# Tooronga Road Level Crossing Removal

## Feasibility Study

**January 2021**

~~Cabinet in Confidence~~



VICTORIA State Government | Department of Transport

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| Acronym | Definition |
|---|---|
| **BCR** | Benefit cost ratio |
| **CAPEX** | Capital Expenditure |
| **CBA** | Cost Benefit Analysis |
| **CPTED** | Crime Prevention Through Environmental Design |
| **CSR** | Combined Services Route |
| **DDA** | Disability Discrimination Act |
| **DoT** | Department of Transport |
| **IDO** | Integrated development opportunity |
| **KPI** | Key Performance Indicator |
| **LXRP** | Level Crossing Removal Project |
| **MCA** | Multi-criteria assessment |
| **MTIA** | Major Transport Infrastructure Authority |
| **MTM** | Metro Trains Me bourne |
| **NPV** | Net Present Value |
| **NPR** | Network Planning Requirements |
| **OPEX** | Operational Expenditure |
| **MTPFA** | Major Transport Project Facilitation Act |
| **SBO** | Special Building Overlay |
| **SCC** | Strategic Cycling Corridor |
| **VITM** | Victorian Integrated Transport Model |

## Document Version Control

| Version | Date | Status |
|---|---|---|
| **FINAL v1** | 27-Jan-2021 | |
| **FINAL v2** | 29-Jun-2021 | Incl. minor edits for submission to Commonwealth |

# Executive Summary

## Background

This feasibility study regards the removal of the Tooronga Road level crossing, which is located on the Glen Waverley Line in Melbourne's south-east.

Removal of the level crossing at Tooronga Road will address three key problems:

- Conflicting demands of rail and road-based transport at the level crossing reduces transport reliability and efficiency.
- Excessive boom gate closures cause community severance and reduce local amenity.
- Motor vehicle driver, cyclist and pedestrian frustration at level crossing delays invites risk-taking behaviour.

This feasibility study is prepared alongside a business case for the removal of the nearby Glenferrie Road level crossing in Kooyong. There is a significant opportunity to realise a delivery efficiency through the concurrent removal of both the Glenferrie Road and Tooronga Road level crossings. The combined removal of both level crossings would also minimise disruptions to the Glen Waverley Line. As such, it is critical that the Tooronga Road level crossing is expedited, with this feasibility study informing a business case for the combined removal of both crossings.

## Project options considered

The feasibility study shortlists two options for the removal of the level crossing:

- **Road Over Rail**, providing a new road overpass that retains the existing rail line.
- **Rail Over Road**, providing a new rail overpass and station, with the existing road level to remain.

Other options that involved trenches, including Rail Under Road and Road Under Rail, are not considered feasible options given the hydrological conditions of the site and its surrounds. Options involving trench present flooding risks, both to the rail, corridor and surrounding neighbourhoods, due to the flood-risk profile of the site, which is close to Gardiners Creek.

A multi-criteria analysis of the shortlisted project options has assessed the costs, benefits, impacts and risks for each.

## Recommendation

**Project Option 2 (Rail Over Road)** is the preferred solution, performing better than the alternative Project Option 1 (Road Over Rail) as it:

- Provides clear improvements to movement, with improved travel times and conditions for all moves. The Road Over Rail option, however, provides marginal improvements and also disrupts local road connections, access to properties and pedestrian routes.
- Provides clear place benefits, including the provision of a new station environment and legibility of the rail corridor area. The Road Over Rail option, however, provides only marginal improvements and has poorer urban design outcomes.
- Provides clear improvements to safety, eliminating the level crossing, the curved platforms of the existing station and three pedestrian crossings. The Road Over Rail option, however, maintains the curved station platforms and one of the pedestrian crossing.
- Performs strongly in terms of deliverability, with a reduced disruption profile and avoiding the need for compulsory acquisitions and business relocations. The Road Over Rail option, however, requires acquisitions of five properties, one business and has a longer occupation timeframe.

## Preferred Solution

The preferred solution for the Tooronga Road level crossing removal is a **Rail Over Road**, with key features including:

- Grade separation of the level crossing at Tooronga Road, Toorak, using a rail over road solution (elevated rail above road).
- New Tooronga Station.
- Improved interchange between Glen Waverley Line trains and Route 624 buses

## Next Steps

As stated, there is an opportunity to provide this option alongside the level crossing at Glenferrie Road. The preliminary cost for the combined delivery of both removals is approximately $651 million (excluding escalation), representing savings of $49 million compared to separate removals. This considerable value for money saving is supported by a reduced disruption profile to the Glen Waverley Line.

# 1 Introduction

## 1.1 Background

The Tooronga Road level crossing is located on the Glen Waverley Line and is located approximately 7.5 kilometres from Melbourne's central business district in the south-eastern suburbs. It is located in the City of Stonnington, on the boundary of Malvern to the west and Glen Iris to the east,

This feasibility study has been prepared in response to a Federal Government commitment to investigate three level crossing removals on the Glen Waverley Line. A business case has been prepared for the Glenferrie Road, Kooyong level crossing. This feasibility study, and another for the level crossing at Madden Grove, Burnley also form part of the Federal Government's commitment.

Two nearby level crossings on the Glen Waverley Line have already been removed. The Toorak Road, Kooyong level crossing was removed in April 2020 and the Burke Road, Glen Iris level crossing was removed in April 2016.

**Figure 1 – Tooronga Road level crossing location and context**


## 1.2 Purpose of this study

The purpose of this feasibility study is to assess preliminary design options and identify a preferred solution. This includes:

- A rapid assessment of the existing problems and benefits of the level crossing removal, including traffic impacts.
- Identification of options and preparation of basic concept designs.
- Desktop assessments of site considerations, including flora/fauna, cultural heritage, land contamination, hydrology, traffic, noise and utilities.
- A preliminary cost estimate
- An indicative/rapid Cost Benefit Appraisal (BCR and NPV) which examines the opportunity to combine delivery of Glenferrie Road and Tooronga together.
- Assessment and identification of a preferred option.
- Consideration to concurrent delivery opportunity with Glenferrie Road (efficiency gains).

# 2 Site considerations

## 2.1 Transport context

The level crossing at Tooronga Road comprises an at-grade intersection between the Glen Waverley train line and Tooronga Road. Tooronga Station is located adjacent to the level crossing on its western side.

**Figure 2 – Tooronga Road level crossing**

Looking south


Looking north

The Glen Waverley Line is an electrified suburban rail line with a two-track arrangement, carrying 153 train services per day.[1] There are 4,230 daily entries and exits from Tooronga Station.[2]

Tooronga Road is a declared arterial road that runs north-south from Hawthorn East to Malvern East. It intersects with several east-west arterials, including Toorak Road, approximately 550 metres to the north of the level crossing, and Malvern Road, approximately 900 metres to the south. The road carries approximately 18,000 vehicles on a typical weekday.

Tooronga Road also serves the Route 624 bus, which runs between the suburbs of Kew and Oakleigh, passes through the level crossing and accounts for two percent of daily entries and exits from the station (approximately 85 passengers).[3]

The Monash Freeway is located approximately 200 metres north of the level crossing. Tooronga Road passes the freeway via a road bridge, however the road does not have an interchange with the freeway. Tooronga Road south of the Monash Freeway is a designated Strategic Cycling Corridor (SCC), which links to the Gardiner's Creek SCC.

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[1] Metro Trains Me bourne, Glen Waverley Line timetables, 2020.

[2] Department of Transport, Network Planning Requirements - Tooronga Station, 2020.

3 Department of Transport, Network Planning Requirements - Tooronga Station, 2020.

**Figure 3 – Tooronga Road level crossing site context**


## 2.2 Land Use

The level crossing is in an area with a mixture of land uses:

- The land to the south of the rail corridor is characterised by residential neighbourhoods.
- The Stonnington Waste Transfer Station is located to the north of the level crossing and plays an important function for the local municipality and requires continued access.
- Public space is located along and adjacent to Gardiner's Creek, and Tooronga Park is located to the west of Tooronga Station.
- Land north of the rail corridor and to the east of Tooronga Road, includes a range of commercial and industrial uses, including the Melbourne Brick premises.
- The Malvern Road – Burke Road Neighbourhood Activity Centre is located approximately 250 metres south of the level crossing, whilst the Tooronga Village Neighbourhood Centre (located in the City of Boroondara) is located approximately 400 metres to the north.

## 2.3 Planning and environmental approvals

The level crossing removal would incorporate land covered by the Stonnington Planning Scheme and the Boroondara Planning Scheme for changes to Tooronga Road, north of the Monash Freeway. Under these planning schemes, various zones and overlays apply to the subject site as follows:

Zones:

- Public Use Zone 4 (Transport) – the rail corridor.
- Road Zone Category 1 - Tooronga Road.
- Public Park and Recreation Zone – Tooronga Park.
- General Residential Zone, Commercial 1 Zone and Industrial 3 Zone – nearby private land and local roads within the Project area.

Overlays:

- Special Building Overlay.
- Public Acquisition Overlay for 'road widening'.
- Specific Controls Overlay
- Heritage Overlay.

