0 / 0 / 0)	0	0	
	Macaulay Road	North Melbourne	Local	Within or near NEC	Priority bus route	3	5	19	18	2,362	0.40	0.81	1	(0 / 0 / 1)	5	0	
	Poplar Road	Parkville	Local	Within or near NEC		1	2	19	18	344	0.06	0.02	0	(0 / 0 / 1)	2	0	
	Park Street	Parkville	Local			0	0	19	18	1,843	0.31	0.50	1	(0 / 1 / 4)	19	1	
	Brunswick Road	Brunswick	Arterial		General traffic route	1	2	19	15	3,419	0.56	1.36	1	(0 / 3 / 2)	22	2	
	Union Street	Brunswick	Local			0	0	19	18	1,500	0.13	0.17	0	(0 / 0 / 4)	17	1	
	Dawson Street	Brunswick	Local		Priority bus route	2	3	19	20	2,524	0.44	1.08	1	(0 / 1 / 1)	7	1	
	Albert Street	Brunswick	Local			0	0	19	18	333	0.06	0.02	0	(0 / 0 / 1)	2	0	
	Victoria Street	Brunswick	Local		Priority bus route	2	3	19	18	1,119	0.09	0.09	0	(0 / 0 / 0)	0	0	
	Hope Street	Brunswick	Local			0	0	19	18	1,200	0.20	0.21	0	(0 / 0 / 0)	0	0	
	Albion Street	Brunswick	Local			0	0	19	18	885	0.15	0.12	0	(0 / 0 / 1)	2	0	
	Moreland Road	Brunswick	Arterial		Priority bus route	3	5	19	18	2,400	0.39	0.82	1	(0 / 0 / 5)	13	1	
	Reynard Street	Coburg	Local			0	0	19	14	682	0.11	0.05	0	(0 / 0 / 1)	2	0	
	Munro Street	Coburg	Local			0	0	19	18	800	0.14	0.09	0	(1 / 2 / 2)	27	2	
	Bell Street	Coburg	Arterial		Preferred traffic route	4	7	19	16	5,247	0.43	1.69	2	(2 / 2 / 8)	58	4	
	O'Hea Street	Coburg	Local			0	0	19	14	1,445	0.23	0.23	0	(0 / 0 / 3)	6	0	
	Gaffney Street	Coburg North	Arterial		Priority bus route	3	5	19	17	2,673	0.45	0.96	1	(0 / 0 / 3)	12	1	
	Bakers Road	Coburg North	Local			0	0	19	14	1,100	0.18	0.13	0	(0 / 0 / 2)	4	0	
	Boundary Road	Hadfield	Arterial		General traffic route	1	2	19	18	2,450	0.42	0.89	1	(0 / 0 / 0)	0	0	
	Fawkner Cemetery Entrance	Hadfield	Local			0	0	19	18	284	0.05	0.01	0	(0 / 0 / 2)	10	1	
	Box Forest Road	Hadfield	Local			0	0	19	14	2,179	0.35	0.52	1	(0 / 0 / 4)	8	1	
	Camp Road	Campbellfield	Arterial	Within or near MAC	Priority bus route	4	7	19	13	3,726	0.30	0.69	1	(4 / 3 / 17)	89	7	
	Barry Road	Campbellfield	Arterial	Within or near MAC	Priority bus route	4	7	19	14	3,363	0.27	0.62	1	(0 / 0 / 5)	25	2	
	Summerhill Road	Wollert	Local			0	0	9	9	65	0.01	0.00	0	(0 / 0 / 0)	0	0	
	Donnybrook Road	Donnybrook	Arterial		General traffic route	1	2	9	9	1,587	0.24	0.16	0	(0 / 0 / 0)	0	0	
	Beveridge Road	Beveridge	Local			0	0	9	9	500	0.08	0.02	0	(0 / 0 / 0)	0	0	

Priority Level Crossing based on Individual Site Assessment Only
(based on traffic and train volumes in 2022)

			Strategic Fit Analysis (60%)					Economic and Environmental Analysis (25%)						Safety Analysis (15%)			Priority
Line	Road Name	Suburb	Road Type	National Employment Clusters (NEC) and Metropolitan Activity Centres (MAC)	SmartRoads Road Use Hierarchy	Total Strategic Fit Analysis points	Total Strategic Fit Analysis score (normalised)	No of trains 2 way 7-9am Mon -Fri	Estimated Boom Closure Time Percentage BCTP (%)	Estimated Traffic volume v (7-9am)	Volume/Capacity ratio Note 3	Total Economic and Environmental Analysis points	Total Economic and Environmental Analysis score (normalised)	Safety Assessment (Fatalities, Serious Injuries / Collisions / Near Misses)	Total Safety Analysis Points	Total Safety Analysis score (normalised)	Priority Note 4
Hurstbridge	Ramsden Street	Clifton Hill	Local			0	0	66	64	316	0.24	0.23	0	(0 / 0 / 7)	20	2	Lower
	Westgarth Street	Northcote	Arterial		Priority bus route	3	5	34	33	750	0.16	0.19	0	(0 / 0 / 0)	0	0	Medium
	Victoria Road	Northcote	Local		Priority bus route	2	3	34	33	1,300	0.27	0.56	1	(0 / 1 / 2)	12	1	Medium
	Station Street	Fairfield	Arterial		General traffic route	1	2	34	32	2,115	0.29	0.93	1	(0 / 0 / 13)	41	3	Lower
	Grange Road	Alphington	Arterial		Preferred traffic route	4	7	34	23	3,218	0.56	2.00	2	(0 / 3 / 6)	33	3	
	Yarralea Street	Alphington	Local			0	0	34	33	400	0.08	0.05	0	(0 / 0 / 2)	10	1	Lower
	Marshall Street	Ivanhoe	Local		Priority bus route	2	3	34	33	1,300	0.18	0.37	0	(0 / 0 / 1)	2	0	Medium
	Lower Plenty Road	Rosanna	Arterial	Within or near NEC	Priority bus route	4	7	34	28	3,950	0.74	3.96	4	(0 / 0 / 8)	34	3	High
	Ruthven Street	Macleod West	Local	Within or near NEC		1	2	34	33	2,133	0.44	1.50	2	(0 / 0 / 4)	14	1	Lower
	Diamond Street	Eltham	Local			0	0	9	8	530	0.10	0.02	0	(0 / 0 / 1)	5	0	
	Railway Road	Eltham	Local			0	0	9	6	353	0.05	0.01	0	(0 / 0 / 0)	0	0	
	Wattletree Road	Eltham	Arterial		Priority bus route	3	5	9	6	2,800	0.42	0.36	0	(1 / 1 / 1)	20	2	
	Allendale Road	Eltham	Local			0	0	9	6	1,300	0.19	0.08	0	(0 / 0 / 1)	5	0	
	Main Hurstbridge Rd	Diamond Creek	Arterial		General traffic route	1	2	9	8	2,687	0.78	0.83	1	(0 / 0 / 1)	5	0	
	Wilson Road	Wattle Glen	Local			0	0	9	8	1,200	0.18	0.09	0	(0 / 0 / 1)	2	0	
South Morang	Charles Street	Northcote	Local			0	0	32	31	565	0.11	0.10	0	(0 / 0 / 3)	6	0	Lower
	Arthurton Road	Northcote	Local		Priority bus route	2	3	32	31	1,690	0.34	0.87	1	(0 / 1 / 5)	15	1	Medium
	Beavers Road	Thornbury	Local			0	0	32	31	322	0.07	0.03	0	(0 / 0 / 3)	6	0	Lower
	Woolton Avenue	Thornbury	Local			0	0	32	31	200	0.04	0.01	0	(0 / 0 / 1)	2	0	Lower
	Normanby Avenue	Thornbury	Arterial		Priority bus route	3	5	32	24	1,579	0.29	0.53	1	(0 / 0 / 1)	5	0	
	Hutton Street	Thornbury	Local			0	0	32	31	500	0.10	0.08	0	(0 / 0 / 6)	18	1	Lower
	Oakover Road	Preston	Local			0	0	32	24	1,900	0.35	0.77	1	(1 / 1 / 1)	20	2	
	Bell Street	Preston	Arterial		Preferred traffic route and priority bus route	6	10	32	30	8,150	0.54	6.40	7	(0 / 0 / 14)	43	3	High
	Cramer Street	Preston	Local			0	0	32	31	1,916	0.19	0.56	1	(0 / 1 / 5)	18	1	Lower
	Murray Road	Preston	Arterial		Priority bus route	3	5	32	31	2,306	0.45	1.56	2	(0 / 0 / 8)	25	2	High
	Regent Street	Reservoir	Local			0	0	32	31	1,400	0.14	0.30	0	(0 / 1 / 5)	18	1	Lower