**Figure 4 – Land use zones surrounding Tooronga Road level crossing**

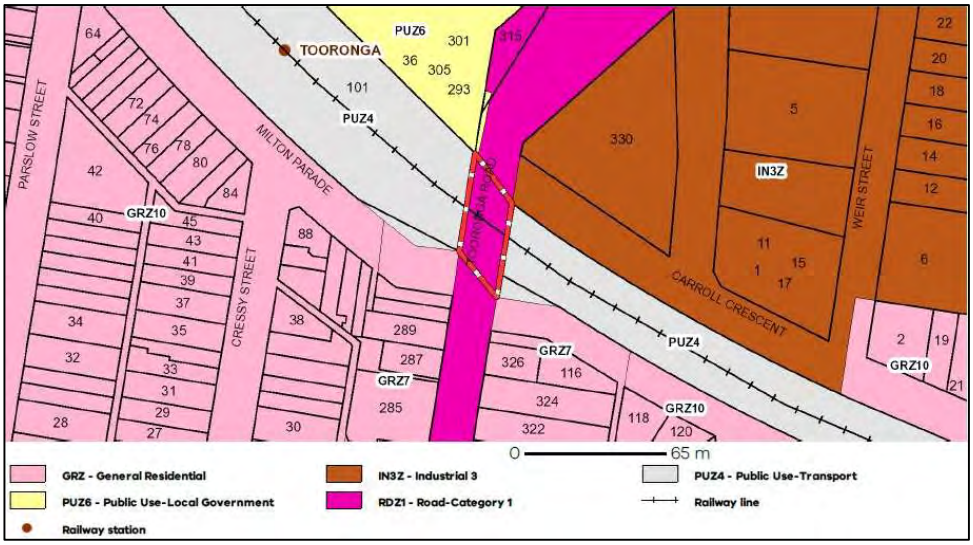
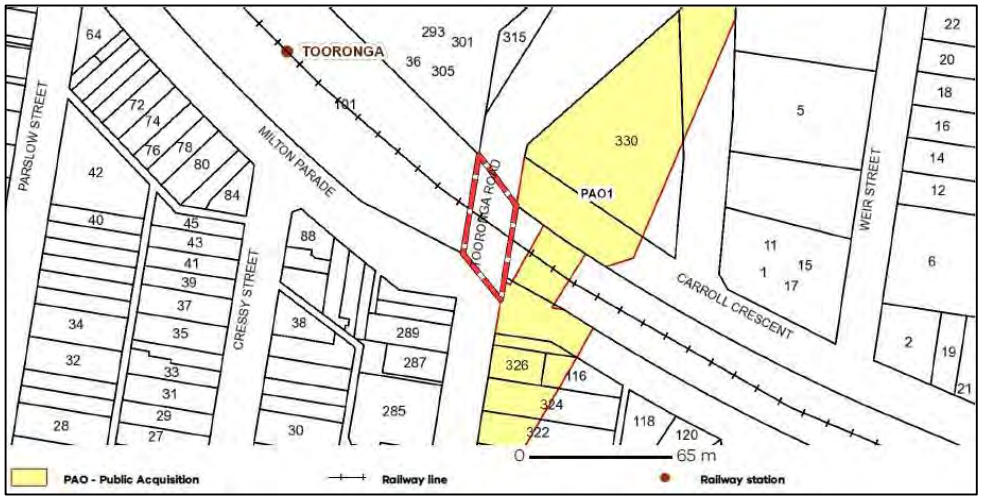



**Figure 5 – Public Acquisition Zone surrounding Tooronga Road level crossing**



These planning controls necessitate planning approval for level crossing removal and associated development. This could be sought either through amendments to planning schemes, or if the project is designated under the Major Transport Projects Facilitation Act 2009, through provisions in the planning system that avoid the need for amendments.

The level crossing removal could also potentially require, several other environmental consents which are outlined below:

**Table 1 – Key environmental approvals for Tooronga Road level crossing removal**

| Approval | Requirement |
|---|---|
| Heritage approval under *Heritage Act 2017* | **Potentially required –** however, a site-based post-contact (European) historic heritage due-diligence assessment would be required to confirm any approval requirements and impacts. |
| Cultural heritage approval under *Aboriginal Heritage Act 2006* | **Approval required –** a Cultural Heritage Management Plan would be required. A site-based cultural heritage due-diligence assessment would be required to confirm approval pathway and impacts to aboriginal cultural heritage. |
| Approval under *Flora and Fauna Guarantee Act 1988* | **Unlikely to be required –** however, a site-based flora and fauna (ecology) due-diligence assessment would be required to confirm ecological values in the project area. |
| Referral of the project under *Environmental Effects Act 1978* for Environmental Effects Statement | **Unlikely to be required –** however, site-based due-diligence assessments and impact assessments would need to be carried out to confirm. |
| Referral of the project under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* | **Unlikely to be required –** however, site-based due-diligence assessments and impact assessments would need to be carried out to confirm. |

## 2.4 Hydrology

The level crossing is in an area subject to overland flows during storm events and heavy rainfall. As such, the site has been included within the Special Building Overlay (SBO) of the Stonnington Planning Scheme.[4] The overlay requires planning permission for buildings and works in the location, and for developments to overcome risks and meet flood management objectives. The SBO covers the level crossing itself and extends to Tooronga Road to the south, the rail corridor to the east and the land to the north of the rail corridor, as shown below.

**Figure 6 – Designation of Special Building Overlay**


[4] Clause 44.05, Stonington Planning Scheme.

## 2.5 Utilities and other transport assets

Several utility assets cross the rail corridor at Tooronga Road or within the project footprint, including:

- Significant overhead high voltage (33kV) power transmission lines that run to the north of the rail corridor and west of Tooronga Station.
- Major drainage infrastructure, including three north-south drains, are also located underneath the rail corridor.

There are currently no known future transport infrastructure projects in the vicinity of the level crossing or along this section of the Glen Waverley Line.

# 3 Needs assessment

## 3.1 Needs assessment

The need to remove the Tooronga Road level crossing has been assessed in the context of three problem areas associated with level crossing sites: **Movement**, **Place** and **Safety**.

They have been used to assess level crossings across Melbourne in the Level Crossing Removal Project Program Business Case (2017), and more recently, the Glenferrie Road Level Crossing Removal Project Business Case (2021).

The three problem areas considered in the needs assessment for Tooronga Road are shown below. Due to the Victorian COVID19 Stage 4 restrictions data collection to inform this assessment was significantly restricted. Further data collection would be required during the business case phase.

**Figure 7 – Problem areas relating to the Tooronga Road level crossing**

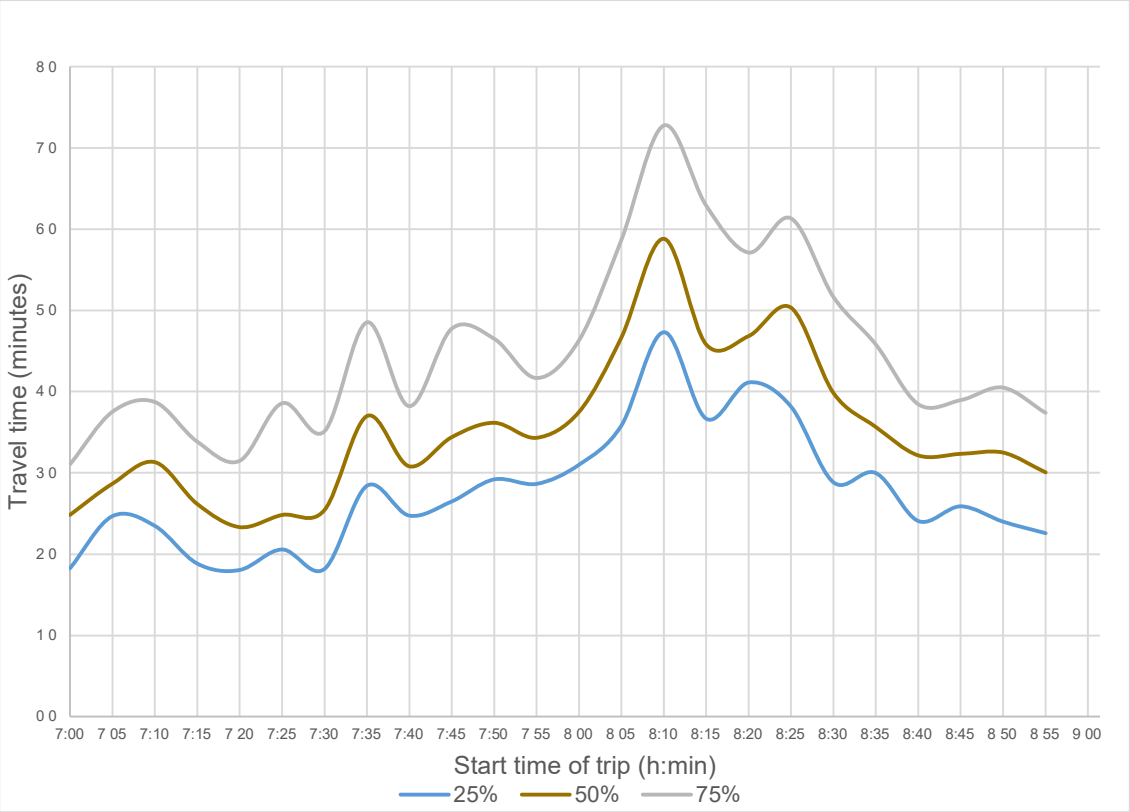

Table 2 describes the problems relating to the Tooronga Road level crossing.