	High Street	Reservoir	Arterial	Within or near NEC	Priority bus route	4	7	32	31	4,703	0.92	6.50	7	(0 / 4 / 23)	99	8	High
	Keon Parade	Reservoir	Arterial		Priority bus route	3	5	32	31	2,561	0.25	0.95	1	(1 / 2 / 12)	56	4	High
	Settlement Road	Thomastown	Arterial		General traffic route	1	2	32	24	1,143	0.27	0.36	0	(0 / 2 / 4)	24	2	
	Heylington Avenue	Thomastown	Local			0	0	32	31	900	0.18	0.24	0	(0 / 0 / 2)	7	1	Lower
	Station Street	Lalor	Local			0	0	32	24	801	0.14	0.13	0	(0 / 2 / 6)	31	2	
	Paschke Crescent	Lalor	Local			0	0	32	31	750	0.15	0.17	0	(0 / 0 / 5)	16	1	Lower
	Childs Road	Epping	Arterial	Within or near MAC	General traffic route	2	3	32	24	2,551	0.47	1.40	1	(0 / 0 / 5)	16	1	
Sunbury	Furlong Road	St Albans	Local	Within or near NEC		1	2	58	47	2,077	1.04	4.82	5	(3 / 2 / 12)	73	6	Medium
	Melton Hwy	Taylors Lakes	Arterial		Priority bus route	3	5	32	41	5,230	0.61	6.26	6	(0 / 0 / 2)	10	1	High
	Calder Park Dr	Calder Park	Local		Preferred traffic route	3	5	32	24	800	0.15	0.14	0	(0 / 0 / 1)	5	0	
	Holden Rd	Diggers Rest	Local			0	0	32	24	1,000	0.18	0.21	0	(0 / 0 / 1)	2	0	
	Old Calder Hwy	Diggers Rest	Local			0	0	32	31	1,132	0.23	0.39	0	(0 / 0 / 6)	18	1	Lower
	Watsons Rd	Diggers Rest	Local			0	0	32	24	100	0.02	0.00	0	(0 / 0 / 0)	0	0	
	Station St	Sunbury	Local			0	0	32	31	2,300	0.23	0.81	1	(0 / 0 / 1)	2	0	Lower
Werribee (Wyndham Vale)	Anderson Street	Yarraville	Local	Within or near MAC		1	2	60	58	762	0.25	0.53	1	(2 / 3 / 8)	69	5	Lower
	Hudsons Road	Spotswood	Local			0	0	60	55	700	0.21	0.39	0	(0 / 0 / 7)	23	2	Lower
	Champion Road	Williamstown North	Local			0	0	48	36	1,000	0.22	0.37	0	(1 / 1 / 2)	22	2	Lower
	Maddox Road	Williamstown North	Local			0	0	48	36	800	0.17	0.24	0	(0 / 1 / 5)	21	2	Lower
	Maidstone Street	Altona	Arterial		General traffic route	1	2	36	27	2,038	0.39	1.02	1	(0 / 1 / 4)	16	1	Lower
	Aviation Road	Laverton	Local			0	0	36	40	3,300	0.38	2.39	2	(0 / 0 / 6)	21	2	Lower
	Old Geelong Road	Hoppers Crossing	Local			0	0	36	31	3,476	0.67	3.52	4	TBC			Lower
	Cherry Street	Werribee	Local	Within or near NEC		1	2	36	38	2,459	1.06	4.79	5	(1 / 1 / 22)	83	6	Medium
	Werribee Street	Werribee	Arterial	Within or near NEC	General traffic route	2	3	n/a	0	3,250	0.43	0.00	0	(0 / 0 / 3)	9	1	
	Galvin Road	Werribee	Local			0	0	n/a	0	350	0.05	0.00	0	(0 / 0 / 0)	0	0	
Pakenham	Webster Street	Dandenong	Local	Both		1	2	48	35	500	0.05	0.05	0	(1 / 2 / 18)	83	6	Lower
	Sth Gippsland Hwy	Dandenong South	Arterial	Both	Priority bus route	4	7	32	20	4,963	0.43	2.08	2	(0 / 5 / 30)	88	7	
	Progress Street	Dandenong South	Local	Within or near NEC		1	2	32	24	800	0.15	0.14	0	(0 / 0 / 4)	8	1	
	Hallam South Road	Hallam	Arterial	Within or near MAC	Priority bus route	4	7	32	26	4,006	0.38	1.90	2	(0 / 1 / 10)	49	4	High
	Webb Street	Narre Warren	Local	Within or near MAC	Priority bus route	3	5	32	31	2,000	0.40	1.22	1	(0 / 0 / 6)	18	1	High
	Clyde Road	Berwick	Arterial	Within or near MAC	Priority bus route	4	7	32	30	3,259	0.62	2.90	3	(0 / 0 / 4)	17	1	High
	Station Street	Beaconsfield	Local			0	0	32	31	1,200	0.24	0.44	0	(0 / 1 / 2)	15	1	Lower
	Brunt Road	Officer	Local			0	0	32	24	700	0.13	0.11	0	(0 / 0 / 0)	0	0	
	Officer South Road	Officer	Local		Preferred traffic route	3	5	32	31	1,518	0.31	0.70	1	(0 / 0 / 3)	6	0	Medium
	Cardinia Road	Pakenham	Arterial		General traffic route	1	2	32	24	3,613	0.33	1.40	1	(0 / 2 / 3)	22	2	
	McGregor Road	Pakenham	Local			0	0	32	24	2,102	0.38	0.93	1	(0 / 0 / 6)	24	2	
	Main Street	Pakenham	Local			0	0	32	31	600	0.12	0.11	0	(0 / 0 / 3)	12	1	Lower
	Racecourse Road	Pakenham	Arterial		General traffic route	1	2	7	5	1,930	0.28	0.13	0	(0 / 0 / 0)	0	0	
Cranbourne	Greens Road	Dandenong South	Arterial	Within or near NEC	Preferred traffic route	5	8	15	12	4,088	0.26	0.58	1	(2 / 1 / 11)	50	4	
	Abbotts Road	Lyndhurst	Local	Within or near NEC		1	2	15	12	3,285	0.52	0.94	1	(4 / 2 / 2)	54	4	
	Evans Road	Lyndhurst	Local		Priority bus route	2	3	15	12	1,100	0.17	0.10	0	(0 / 0 / 3)	6	0	
	Thompsons Road	Cranbourne West	Arterial		Preferred traffic route	4	7	15	15	3,971	0.32	0.92	1	(1 / 1 / 6)	33	3	
	Camms Road	Cranbourne	Local		Priority bus route	2	3	15	15	1,700	0.28	0.34	0	(0 / 0 / 1)	5	0	
Lilydale	Dublin Road	Ringwood East	Local	Within or near MAC		1	2	20	20	1,658	0.55	0.87	1	(0 / 0 / 1)	5	0	
	Coolstore Road	Croydon	Local			0	0	20	20	1,000	0.17	0.17	0	(1 / 1 / 3)	30	2	
	Manchester Road	Mooroolbark	Local			0	0	20	20	2,600	0.43	1.07	1	(0 / 0 / 2)	4	0	
	Melba Avenue	Lilydale	Local			0	0	20	15	389	0.06	0.02	0	(0 / 0 / 0)	0	0	
	Maroondah Hwy	Lilydale	Arterial		Priority bus route	3	5	20	21	3,640	0.32	1.18	1	(0 / 0 / 2)	7	1	
Sandringham	Greville Street	Prahran	Local			0	0	36	35	300	0.06	0.03	0	(0 / 0 / 17)	73	6	Lower
	Union Street	Windsor	Local			0	0	36	35	269	0.06	0.03	0	(0 / 0 / 5)	19	1	Lower
	Glen Eira Road	Ripponlea	Arterial		General traffic route	1	2	36	35	1,597	0.34	0.90	1	(0 / 0 / 3)	6	0	Lower
	Bay Street	Brighton	Local		Priority bus route	2	3	36	35	300	0.06	0.03	0	(0 / 0 / 11)	37	3	Medium
	Church Street	Brighton	Local			0	0	36	35	300	0.06	0.03	0	(0 / 1 / 7)	40	3	Lower
	New Street/Dendy Street	Brighton	Local		Priority bus route	2	3	36	35	1,004	0.21	0.35	0	(0 / 0 / 4)	8	1	Medium
	South Road	Brighton	Arterial			1	2	36	27	800	0.08	0.08	0	(0 / 0 / 1)	2	0	Lower
	New Street	Hampton	Local														
	Hampton Street	Hampton	Arterial		General traffic route	1	2	36	35	1,514	0.32	0.81	1	(0 / 0 / 3)	15	1	Lower
	Linacre Road	Hampton	Local			0	0	36	27	100	0.02	0.00	0	(0 / 0 / 0)	0	0	
	Abbott Street	Sandringham	Local			0	0	36	37	674	0.15	0.18	0	(0 / 0 / 1)	5	0	Lower
Laverton (Altona)	Kororoit Creek Road	Altona	Arterial		General traffic route	1	2	12	9	3,494	0.53	0.79	1	(0 / 0 / 5)	22	2	
	Civic Parade	Seaholme	Local			0	0	12	12	2,800	0.44	0.68	1	(0 / 0 / 2)	7	1	
	Millers Road	Seaholme	Local		Priority bus route	2	3	12	12	100	0.01	0.00	0	(0 / 0 / 0)	0	0	
	Pier Street	Altona	Local		Priority bus route	2	3	12	12	1,000	0.16	0.09	0	(0 / 0 / 1)	5	0	
	Grieve Parade	Altona	Local			0	0	12	12	328	0.05	0.01	0	(0 / 0 / 3)	12	1	
	Maidstone Street	Altona	Arterial		General traffic route	1	2	12	12	1,597	0.13	0.11	0	(0 / 0 / 6)	21	2	
Williamstown	Ferguson Street	Williamstown	Arterial		Priority bus route	3	5	12	9	3,494	0.27	0.41	0	(1 / 1 / 2)	25	2	
	Giffard Street	Williamstown	Local			0	0	12	12	500	0.08	0.02	0	(0 / 0 / 1)	2	0	
Flemington Racecourse	Ascot Vale Road	Flemington	Arterial														