**Table 2 – Problems summary for Tooronga Road level crossing**

| Problem | Description |
|---|---|
| **Problem 1: Movement**<br>**Conflicting demands of rail and road-based transport at the level crossing reduces transport reliability and efficiency** | • Boom gate closures at Tooronga Road result in delays and unreliable travel times to the 19,000 vehicles on the arterial road each day. Travel times for other road-based transport (i.e., the Route 624 bus and cyclists) is compromised.<br>• The level crossing restricts the performance of trains due to speed restrictions, faults and incidents, which hinders network efficiency. |
| **Problem 2: Place**<br>**Excessive boom gate closures cause community severance and reduce local amenity** | • The Tooronga Road level crossing forms a significant barrier for north-south movements within the suburbs of Malvern and Glen Iris. Access to local shops is restricted, including the Malvern Road – Burke Road Neighbourhood Activity Centre to the south, and the Tooronga Village Neighbourhood Centre to the north.<br>• Access to Tooronga Station, open space and community facilities is restricted.<br>• Interchange facilities between the Glen Waverley Line train services and Route 624 bus are poor, with limited accessibility and a long unsheltered walkway. |
| **Problem 3: Safety**<br>**Motor vehicle driver, cyclist and pedestrian frustration at level crossing delays invites risk-taking behaviour** | • Prolonged wait times at level crossings compromise the safety of motorists, cyclists and pedestrians through risk-taking behaviour.<br>• This is exacerbated by the adjacent signalised intersections at Milton Rd and Carrol Crescent, directly adjacent to the level crossings.<br>• Pedestrian safety is compromised when crossing Tooronga Road and Milton Avenue to access Route 624 bus services. |

The unreliability of travel times described in Table 2 is evidenced by travel time data collected in 2018 using Bluetooth technology. The data recorded travel times on Tooronga Road between Malvern Road and Toorak Road; a 900 metre stretch that includes the level crossing. The average travel time is found to vary between approximately two and a half and six minutes based on the average (50th percentile) travel time across the mid-week two-hour peak period (7am to 9am). The difference between a "good and bad run" (10th and 90th percentile) along this 900 metres section of Tooronga Road can add several minutes to journey times, with some journeys taking over seven minutes.

**Figure 8 – Mid-week travel time (various percentiles) on Tooronga Road between Malvern Road and Toorak Road (northbound)[5]**




Addressing these problems will result in a number benefits for the local community and users of Tooronga Road and the Glen Waverley Line. These benefits correspond to the movement, place and safety problems.

The benefits that the Tooronga Road level crossing removal will deliver are described below.

[5] Mid-week (Tuesday, Wednesday & Thursday) data from weeks 6 to 9, inclusive, in 2018. Public holidays are excluded. Data is sourced from VicRoads database of travel time data collected using Bluetooth technology. Trip cap of 15 minutes. Data is pooled in 5-minute increments (e.g. 7:00 to 7:05am), and travel time percentiles are calculated for the 24 5-minute intervals, between 7 & 9am.

**Table 3 – Benefits summary for removal of Tooronga Road level crossing**

| Benefit | Description |
|---|---|
| **Benefit 1: Movement**<br>**Improved productivity from more reliable and efficient transport networks** | • Travel times and reliability will be improved for the 19,000 vehicles that use the road each day.<br>• The performance of the Route 624 bus will improve as services are no longer delayed by boom gate closures.<br>• Pedestrians crossing the rail corridor will no longer be delayed by boom gate closures.<br>• Removal of the level crossing will reduce delays for cyclists using the Tooronga Road Strategic Cycling Corridor, providing better access to other cycling corridors (i.e., the Gardiner's Creek Trail). |
| **Benefit 2: Place**<br>**Better connected, liveable and thriving communities** | • Removal of the level crossing will improve the public realm of Tooronga Road and surround and the local environment for pedestrians and cyclists.<br>• Intermodal connectivity between Glen Waverley Line trains and Route 624 bus will be better facilitated by bringing the station platforms and bus stops closer together,<br>• Removal of the level crossing will reduce delays for pedestrians, thereby improving accessibility to nearby activity centres (i.e., Malvern Road – Burke Road to the south and Tooronga Village to the north) and open space. |
| **Benefit 3: Safety**<br>**Safer communities** | • Removal of the level crossing will eliminate the risk of accidents and incidents between trains and road users.<br>• Unimpeded travel through the area and a better pedestrian environment will diminish risk-taking behaviour by drivers and pedestrians. |

## 3.2 Site prioritisation framework

In 2018 the Victorian Government prepared the *Prioritising Future Level Crossing Removals: Site Prioritisation Framework*.[6] This framework was used to determine the preferred program for an additional 25 level crossing removals.

Tooronga Road was just outside of the High Need[7] sites identified under the framework, and was not included in the selected program of 25 additional crossing removals.

It is likely that Tooronga Road would be a strong candidate in any future work utilising the Site Prioritisation Framework.

[6] Prioritising Future Level Crossing Removals: Site Prioritisation Framework, Level Crossing Removal Authority, 2018.

[7] 'High need' sites are those with over 4000 vehicles per day and over 10 trains per hour.

# 4 Project options

## 4.1 Project objectives

Project objectives have been developed for the proposed removal of the Tooronga Road level crossing. These are aligned to the *LXRP Options Assessment Framework* and are categorised as follows:

- **Benefits:** Core benefits to be delivered
- **Project Outcomes:** Project execution and value, network integration and integrity
- **Project Impacts:** Impacts on the environment and people

The project objectives have also been informed by the Victorian Level Crossing Removal Program Investment Logic and DOT Movement and Place Framework. These have been defined in Network Planning Requirements (NPRs) for this site, which considers the transport network strategies, including station and road classifications.

**Table 4 – Project objectives for Tooronga Road level crossing**

| Project Objective | Description |
|---|---|
| **Benefits** | |
| **Movement: Improved productivity from more reliable and efficient transport networks** | Improve the reliability of the rail and on-road public transport network and reduce travel times for all road users. |
| **Place: Better connected, liveable and thriving communities** | Provide better access to important community facilities, such as nearby schools and local shops, through the removal of the level crossing and improved urban design. |
| **Safety: Safer communities** | Eliminate the conflict risk due to the level crossing. Reduce delays for drivers, cyclists and pedestrians, to diminish risk-taking behaviour that would have previously resulted in serious incidents. |
| **Project Outcomes** | |
| **Capital Cost** | Minimise, where possible, the capital expenditure (CAPEX) required to deliver the project and identify opportunities to achieve value-for-money outcomes. |
| **Whole of Life Cost** | Achieve a positive net change to annual operational expenditure (OPEX) for rail and on-road public transport networks that is sustainable long-term where possible. |
| **Timeframe** | Meet a project delivery timeline that is considered realistic and acceptable. |
| **Delivery Risk and Uncertainty** | Address potential impacts, issues and risks associated with both construction and the characteristics of the site and its surrounds (e.g., topography, groundwater). |
| **Opportunities** | Maximise potential opportunities for optional investment delivering additional project outcomes. |
| **Compliance with Standards** | The project meets relevant design standards and industry best practice. |
| **Alignment with Strategy, Future Proofing** | The project aligns with existing transport and land use strategies and does not adversely impact on the ability to deliver future transport projects. |
| **Project Impacts** | |
| **Land Use Impacts** | Minimise or avoid compulsory land acquisition and other adverse impacts for residents, businesses and community groups. |
| **Environmental Impacts** | Avoid adverse impacts on the environment and minimise noise, air or light pollution. |
| **Temporary (Construction) Impacts** | Limit disruption for public transport users, nearby residents and businesses, and community infrastructure during construction. |

## 4.2 Project options assessment

Project Options for the Tooronga Road level crossing removal have been assessed against the *LXRP Options Assessment Framework*, which provides a standardised approach for identifying preferred solutions for level crossing removals across Melbourne. This Framework ensures that the assessment of project options is comprehensive, transparent and consistent. The assessment includes an initial feasibility assessment of a thorough list of potential solutions, with short-listed options then taken forward for more detailed assessment, as shown below.

**Figure 9 – Approach to determining the preferred project option**


### 4.2.1 Initial feasibility assessment of options

A summary of the project options considered, and the outcome of the initial feasibility assessment is shown below.

**Table 5 – Project Option identification and initial feasibility assessment for Tooronga Road**

| Project Option | Description | Initial feasibility | Rationale |
|---|---|---|---|
| 1. **Rail under road** | Provide new rail cutting with new road bridge, and a new Tooronga Station west of Tooronga Road. | **Option set aside** | Significant technical challenges due to drainage works required to maintain floodwater flow and increase in flooding risk. This is further described below. |
| 2. **Road over rail** | Provide new road overpass with existing rail line to remain. | **Option carried forward** | Meets key program benefits and is considered feasible to deliver. This is further described below. |
| 3. **Rail over road** | Provide new rail overpass with existing road level to remain, and a new Tooronga Station west of Tooronga Road. | **Option carried forward** | Meets key program benefits and is considered feasible to deliver. This is further described below. |
| 4. **Road under rail** | Provide new road underpass with new rail bridge to retain existing rail levels. | **Option set aside** | Significant technical challenges due to drainage works required to maintain floodwater flow and increased flood risk. Also results in access issues to properties fronting Tooronga Road requiring land acquisition, and disconnection of local road intersections. |
| 5. **Road closure / nearby improvements** | Close level crossing (and upgrade alternative routes). | **Option set aside** | Loss of functionality of major arterial road and adverse impact on surrounding road network. Given the importance of Tooronga Road as a major north-south arterial, truncating the road at the level crossing would not be acceptable. |
| 6. **Hybrid / alternative** | Road Over Rail with partial rail lowering, or Rail Over Road with partial road lowering | **Option set aside** | Highly disruptive to both road and rail networks during construction and more complex without providing advantages compared to feasible rail or road options. |

### 4.2.2 Non feasible options set aside

As stated above, four options were set aside in the initial feasibility assessment.