Summary Table		
Arterial Boom Gate Filter>25% Local Boom Gate Filter >30%		
Priority	Arterial Roads	Local Roads
High	15	5
Medium	6	11
Lower	7	43

NOTES:

1. Including all level crossings on the existing electrified network and proposed electrified network by 2031 according to PTV Network Development Plan for Metro Rail (2012)
2. Planning and Preconstruction Stage.
3. Volume/Capacity (V/C) ratio considers traffic volumes, number of traffic lanes and adjacent signalised intersections.
4. Only level crossings with boom gate closure time greater than 25% (arterial) and 30% (local) are ranked. High priority = overall score at least 3.5; Medium priority = overall score between 2 and 3.5; Lower priority = overall score less than 2

Appendix G – Priority level crossings (based on sequencing and staging)

Priority Level Crossings
(Based on Sequencing and Staging)

Line	Road Name	Suburb	Road Type	Site Priority Based on Traffic & Train Volumes		Grade Separations Must be Constructed Together	Grade Separations Desirable to be Constructed as a Program	Existing / Future Concurrent Projects	Recommended Delivery Timeframe	
				2013	2022				Short - Medium Term	Long Term
Caulfield - D'nong	Grange Road	Caulfield East	Arterial	Medium	Medium			Cranbourne - Pakenham Rail Corridor Project		
	Poath Road	Hughesdale	Local	High	High					
	Corrigan Road	Noble Park	Local	Lower	Lower					
	Heatherton Road	Noble Park	Arterial	High	High					
	Chandler Road	Noble Park	Arterial	High	High					
Frankston (Baxter)	Neerim Road	Caulfield East	Arterial	Medium	Medium					
	Glen Huntly Road	Glen Huntly	Local	High	High					
	McKinnon Road	McKinnon	Local	Lower	Lower					
	Centre Road	Bentleigh	Arterial	High	High					
	Wickham Road	Highett	Local	Lower	Lower					
	Highett Road	Highett	Local	Lower	Lower					
	Park Road	Cheltanham	Local	Medium	Medium					
	Charman Road	Cheltenham	Local	High						
	Balcombe Road	Mentone	Arterial	High	High					
	Parkers Road	Parkdale	Local	Lower	Lower					
	McDonald Street	Mordiallic	Local	Lower	Lower					
	Bear Street	Mordialloc	Local	Lower	Lower					
	Station Street	Aspendale	Local							
	Lincoln Parade	Aspendale	Local	Lower	Lower					
	Lochiel Avenue	Edithvale	Local	Lower	Lower					
	Edithvale Road	Edithvale	Arterial	Medium	Lower					
	Chelsea Road	Chelsea	Local	Lower	Lower					
	Argyle Avenue	Chelsea	Local							
	Bondi Road	Bonbeach	Local	Lower	Lower					
	Station Street	Bonbeach	Local							
	Station Street	Carrum	Arterial	Lower	Lower					
	Station Street	Seaford	Local	Lower						
	Seaford Road	Seaford	Arterial	Lower						
Glen Waverley	Madden Grove	Burnley	Arterial	High	High					
	Glenferrie Road	Kooyong	Arterial	High	High					
Belgrave	Union Road	Surrey Hills	Local	High	High			Stabling facility at Lilydale		
	Mont Albert Road	Mont Albert	Local	Lower	Lower					
	Heatherdale Road	Ringwood	Local	Medium	Medium					
	Mountain Highway	Bayswater	Arterial					New maintenance facility in Lilydale		
	Scoresby Road	Bayswater	Arterial							
Craigieburn	Macaulay Road	Kensington	Local		High			Arden-Macaulay Structure Plan		
	Puckle Street	Moonee Ponds	Local	Lower	Lower					
	Park Street	Moonee Ponds	Local		Lower			Essendon turnback and VicTrack identified upgrade of Essendon Station.		
	Buckley Street	Essendon	Arterial	Medium	Medium					
	Gaffney Street	Pascoe Vale	Arterial	Medium	Medium					