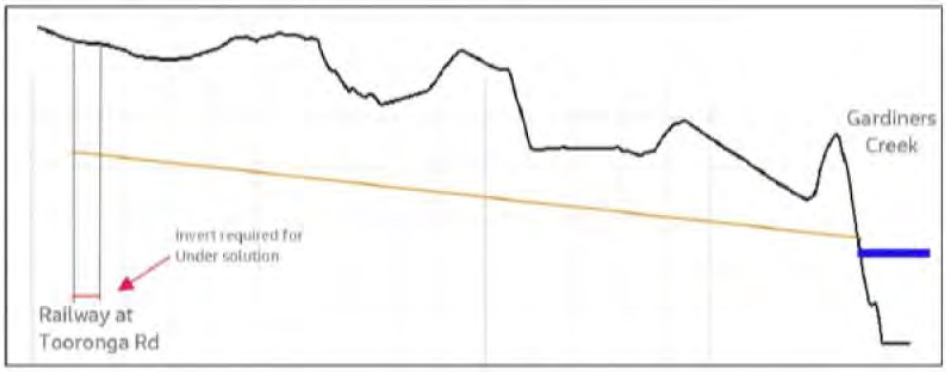
Options that require trenches, including Rail Under Road and Road Under Rail, present significant hydrological challenges. They would require substantial diversions to drainage systems and the construction of new drainage infrastructure to minimise the risk of any inundation, both to the transport infrastructure (i.e., rail or road trenches) and nearby properties. Further details are provided below.

**Table 6 – Hydrological issues for Rail Under Road and Road Under Rail options**

| Item | Overland Flows | Major Underground Drainage |
|---|---|---|
| **Existing Conditions** | • The Tooronga Road site is prone to overland flooding, and a critical junction for transferring flows from Tooronga Road and Creswick Street main drain | • There are two existing major drainage pipes (approximately 2m diameter) passing directly underneath rail corridor at this site.<br>• This existing drainage is already at capacity, and any alterations to it may not to fully mitigate against flood events |
| **Impacts of Rail under Option** | • The rail trench would truncate overland flow paths | • Would Require significant diversion of underground major drainage (to north-west of its current position)<br>• The required depth of cutting would result in these pipes not being able to drain under gravity to outlet at Gardiners Creek. This may risk cause substantial flood impacts to areas on Milton Parade, or Creswick Street |
| **Impacts of Road Under Option** | • Overland flow paths would pond in the low point of the road underpass. | • The required depth of cutting would result in these pipes not being able to drain under gravity to outlet at Gardiners Creek. This may risk substantial flood impacts to adjacent areas on Milton Parade or Creswick Street. |

**Figure 10 – Extent of land subject to inundation at Tooronga Road**

**Figure 11 – Level crossing site relative to Gardiner Creek**




For this reason, it is not considered that options incorporating trenches are feasible in this location.

Given the importance of Tooronga Road as a north-south arterial, an option based on truncating the road at the level crossing was set aside.

The Hybrid Rail Over Road option was considered but not assessed as part of the MCA, as it would have a higher cost that all other options, but with little added benefits and higher impacts. This is due to the combination of similar hydrology issues, an elevated level of disruption to both rail services and road users, and the expected higher cost of construction.

### 4.2.3 Road Over Rail Option: Description

The indicative scope of the Road over Rail option is as follows:

**Table 7 – Road Over Rail indicative scope**

| Item | Description |
|---|---|
| **Description** | • Provide new road overpass with existing rail line to remain. |
| **Rail** | • Retention of existing rail infrastructure, including at-grade pedestrian crossing on the up end. |
| **Tooronga Station** | • Retention of existing station. |
| **Road** | • Elevation of Tooronga Road (approximately 400 metres in length) using a combination of bridge structures, retaining walls and embankments to span over the existing rail line.<br>• Extension of Milton Parade (east), which is currently truncated at Tooronga Road, to connect to Milton Parade (west) beneath the raised Tooronga Road bridge.<br>• Modifications to access into Milton Parade from Tooronga Road (one-way only) to retain access bility for residential properties.<br>• Modification to the alignment of Weir Street to retain access to Stonnington Waste Transfer Station and industrial precinct.<br>• Elevation of Carroll Crescent to retain intersection with Tooronga Road.<br>• Modifications to access into Milton Parade from Tooronga Road (one-way only, left from Tooronga Road) to retain accessibility for residential properties. |
| **Utilities** | • Utility relocations and protection. |
| **Compulsory acquisition** | • Requires the acquisition of five residential properties. |

**Figure 12 – Option 2: Road Over Rail**


### 4.2.4 Rail Over Road Option: Description

The indicative scope of the Rail over Road option is as follows.

**Table 8 – Rail Over Road indicative scope**

| Item | Description |
|---|---|
| **Description** | • Provide new rail overpass and a new Tooronga Station west of Tooronga Road, with existing road level to remain |
| **Rail** | • Elevation of rail line (approximately 800 metres in length) using a combination of U-trough structures and embankments.<br>• New rail infrastructure including track, overhead line equipment and signalling.<br>• Removal of the pedestrian bridge over the rail line at Edgar Street (east of the level crossing), with an opportunity to provide a pedestrian link beneath the elevated rail line closer to Tooronga Road.<br>• Introduction of a train speed restriction due to narrow and curving rail corridor. |
| **Tooronga Station** | • Development of new station north of the existing station, on the western side of Tooronga Road. |
| **Road** | • Modifications to adjacent local roads commensurate with works. |
| **Utilities** | • Utility service relocations and protection. |
| **Compulsory acquisition** | • No acquisitions required. |

**Figure 13 – Option 3: Rail over road (looking west)**


## 4.3 Multi criteria assessment (MCA)

The two feasible project options ('road over rail' and 'rail over road') have undergone a detailed multi-criteria analysis (MCA). The purpose of the MCA is to critically assess the ability of the project options to deliver project benefits, achieve desirable project outcomes and minimise project impacts.

The MCA was completed in-line with the LXRP Options Assessment Framework. In undertaking the MCA, a detailed stakeholder workshop was held involving representatives from LXRP, Department of Transport, Public Transport Victoria, Metro Trains Melbourne, Yarra Trams and VicTrack, together with the project's strategic and technical advisors.

Table 9 evaluates how each of the project options align with the project benefits described in Chapter 3.

**Table 9 – Assessment of Tooronga Road project options against benefit criteria**

| Primary criteria | Secondary criteria | Option 2: Road over rail | Option 3: Rail over road |
|---|---|---|---|
| **Alignment with project benefits** | **Movement**<br>More reliable and efficient transport networks to improve productivity | **Marginal improvement**<br>Provides improved vehicles travel time and reliability. Local road connections and access to some properties are disrupted, and there is separation of bus stops and the existing station. Rail replacement bus services would also be disrupted as Milton Road becomes one-way. | **Clear improvement**<br>Provides improvement, with vehicle travel time and journey reliability improved, retention of local roads and integration of bus stops and new station. |
| | **Place**<br>Better connected, liveable and thriving communities | **No improvement**<br>Provides disconnection between residential areas on each side of Tooronga Road, and removes existing local road access from Milton Parade (west) to Tooronga Road. Existing direct access to the station for pedestrians residing north of the level crossing, requiring ramp detours (of lifts) from the elevated road bridge to ground level. The space beneath the bridge would result in adverse CPTED issues. | **Clear improvement**<br>Provides opportunities for an enhanced station precinct with opportunities for urban renewal beneath the elevated rail structure and improvement connections across the rail corridor. |

| Primary criteria | Secondary criteria | Option 2: Road over rail | Option 3: Rail over road |
|---|---|---|---|
| | **Safety** Safer communities | **Marginal improvement** Provides some improvements with removal of the level crossing and two pedestrian crossings, however the pedestrian crossing at the up end of the station and existing curved platforms are retained. | **Clear improvement** Provides improvement to safety with the removal of; the level crossing, three at-grade pedestrian crossings and the existing curved platforms at the station. |

Table 10 evaluates how each of the project options align with the project outcomes described in Chapter 3.

**Table 10 – Assessment of Tooronga Road project options against project outcomes criteria**

| Primary criteria | Secondary criteria | Option 2: Road over rail | Option 3: Rail over road |
|---|---|---|---|
| **Project outcomes** | **Project capital cost** (unescalated) | **$130m - $180m** | **$290 - $340m** |
| | **Whole of life cost** | **Average performance** Reduced maintenance requirements of the existing level crossing, however savings are outweighed by the increased maintenance requirements of the road bridge and vertical transport. | **Average performance** Reduced maintenance requirements of the existing level crossing, however savings are outweighed by the increased maintenance requirements of the new station facilities (i.e., lifts) and rail structures (i.e., retaining walls, piers, U-troughs). |
| | **Value caption and creation opportunities** | **Average performance** Provides potential value capture opportunities and is supported by existing land values and urban context. Potential for IDO may be possible on acquired properties and government-owned land subject to street frontages being achieved, with another possible on surplus land resulting from the Melbourne Brickworks acquisition subject to flood risk and surface water management issues being addressed. | **Poor performance** Provides no apparent value capture opportunities as any IDO would need to be setback a minimum of five metres from the rail viaduct, making land parcels too narrow to develop. |
| | **Timeframe** | **Average performance** | **Average performance** |
| | Level crossing removal | 24 months | 24 months |
| | Completion of all works | 30 months | 30 months |

| Primary criteria | Secondary criteria | Option 2: Road over rail | Option 3: Rail over road |
|---|---|---|---|
| | **Delivery risks** | **Average performance**<br>Presents an average level of delivery risk, including: a requirement to divert all existing utilities; long road closures, including two 4-week closures to stage traffic on to the new structure; a requirement for temporary retaining wall to stage embankments; and significant property acquisition. | **Average performance**<br>Presents an average level of delivery risk, including: a requirement to deliver the solution at a level at which overhead power lines are not disrupted; and long rail occupations resulting in Glen Waverley line closures due to significant works on the existing alignment. |
| | **Compliance with design standards and best practice** | **Average performance** | **Average performance** |
| | **Protection of future assets** | **Strong performance**<br>No known future transport infrastructure projects in the vicinity of the level crossing. Provides flexibility for future cross corridor utility connections. | **Strong performance**<br>No known future transport infrastructure projects in the vicinity of the level crossing. Provides flexibility for future cross corridor utility connections. |

- Assessment of Tooronga Road project options against project impacts criteriaTable 11 evaluates how each of the project options align with the project outcomes described in Chapter 3.

**Table 11 - Assessment of Tooronga Road project options against project impacts criteria**

| Primary criteria | Secondary criteria | Option 2: Road over rail | Option 3: Rail over road |
|---|---|---|---|
| **Property impacts** | Land acquisition impacts | **Poor performance** | **Strong performance** |
| | No. of full acquisitions | **Poor performance**<br>Five (with a further five already government-owned also required) | **Strong performance**<br>Nil |
| | No. of partial acquisitions | **Average performance**<br>One | **Average performance**<br>Partial acquisition of Milton Parade reservation (east of Tooronga Road) for elevated rail structure. |
| | **Land use impacts** | **Poor performance**<br>Results in significant visual amenity, noise impacts, light spill, overlooking and overshadowing to neighbouring residential properties that will be difficult to mitigate. Impacts will be worsened by additional structures on the road bridge, such as privacy screens. Limited opportunities to improve amenity of space below the road bridge. | **Average performance**<br>Results in some visual impacts, noise impacts amenity impacts from the elevated rail structure to neighbouring residential properties. Impacts will be worsened by vegetation removal. |
| | **Environmental impacts** | **Strong performance**<br>Does not result in significant impacts on sensitive biodiversity, with limited vegetation removal and no heritage impacts. | **Average performance**<br>Requires large-scale vegetation removal in the rail corridor, however native vegetation removal will be limited. Does not result in significant impacts on biodiversity and no heritage impacts. |
| | **Temporary impacts** | **Average performance**<br>Minimal rail disruption, however long road closures including disruption to Carroll Crescent and Milton Parade to construct new elevated road bridge. | **Average performance**<br>Major rail disruptions due to occupation of the rail corridor. |
| | Rail disruption (days) | 4 – 5 weekend closures | 6 – 7 weeks (continuous occupation) and multiple weekend or extended weekend occupations |
| | Road closure (days) | Two 4-week closures to tie in with existing road levels. | 4 – 6 weekend type closures. |

## 4.4 Key stakeholder views

Key stakeholders that have been identified as potentially impacted by the removal of the Tooronga Road level crossing have been identified.

Initial consultation has taken place with the Commonwealth Government, the Victorian Department of Transport, the City of Stonnington, Metro Trains Melbourne and VicTrack. No specific consultation on project options has been undertaken, although inputs from these stakeholders has informed the MCA and this feasibility study.

Further engagement with key stakeholders will be undertaken alongside the preparation of a business case and as part of the subsequent detailed design process.

**Table 12 – Key stakeholder identification and position**

| Stakeholder | Interest in the project | Position on project |
|---|---|---|
| **Commonwealth Government** | Funding the feasibility study and delivery of the level crossing removal if progressed to business case. | Committed to consider removal of level crossing subject to feasibility study, with possible packaging with the Glenferrie Road, Kooyong level crossing removal |
| **Department of Transport** | Department responsible for Melbourne's arterial roads, rail network and project integration. | Supports the removal of level crossings across Me bourne. |
| **City of Stonnington** | Local government area in which the level crossing is located that is responsible for statutory approvals and local road management. | Supports the removal of level crossings within the municipality. |
| **Metro Trains Melbourne** | Operator of Melbourne's passenger rail network, including the Glen Waverley Line. | Supports removal of the level crossing and provision of improved infrastructure and passenger amenity. |
| **VicTrack** | Owner of rail corridor land and infrastructure. | Supports grade-separations as they result in upgrades of existing assets. |
| **Utility companies** | Owners of utility infrastructure located in the vicinity of the level crossing. | Likely to support the project if utilities can be relocated or protected. |

Stonnington Council has provided a written submission regarding its advocacy for level crossing removals in the municipality, which is included as an attachment. This includes Council's positions on level crossing removals which are as follows:

- Concurrent removal of all three Glen Waverley Line level crossings within the City of Stonnington (Glenferrie Rd, Tooronga Rd, High St Glen Iris).
- Collaborative engagement with Council, residents, businesses and the local community as designs are developed.
- Avoid poorly designed solutions (either for rail-over or rail-under).
- Inclusion of DDA compliant infrastructure, complemented by direct connections, pedestrian crossing points, lighting, wayfinding and public realm improvements.

## 4.5 Overall Assessment and Recommendation

Based on the outcome of the MCA, the preferred option for the Tooronga road level crossing removal is grade separation by raising the rail corridor above Tooronga Road (rail over road). A summary of the MCA is provided below.

**Table 13 – Project options assessment outcome**

| | Project Option 1: Road over rail | Project Option 2: Rail over road |
|---|---|---|
| Movement: more reliable and efficient transport networks | Marginal improvement | Clear improvement |
| Place: Better connected, liveable and thriving communities | No improvement | Clear improvement |
| Safety: Safer communities | Marginal improvement | Clear improvement |
| **Project outcomes** | | |
| Preliminary Estimate *Excl. Escalation* | **$130m - $180m** | **$290m - $340m** |
| Whole of life cost | Average performance | Average performance |
| Opportunities | Average performance | Poor performance |
| Timeframe | Average performance | Average performance |
| Delivery risks | Average performance | Average performance |
| Compliance with design and best practice | Average performance | Average performance |
| Protection of future assets | Strong performance | Strong performance |
| **Project impacts** | | |
| Land acquisition impacts | Poor performance | Strong performance |
| Land use impacts | Poor performance | Poor performance |
| Environmental impacts | Strong performance | Strong performance |
| Temporary impacts | Average performance | Average performance |
| **MCA outcome** | | |
| Recommendation | | **Preferred Option** |

**Project Option 2: Rail Over Road** is the preferred option when compared with to Project Option 1: Road Over Rail option. While Rail Over Road does have a significantly higher cost when compared to the Road Over Rail option, it performs better overall in the multi-criteria assessment undertaken for the options.

The Rail Over Road option is preferred due to the following reasons:

- The Rail Over Road option provides clear improvements to the movement benefit. The Road Over Rail option, however, provides only marginal improvements, as it disrupts existing local road connections and residential property access fronting Tooronga Road. It also creates longer connections for pedestrians accessing the station from the north and for passengers interchanging between bus stops and the station.
- The Rail Over Road option provides clear improvements to the place benefit. The Road Over Rail option, however, provides only marginal improvements, as it disconnects residential areas each side of Tooronga Road and would present adverse Crime Prevention Through Environmental Design (CPTED) issues.

- The Rail Over Road option provides clear improvements to safety with the removal of the level crossing as well three pedestrian crossings and the curved station platforms. The Road Over Rail option, however, maintains the curved station platforms and one of the pedestrian crossings.
- The Rail Over Road option does not require any compulsory land acquisitions or business relocations. The Road Over Rail option, however, requires the compulsory acquisition of five residential properties and one business.
- The Rail Over Road option has a reduced disruption profile, with a sizable proportion of rail station works occurring 'offline'. This results in a reduced occupation of the rail line.
- The Rail Over Road option results in some visual amenity impacts due the elevated rail structure and retaining walls. However, the rail line is separated from adjacent residential properties by a local road (Milton Parade) and there are opportunities to minimise visual intrusion through vegetation planting and architectural finishes.
- The Rail Over Road option has broad stakeholder support (LXRP, MTM, DOT, VicTrack).
- The Rail Over Road option is considered likely to be supported by local businesses and residents due to the overall benefits to the precinct.

## 4.6 Preliminary Cost Estimate

A Preliminary Estimate has been prepared for the Rail Over Road solution, which as stated in Table 10, is between $290 million to $340 million.

The removal of Tooronga Road level crossing together with the Glenferrie Road level crossing presents a significant efficiency opportunity that will reduce these project costs. The efficiencies that can be realised through combined delivery and the associated cost impact are outlined below.