	Devon Road	Pascoe Vale	Local		Lower					
	Glenroy Road	Glenroy	Arterial	Medium	Medium					
Melton	Fitzgerald Road	Sunshine West/Ardeer	Local		Lower			Track duplication works		
	Mt Derrimut Road	Deer Park	Arterial		High					
	Robinsons Road	Deer Park	Local		Medium					
	Exford Road	Melton South	Local		Lower					
Hurstbridge	Ramsden Street	Clifton Hill	Local	Lower	Lower					
	Westgarth Street	Northcote	Arterial	Medium	Medium					
	Victoria Road	Northcote	Local		Medium			Yarralea Street could be timed with VicTrack upgrade of Alphington Station		
	Station Street	Fairfield	Arterial	Lower	Lower					
	Grange Road	Alphington	Arterial							
	Yarralea Street	Alphington	Local		Lower					
	Marshall Street	Ivanhoe	Local		Medium					
	Lower Plenty Road	Rosanna	Arterial		High					
	Ruthven Street	Macleod West	Local		Lower					
South Morang	Charles Street	Northcote	Local		Lower			Timed to follow the new stabling facility at South Morang		
	Arthurton Road	Northcote	Local		Medium					
	Beavers Road	Thornbury	Local		Lower					
	Woolton Avenue	Thornbury	Local		Lower					
	Normanby Avenue	Thornbury	Arterial							
	Hutton Street	Thornbury	Local		Lower					
	Oakover Road	Preston	Local							
	Bell Street	Preston	Arterial		High					
	Cramer Street	Preston	Local		Lower					
	Murray Road	Preston	Arterial		High					
	Regent Street	Reservoir	Local		Lower					
	High Street	Reservoir	Arterial		High					
	Keon Parade	Reservoir	Arterial		High					
	Heyington Avenue	Thomastown	Local		Lower					
	Paschke Crescent	Lalor	Local		Lower					

Line	Road Name	Suburb	Road Type	Site Priority Based on Traffic & Train Volumes		Grade Separations Must be Constructed Together	Grade Separations Desirable to be Constructed as a Program	Existing / Future Concurrent Projects	Recommended Delivery Timeframe	
				2013	2022				Short - Medium Term	Long Term
Sunbury	Furlong Road	St Albans	Local		Medium			New stabling facility at Sunbury		
	Melton Hwy	Taylors Lakes	Arterial	High	High					
	Old Calder Hwy	Diggers Rest	Local		Lower					
	Station St	Sunbury	Local		Lower					
Werribee (Wyndham Vale)	Anderson Street	Yarraville	Local	Lower	Lower					
	Hudsons Road	Spotswood	Local	Lower	Lower					
	Champion Road	Williamstown North	Local	Lower	Lower					
	Maddox Road	Williamstown North	Local	Lower	Lower					
	Maidstone Street	Altona	Arterial		Lower					
	Aviation Road	Laverton	Local	Lower	Lower					
	Old Geelong Road	Hoppers Crossing	Local		Lower					
	Cherry Street	Werribee	Local	High	Medium					
Pakenham	Webster Street	Dandenong	Local	Lower	Lower					
	Hallam South Road	Hallam	Arterial		High					
	Webb Street	Narre Warren	Local		High					
	Clyde Road	Berwick	Arterial		High					
	Station Street	Beaconsfield	Local		Lower					
	Officer South Road	Officer	Local		Medium					
	Main Street	Pakenham	Local		Lower					
Sandringham	Greville Street	Prahran	Local		Lower			VicTrack upgrade of Windsor Station		
	Union Street	Windsor	Local		Lower					
	Glen Eira Road	Ripponlea	Arterial		Lower					
	Bay Street	Brighton	Local		Medium					
	Church Street	Brighton	Local		Lower					
	New Street/Dendy Street	Brighton	Local		Medium					
	South Road	Brighton	Arterial		Lower					
	Hampton Street	Hampton	Arterial		Lower			VicTrack upgrade of Hampton Station		
	Linacre Road	Hampton	Local							
	Abbott Street	Sandringham	Local		Lower					