**Table 14 – Efficiencies for combining Glenferrie Road and Tooronga Road level crossing removals**

| Efficiency area | Opportunity | Cost impact |
|---|---|---|
| **Likely Efficiencies** | | |
| **Disruption** | • Avoidance of additional rail occupations otherwise required if Tooronga Road was removed as a subsequent project<br>• Reduced disruption to rail commuters and road users due to reduction of rail occupations and associated replacement buses<br>• Reduced impacts to public open space and local roads used for construction laydown<br>• Minimised construction fatigue for local residents and businesses | 40-60 additional days of rail and road disruptions avoided<br><br>$19 million cost savings |
| **Contractor Project Management** | • Single site establishment<br>• Optimisation of management, communications and support staff resourcing<br>• Reduced Contractor Overheads | $22 million cost savings |
| **Overall Project Management and Administration** | • Reduced Overall Project Management & administration, including single land planning and approvals pathway<br>• Single procurement process for combined projects | $8 million cost savings |
| **TOTAL** | | **$49 million** excl. escalation<br>**$53 million** Incl. escalation |

| Efficiency area | Opportunity | Cost impact |
|---|---|---|
| **Other Potential Efficiencies** *Not included in Estimate, to be determined in next phase of project)* | | |
| **Other** | • Reduced exposure to escalation cost if both projects were delivered concurrently, assuming there would otherwise be significant separation between the delivery of each project<br>• Potential opportunity for cost savings through buying power attributed to the larger quantities of materials required to be delivered at the same time<br>• Potential opportunity to utilise fill from Glenferrie Road rail trench for Tooronga Road bridge embankments | |

With these efficiencies realised, a preliminary estimate of the combined costs for removing Tooronga Road and Glenferrie Road, are outlined below.

**Table 15 – Combined costs for removal of Glenferrie Road and Tooronga Road level crossings**

| Item | Excluding Delivery Efficiency | | Including Delivery Efficiency | |
|---|---|---|---|---|
| | **Glenferrie Road: Rail Under** *Detailed Estimate* | **Tooronga Rd: Rail Over** *Preliminary Estimate Only* | **Likely Delivery Efficiencies** *Preliminary Estimate Only* | **Combined Cost Total** *Preliminary Estimate Only* |
| **Base Construction** *Excl. Risk & Escalation* | **$245m** | **$218m** | **$41m** | **$422m** |
| **TEI Excluding escalation** | | **Low $290m** | | |
| | **$330m** *P50 unescalated* | **Mid $311m** | **$49m** | **Mid $592m** |
| | **$360m** *P90 unescalated* | **High $340m** | **$49m** | **High $651m** |
| **TEI Including escalation** | | | | |
| | **$349m** *P50 escalated* | **Mid $329m** | **$53m** | **Mid $626m** |
| | **$380m** *P90 escalated* | **High $358m** | **$53m** | **High $685m** |

## 4.7 Rapid Economic appraisal

A rapid economic appraisal has been prepared, to consider the combination of removing Tooronga Road and Glenferrie Road level crossings.

The CBA for the combined level crossing removal employed the traffic modelling (VITM data) developed for Glenferrie Road to estimate the requisite benefits for Tooronga Road. As such, the CBA includes standard road and public transport benefits. Reliability benefits for the combined removal were calculated by using the ration of time savings, the station upgrade and other benefits (residential value, safety, emissions) and doubling the benefits, given the similar scope and contexts of the two-level crossings.

The analysis has found that including the Tooronga Road level crossing in the program for Glenferrie Road could increase benefits by approximately 70 percent. The capital costs for the Tooronga Road level crossing removal are estimated to be in a similar range to the Glenferrie Road removal, indicating a BCR (Benefit Cost Ratio) for the combined package of approximately **0.45** assuming a real discount rate of 7 percent. A BCR of each of the shortlisted project options (i.e., Road Over Rail and Rail Over Road) will be included in a business case for the project.

**Table 16 – Comparison of the Glenferrie Road and combined Glenferrie Road and Tooronga Road level crossing removals**

| Core costs and benefits | Glenferrie Road only | Combined Glenferrie Road & Tooronga Road | Difference (%) |
|---|---|---|---|
| **Project benefits (PV at 7% discount rate)** | | | |
| **Road & public transport benefits from VITM** | | | |
| Road travel time savings | $85.1m | $132.7m | 56% |
| Vehicles operating cost (VOC) savings | $25.9m | $41.5m | 60% |
| PT travel time savings and user charges (fares) | $1.8m | $2.5m | 43% |
| **TOTAL BENEFITS ESTIMATED FROM VITM** | $112.7m | $176.7m | 57% |
| **Other benefit estimates (approx.)** | | | |
| Road travel time reliability improvements | $40.1m | $62.6m | 56% |
| Station upgrade amenity benefits | $1.0m | $2.0m | 100% |
| Other benefits (residential value, safety, emissions) | -$1.7m | -$3.4m | 100% |
| **TOTAL OTHER BENEFITS ESTIMATES** | $39.5m | $61.3m | 83% |
| **TOTAL VITIM BASED AND APPROX. OTHER BENEFITS** | $152.2m | $238.0m | 70% |
| **COMBINED COSTS** | $289.5 | $519.5m | 79% |
| **RAPID ECONOMIC ASSESSMENT** | **0.52** | **0.45** | |

# 5 Recommendations and next steps

This feasibility study for Tooronga Road has been prepared simultaneously with the business case for the Glenferrie Road level crossing removal. There is an opportunity for the Tooronga Road business case to be expeditated, with funding and delivery packaged with the level crossing removal at Glenferrie Road.[8]

# 6 Attachments

| Report Title | Date |
|---|---|
| Tooronga Road, Malvern Options Appraisal, Level Crossing Removal Project | September 2020 |
| Tooronga Road Level Crossing Network Planning Requirements, Department of Transport | August 2020 |
| Tooronga Station Network Planning Requirements, Department of Transport | August 2020 |
| Stonnington Council, written submission | December 2020 |

[8] A feasibility study has also been prepared simultaneously for Madden Grove. Potential packaging with Madden Gve would require review given the longer development phase required.

# Glenferrie Road Level Crossing Removal Project

## Business Case

**January 2021**

~~Cabinet in Confidence~~

VICTORIA State Government | Department of Transport

# Table of Contents

## List of acronyms

| Acronym | Definition |
|---|---|
| **ARO** | Accredited Rail Operator |
| **AWP** | Additional Works Package |
| **CAPEX** | Capital expenditure |
| **CHMP** | Cultural Heritage Management Plan |
| **CSR** | Combined services route |
| **DDA** | Disability Discrimination Act |
| **DoT** | Department of Transport |
| **HV** | High voltage |
| **HVHR** | High value high risk (framework) |
| **IDO** | Integrated development opportunity |
| **KPI** | Key Performance Indicator |
| **LXRP** | Level Crossing Removal Project |
| **LV** | Low voltage |
| **MCA** | Multi-criteria assessment |
| **MTIA** | Major Transport Infrastructure Authority |
| **MTM** | Metro Trains Me bourne |
| **MTPFA** | Major Transport Project Facilitation Act |
| **PPSU** | Portfolio Procurement Strategy Update |
| **SCC** | Strategic Cycling Corridor |
| **SRL** | Suburban Rail Loop |
| **TOC** | Target Outturn Cost |
| **VCC** | Value Capture and Creation |
| **VfM** | Value for Money |
| **VITM** | Victorian Integrated Transport Model |
| **VPS** | Voluntary Purchase Scheme |
| **WSUD** | Water sensitive urban design |

## Document Version Control

| Version | Date | Status |
|---|---|---|
| **DRAFT** | 22-Jan-2021 | |
| **FINAL v1** | 27-Jan-2021 | |
| **FINAL v2** | 4-Jun-2021 | Incl. minor edits & signoffs for submission to Commonwealth |

# Executive Summary

## Summary

This Business Case is for Glenferrie Road level crossing removal project, and seeks:

- **$380 million** of capital funding for removal of the Glenferrie Road level crossing; and
- **$3.5 million** of capital funding for an optional value creation enhancement, to improve a nearby pedestrian underpass.

Key features of the Glenferrie Road level crossing removal include:

- Grade separation of the level crossing and tram square at Glenferrie Road, Kooyong, using a rail under road solution (rail trench with new road bridge);
- New Kooyong Station; and
- Improved interchange between Glen Waverley Line trains and Route 16 trams.

## Problems and benefits

The problems identified in the investment logic for the project are outlined below.

**Table E1 – Problem summary**

| Problem | Description |
|---|---|
| **Problem 1: Movement**<br>Conflicting demands of rail and road-based transport at the level crossing reduces transport reliability and efficiency | • Boom gates are closed for almost half of the morning peak hour, resulting in delays and unreliable journey times for vehicles, trams and cyclists.<br>• The tram square arrangement causes disruptions, resulting in regular faults and incidents.<br>• The performance of trains and trams is restricted, reducing the efficiency of the overall public transport network. |
| **Problem 2: Place**<br>Excessive boom gate closures cause community severance and reduce local amenity | • The level crossing forms a significant barrier for north-south movement within Kooyong and between nearby neighbourhoods.<br>• Access to local shops and services, schools and open space is restricted.<br>• Interchange facilities between train and tram services are restricted.<br>• Traffic congestion is eroding local amenity. |
| **Problem 3: Safety**<br>Motor vehicle driver, cyclist and pedestrian frustration at level crossing delays invites risk-taking behaviour | • Congestion arising from boom gate closures results in risk-taking behaviour.<br>• The level crossing has a history of near misses and accidents that have caused serious injuries. |

Removal of the Glenferrie Road level crossing will provide the following benefits:

- **Benefit 1 (Movement)** – Improved travel times and reliability for road-based transport on Glenferrie Road. Reduced delay for cyclists, providing better access to other cycling corridors. Improved network resilience for trains and trams.
- **Benefit 2 (Place)** – Reduced delay for pedestrians, thereby improving accessibility to the adjacent precinct, schools, and other community facilities. Improved intermodal connectivity between trains and trams. Improved public realm.
- **Benefit 3 (Safety)** – Elimination of the risk of accidents and incidents between trains and road users, and less risk-taking behaviour by drivers and pedestrians.

## Project options assessment

Project options were identified, with a multi-criteria analysis that assesses the costs, benefits, impacts and risks for each project option as summarised below.

**Table E2 – Project options assessment outcome**

| | Project Option 0: Base case | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Description | No investment | Rail cutting with new road bridge and a new Kooyong Station | Rail overpass and a new Kooyong Station |
| **Alignment with project benefits** | | | |
| Movement: more reliable and efficient transport networks | No improvement | Clear Improvement | Clear Improvement |
| Place: Better connected, liveable and thriving communities | No improvement | Clear Improvement | Marginal Improvement |
| Safety: Safer communities | No improvement | Clear Improvement | Clear Improvement |
| **Project outcomes** | | | |
| Preliminary Cost Estimate excl. escalation | - | $320m - $370m | $340m - $390m |
| Rapid BCR (based on preliminary estimate) | | **0.45 - 0.52** | **0.43 – 0.49** |
| **TEI Detailed Cost Estimate** (P90) | - | **$360m** excl. escalation<br>**$380m** incl. escalation | - |
| Whole of life cost | - | Average Performance | Average Performance |
| Opportunities | - | Strong Performance | Average Performance |
| Timeframe | - | Average Performance | Average Performance |
| Delivery risks | - | Average Performance | Poor Performance |
| Compliance with design and best practice | - | Average Performance | Average Performance |
| Protection of future assets | - | Average Performance | Strong Performance |
| **Project impacts** | | | |
| Land acquisition impacts | - | Strong Performance | Average Performance |
| Land use impacts | - | Strong Performance | Average Performance |
| Environmental impacts | - | Average Performance | Average Performance |
| Temporary impacts | - | Average Performance | Poor Performance |
| **MCA outcome** | | | |
| Recommendation | **Not acceptable** | **Preferred Option** | **Acceptable alternative** |

## Recommendation

**Project Option 1 (rail under road)** is the preferred solution. Project Option 3 (rail over road) is considered an acceptable alternative, with similar benefits. However, there are marginally lower costs and impacts for the rail under option, and on balance this option performs better for the following reasons:

- The rail under option will provide greater place benefits
- No compulsory land acquisition or business relocation is required to deliver the rail under option.
- The rail under option has less overall disruption to rail users, with a shorter major rail occupation duration.
- The rail under option has less impact on vegetation removal at the western end of the works.
- The rail under option has a slightly lower capital cost than the rail over option.

It is noted that the Australian Government has committed $260m for a Rail Under Road solution at this site. Project Option 1 (Rail Under Road) would align with this commitment, however it has a Total Estimated Cost that is higher that the Australian Government commitment.

## Detailed Economic Appraisal

A rapid cost-benefit analysis has been undertaken on all project options, with a detailed cost-benefit analysis prepared only for the preferred rail under road option, to inform the investment decision.

The core benefits include travel time savings, reduced vehicle operating costs, road travel reliability benefits, public transport user benefits, and avoided collisions.

In accordance with other major transport investments being undertaken by the Australian Government, the appraisal uses the standard discount rate of 7 per cent (real). However, in recognition of current market rates and the impact of COVID on the economy, a discount rate of 4 per cent is also presented for comparison.

**Table E3 – Economic Appraisal**

| Item | PV (7%) $m | PV (4%) $m |
|---|---|---|
| PV Total Benefits PV | $152.2 | $288.8 |
| PV Cost (P50) | $289.5 | $308.9 |
| **NPV** | -$137.3 | -$20.1 |
| **BCR** | **0.52** | **0.93** |

The Benefit Cost Ratio (BCR) has been calculated using a standard appraisal methodology, which excludes other significant benefits that this project can be expected to deliver, including:

- Improved network resilience to incidents (eg. tram square faults at the level crossing, causing impacts on the rail line and wider road network);
- Local precinct amenity and accessibility benefits; and
- Benefits for emergency services.

Recognising the unique benefits of level crossing removal projects, a further sensitivity assessment has been undertaken that includes local precinct amenity & accessibility benefits. This is based on the expected increase in nearby land value resulting from the project, representing increased willingness to pay for enhanced local amenity and accessibility. These benefits have been estimated based on controlled observation of increases in land value that have occurred at other nearby recent level crossing removals. Using a discount rate of 7 per cent (real), the BCR including local precinct amenity & accessibility benefits is estimated to be between **0.75** and **1.29.**

## Delivery

The Project will be managed by the Major Transport Infrastructure Authority - Level Crossing Removal Project (MTIA-LXRP), with the Victorian Department of Transport (DoT) as the Asset Manager.

The procurement approach will follow the *Portfolio Procurement Strategy Update (PPSU)* endorsed by the Victorian Cabinet in February 2019. MTIA-LXRP will follow its established processes to allocate, assess and award the Glenferrie Road Level Crossing Removal as an Additional Works Package under a Program Alliance.

## Key risks and opportunities

Key risks identified for the project, along with management strategies, are identified below.

**Table E4 – Key project risks**

| Key risk | Management |
|---|---|
| Signalling arrangement design yet to be finalised | Engage with Accredited Rail Operator to ensure signalling works are consistent with its Safety Management System |
| Final stakeholder approval for tram stop upgrade design | Ongoing work with Yarra Trams and Victorian Department of Transport to finalise tram stop arrangement |

## Tooronga Road Opportunity

There is a significant opportunity to realise a delivery efficiency, by having concurrent removal of the nearby Tooronga Road level crossing together with the Glenferrie Road level crossing.

A preliminary assessment of the Tooronga Road level crossing has found that a rail over road solution would be the preferred option at this site, with a preliminary estimate of approximately $358 million.

However, there are a number of delivery efficiencies that could be achieve if the Tooronga Road level crossing is removed concurrently with Glenferrie Road. The preliminary cost for combined delivery of Glenferrie Road and Tooronga Road level crossings would be approximately $685 million, representing a cost saving of approximately $53m, compared to independent removal of these sites. In addition, there are other benefits to be realised, such as reduced commuter and community disruption.

To realise this efficiency would require development of the Tooronga Road level crossing removal and an update to this Business Case.

.

## Timeline and milestones

The below table outlines the estimated timing for key project milestones for the Glenferrie Road level crossing removal (and Tooronga Road level crossing should it be included). These dates are based on full funding being provided in the 2021-22 Federal Budget.

**Table E5 – Glenferrie Road Project schedule key milestones**

| Key milestones | Timing |
|---|---|
| Project award | Late 2021 |
| Planning and environmental approvals | Early 2022 |
| **Commence construction** | **Early 2022** |
| **Works completion** | **Early 2024** |

## Budget

This project seeks the following asset funding and operational funding over the forward estimates, starting in 2021-22. The proposed funding is based on a conventional assessment of risk and escalation.

**Table E6 – Funding**

| | Description | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 2024-25 | Total |
|---|---|---|---|---|---|---|---|
| **Glenferrie Road Level Crossing Removal** | Capital costs | $8m | $75m | $165m | $131m | - | **$380m** |
| | Less Existing funding | $8m | | | | | $8m |
| | **Net capital funding required (Australian Govt)** | - | $75m | $165m | $131m | | **$372m** |
| **Value Creation option** (Pedestrian Underpass Enhancement) | **Net capital funding required (Australian Govt)** | | - | - | **$3.5m** | | **$3.5m** |

The operational costs are not included in this submission and will be managed separately as part of the normal recurrent Victorian budget funding processes for the rail network.

A preliminary estimate of the ongoing operation of the new station and level crossing removal is approximately **$221,000** per annum. As part of the next steps for the project, a review of these costs will be required, taking into account savings from removal of the tram square.

## Next steps

Once funding for this business case is confirmed, the immediate next steps will be:

- Refine and further develop the project solution design, including further engagement with key stakeholders and the community on the design solution
- Obtain permits and approvals.
- Commence procurement and construction.
- Subject to Australian Government advice, update the Business Case to include the Tooronga Road level crossing removal and commence further development activities for the Tooronga Road site.