Note: Only include level crossings with estimated boom gate closure times greater than 25% (arterial roads) and 30% (local roads

Appendix H – Procurement options

Procurement Option	Description	Risks and Opportunities	Suitability
Construct Only	Under a Construct only contract, the client prepares a project brief, concept design, and performance and quality requirement specifications. The Project design is undertaken by the client and the contractor is responsible for constructing the works to the client's' design. The contract usually involves a lump sum price or is based on a schedule of rates.	Clear and enforceable risk allocation. The client takes on design risk. This requires the extensive development of the design, test and acceptance criteria and robust procedures for managing design change during the construction phase. Good for repetitive work against standardised designs. Does not encourage contractor innovation. Contractor owns construction cost and quality risk.	Not considered appropriate for this requirement
Design and Construction (& Maintain)	Under a Design & Construct (D&C) contract, the client prepares a project brief, and performance and quality requirement specifications (and possibly participates in the preparation of the concept design). A contract is awarded to prepare or complete the concept design, and for design development/documentation and construction of the works. The contract usually involves a lump sum price or is based on a schedule of rates.	Clear and enforceable risk allocation. Single point of management and accountability. Cost certainty is possible, however, client usually owns cost over-run risks. Little focus on Through Life Support costs. Encourages design innovation that support construction efficiencies. Rapid initiation – potential to save approximately 25 – 30% over construction only model due to the ability to conduct latter design concurrently with early construction phases. Design once – Construct many.	Design and Construct may be considered appropriate for the multiple low volume, low complexity level crossings along the Frankston Line.
Managing Contractor	Under the Managing Contractor model, the client prepares a project brief, concept design, performance and quality requirement specifications, before engaging a Managing Contractor. The Managing Contractor enters into the various contracts necessary to complete the works on behalf	Most risk is retained by the client but managed by the MC. Potential to achieve cost savings as individual work packages are competitively tendered. Final cost is unknown until final Trade contract is let. Can be combined with Panel Arrangements for large programs to reduce cost uncertainties.	Managing Contractor may be considered appropriate for individual, technically complex sites without complex stakeholder relationship issues. This model could be combined with Panel Arrangements allowing the MC to seek competitive tenders from a pre-approved panel of suppliers over an

	of the client. Managing Contractor is effectively a client consultant and is not responsible for Trade contractor default.	Poor model where complex stakeholder relationships exist. Rapid initiation – potential to save 20% over construction only model	extended period. This combined approach will reduce the cost uncertainty typically inherent in MC projects. The model could be more broadly applied to the projects within this program if a Stakeholder/Communications Manager is embedded within the MC Team.
Panel Arrangements	This model would require the client to establish a panel of pre-qualified suppliers. Each work package is then competitively tendered from within the panel. Costs are based on agreed schedule of rates.	Clear and enforceable risk allocation. The client takes on the role of Managing Contractor. Most risk is retained by the client. This model requires some time to establish however, once in place supports the rapid engagement of panel members at known rates for any given task.	This model is considered most appropriate for almost any individual site including technically complex sites with complex stakeholder relationship issues. The success of the model is highly contingent upon the experience of the core Project Management Team and the ability to quickly engage contractors from the panel(s).
Franchisee Delivered	Traditionally, franchising is a business relationship in which the benefit owner (the client), assigns to the franchisees, the right to develop, market and distribute the solution for a fixed period of time. In this context, the franchisee would be MTM who would be engaged to provide 'Project' Management Services. The franchisee may use whatever contracting models it sees fit to deliver the solutions (within any client defined constraints). Payment regimes can be designed to align with benefits realisation with final payments due soon after completion.	Clear and enforceable risk allocation. Franchisee substantially exposed to risks of design, construction, capital assets ownership and service KPIs. The client is effectively procuring the management services of the Franchisee. Stakeholder engagement is not always transparent to the client. Often results in innovative solutions. Unless future capacity requirements are well understood and documented, there is some risk that the Franchisee is not incentivised to 'future proof' the facility beyond their tenure. As the network operator, the Franchisee is incentivised to deliver the facility rapidly in order to minimise network disruption and increase patronage.	The Franchisee model is well suited to a project that comprises a series of sites along any corridor where cross-road traffic disruption can be managed with local diversions or where stabling facilities are incorporated. The Franchisee will design and sequence the individual sites to minimise rail network disruption. It is expected that the Franchisee would seek to incorporate elements of the ECI model.

Alliance Contracting	Alliance contracts are part of a range of delivery and contract systems that involve "relationship contracting". They include processes to manage relationships, remove barriers, and maximise the contributions made and successes achieved by all the participants. Other relationship contracting models include the managing contractor system, and, in some cases, early contractor involvement. Alliance participants are selected early in the project on the basis of factors other than price, including the alignment expected with, and the relationships expected between, the participants. The client chooses the entities it regards as most able to deliver the required project outcomes, including value for money. Time is spent in the selection of participants, involving discussion, alignment, senior executive meetings and workshops, to establish trust, explore relationships and identify the right personnel and participants. Alliances can involve selection of tenderers via either a single Target Outturn Cost (TOC) or dual TOC process. In single TOC alliances, the tender selection is heavily based on non-price criteria. It is the quickest alliance process and allows for greater industry participation. Whereas a competitive TOC process places a greater emphasis on price as after the initial assessment, two (or more) parties are invited to proceed through the design process with the client introducing direct price competition.	Parties must be genuinely committed to the relationship. Collaboration and openness is paramount. Heavily reliant on relationships between key individuals. Not suited to adversarial cultures. Suited to highly complex projects of uncertain risk where actual solutions are undefined Not all risks can be dimensioned upfront and are best managed jointly. Known Risk exposure is "shared". The client's financial exposure is uncapped (unknown risks); noting that the private parties have capped exposure. Client bears catastrophic risks. Client owns and operates the completed facility.	This procurement method has been used successfully to remove the level crossings at Mitcham and Springvale.

Public Private Partnership (PPP)	Under a PPP, the client engages a private sector entity to be responsible for construction, financing, operations and maintenance. This engagement is by way of a long term contract typically 20 to 30 years. PPP sub-options include: • Design Build Operate • Design Build Finance Operate • Design Build Finance Maintain • Design Build Finance Operate & Maintain The client's responsibilities for managing the project are therefore different from all the other delivery models. The client becomes a purchaser of asset-based services that are paid for according to performance. Under a PPP contract, the client allocates certain risks to the private party, locks in whole-of-life budgets and quality standards and focuses on its core business.	Consortium is substantially exposed to risks of design, construction, capital assets ownership and service KPIs. Encourages design and construction innovation that delivers through life support efficiencies. Effective when highly integrated solutions are required and possible (Greenfield contracting). Client owns and operates the completed facility **after** the long-term engagement is completed. Ongoing costs are understood and easy to forecast.	The PPP model is well suited to projects that incorporate sites co-located with major activity hubs and stations. The ability to develop commercial opportunities concurrently with the Grade Separation is expected to be attractive to financiers.
Early Contractor Involvement	Combines D&C with Alliance principles over long term relationships. Contractor initially engaged under a Services or Design Only Contract as appropriate. Fee is typically time & materials based against agreed fees and skills. Requires the development of a Risk Adjusted Pricing (RAP) model that is not agreed until most risks and construction costs are known. Contractor is involved in early stages of design and program planning. Initially engaged for planning and design only. Decision to proceed (or not) with Contractor made when planning, design and RAP completed.	Senior client staffs are required to be fully engaged as decisions are made rapidly. Requires independent cost estimators. Can deliver complex projects quickly. Encourages innovation across the life-cycle. Client owns and operates the completed facility after the long-term engagement is completed. Other risks and opportunities are similar to Alliance Contracting model.	

Table 4: Procurement options for level crossing removals

vicroads