# Part 1: Investment Case

VICTORIA State Government | Department of Transport

# 1 Problem Definition

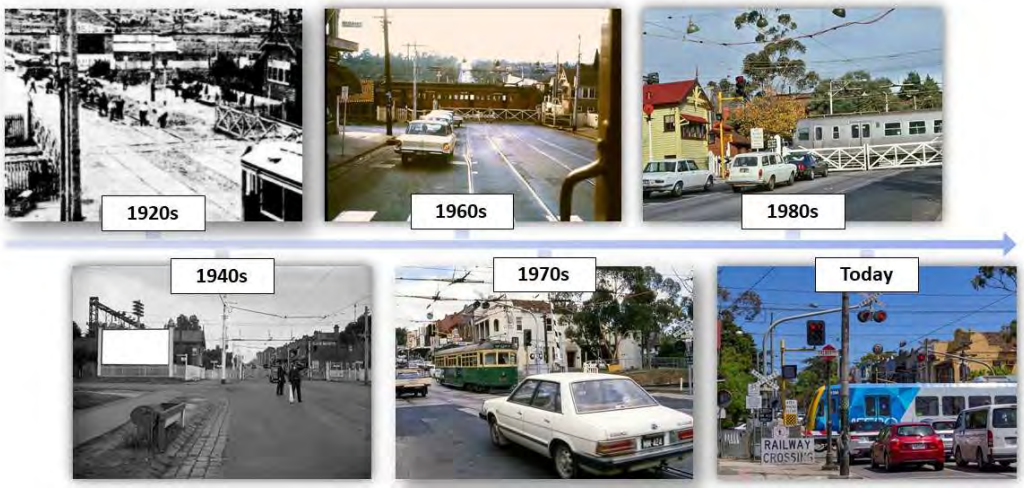
## 1.1 Background

The Glenferrie Road level crossing is located in Kooyong, approximately eight kilometres from the central business district in Melbourne's south-eastern suburbs. It is an at-grade intersection between the Glen Waverley train line and Glenferrie Road, including the Route 16 tram. The level crossing is immediately adjacent to Kooyong rail station.

**Figure 1 – Glenferrie Road level crossing context maps**


The level crossing is characterised by its 'tram square': one of only three currently remaining on the Melbourne metropolitan network that date back to the early 1900s.[1] Tram squares, named for the pattern made by crossing tracks, are points at which train and tram lines intersect. They involve the manual switching of power supply between modes to enable trains and trams to pass. The operation requires trains to pass through at very slow speeds, resulting in long boom gate closures. This out-dated and now unique arrangement is also prone to failure, which can cause significant delays for both trains and trams.

**Figure 2 – Glenferrie Road tram square retains its original design, and is a legacy of Melbourne's past**




The Glen Waverley Line is an electrified suburban rail line carrying 142 train services per day. Glenferrie Road is an important arterial road that carries 16,000 vehicles per day and runs seven kilometres between Kew and Caulfield. The road intersects with a number of east-west arterials but does not interchange with the nearby Monash Freeway. Glenferrie Road also carries Route 16 trams, which has 209 services per day connecting Melbourne University to Kew.

[1] There is a tram square at Riversdale Road, Camberwell, another tram square at Glen Huntly Road, which has been committed to be removed.

The level crossing is in close proximity to local residential areas north and south of the rail corridor, the Kooyong Neighbourhood Activity Centre, nearby schools and other institutions, including the Kooyong Lawn Tennis Club and Vision Australia headquarters.

## 1.2 Problem summary

The project's Investment Logic Map (ILM) (refer to Appendix B) identifies three primary problems regarding the level crossing at Glenferrie Road. Table 1 provides a summary of the problems and supporting evidence.

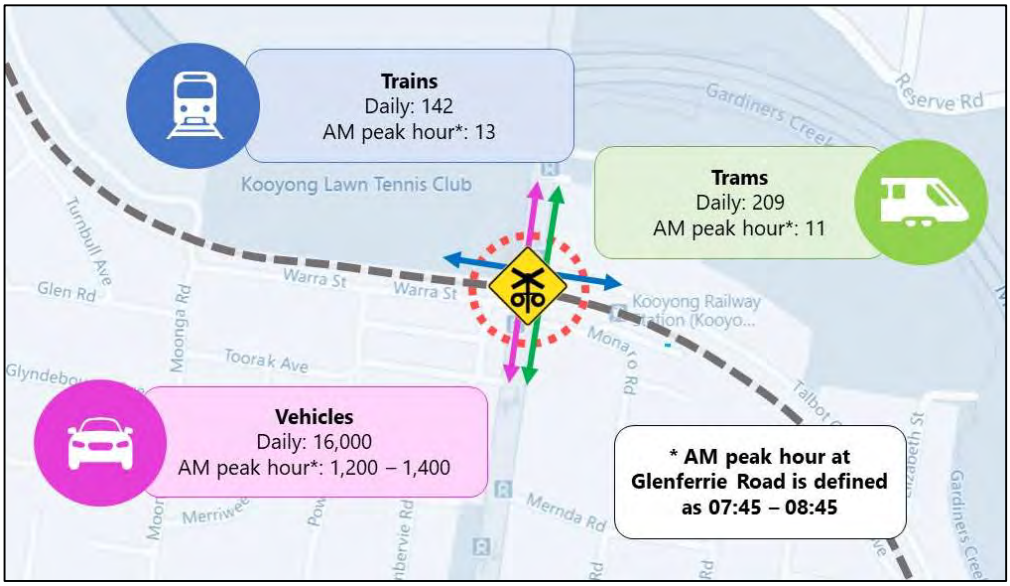
**Table 1 – Problem evidence summary**

| Problem | Summary Description | Evidence |
|---|---|---|
| **Problem 1: Movement**<br>**Conflicting demands of rail and road-based transport at the level crossing reduces transport reliability and efficiency** | Boom gate closures at the Glenferrie Road level crossing form a major impediment to travel in Melbourne's south-eastern suburbs.<br>Delays and travel time unreliability impact significant volumes of traffic using the arterial road.<br>The performance of trains and trams is restricted, reducing the overall efficiency of the public transport network. | • Boom gates that are closed for almost half of the morning peak hour result in delays to vehicles, trams and cyclists<br>• The tram square arrangement causes variable boom gate closure durations and unpredictable journey times<br>• Regular faults and incidents at the level crossing hinder network efficiency |
| **Problem 2: Place**<br>**Excessive boom gate closures cause community severance and reduce local amenity** | The Glenferrie Road level crossing creates a significant barrier for north-south movements within Kooyong and between nearby residential neighbourhoods.<br>Access to local shops, Kooyong Station, schools, open space and other important community facilities is impacted.<br>Traffic congestion at the level crossing further erodes local amenity. | • The rail corridor severs Kooyong, dividing neighbourhoods to the north and south<br>• Poor interchange facilities between trains and trams limits accessibility |
| **Problem 3: Safety**<br>**Motor vehicle driver, cyclist and pedestrian frustration at level crossing delays invites risk-taking behaviour** | Longer wait times at level crossings compromise the safety of motorists, cyclists and pedestrians through risk-taking behaviour.<br>As one of Melbourne's last remaining tram squares, the level crossing results in a unique conflict between modes.<br>The presence of the level crossing has and will continue to result in a number of safety incidents and near misses. | • Congestion at the level crossing encourages risk-taking behaviour<br>• The level crossing has a history of near miss incidents and accidents causing injuries and serious injuries |

## 1.3 Problem 1: Conflicting demands of rail and road-based transport at the level crossing reduces transport reliability and efficiency

The Glenferrie Road level crossing provides a major impediment to travel in Melbourne's south-eastern suburbs. Boom gates are closed for almost half of the weekday morning peak hour, which is defined as 7:45am to 08:45am. The variability in the length of individual boom gate closures during the morning peak hour significantly impacts travel time reliability along the designated arterial road. The level crossing is one of Melbourne's last remaining 'tram squares': a hotspot for tram failures that regularly block trains, suspending entire parts of the Glen Waverley Line and the Route 16 tram. Similarly, trains may experience faults causing boom gates to remain down unnecessarily, resulting in excessive delays to trams and traffic.

**Figure 3 – Average daily and peak hour volumes through the Glenferrie Road level crossing**[2]




### 1.3.1 Boom gates that are closed for almost half of the morning peak hour result in delays to vehicles, trams and cyclists

There are 142 train services that cross Glenferrie Road every day, resulting in frequent boom gate closures. The 16,000 daily vehicle movements through this part of Glenferrie Road face significant delays due to the level crossing, regularly bringing traffic to a standstill. These frequent and unpredictable boom gate closures form a major impediment to a significant number of vehicles and trams using Glenferrie Road.

Boom gate closures were surveyed across three consecutive weekdays in July 2020, at which time Glen Waverley Line services were running on a typical weekday timetable. Across these days there were between 9 and 14 boom gate closure events during the morning peak hour (7:45-8:45am), where total boom gate downtime was between 25:42 and 28:16, or **43 and 47 percent** of the peak hour.[3] Boom gate closures are measured as the period when boom gate lights start and finish flashing, although in reality traffic is stopped even longer due to traffic signals at the crossing being triggered prior to boom gate activation.

Meaningful observations of typical 2020 queue lengths were not possible due to COVID-19 restrictions. Modelling for the 2018 base year shows that queues of over 600 metres for northbound traffic and over 200 metres for southbound traffic are experienced at the level crossing in the morning peak hour (see Table 2)[4] The same modelling shows that queue lengths can be expected to

[2] AGJV October 2020, Glenferrie Road Demand Modelling Valida ion and Forecast Report, Glen Waverley Line timetable (07:45-08:45am), Route 16 timetable (07:45-08:45am).
[3] Austraffic 2020, Glenferrie Road corridor survey – 28 July 2020.
[4] AGJV October 2020. Glenferrie Road Microsimulation Modelling Report.

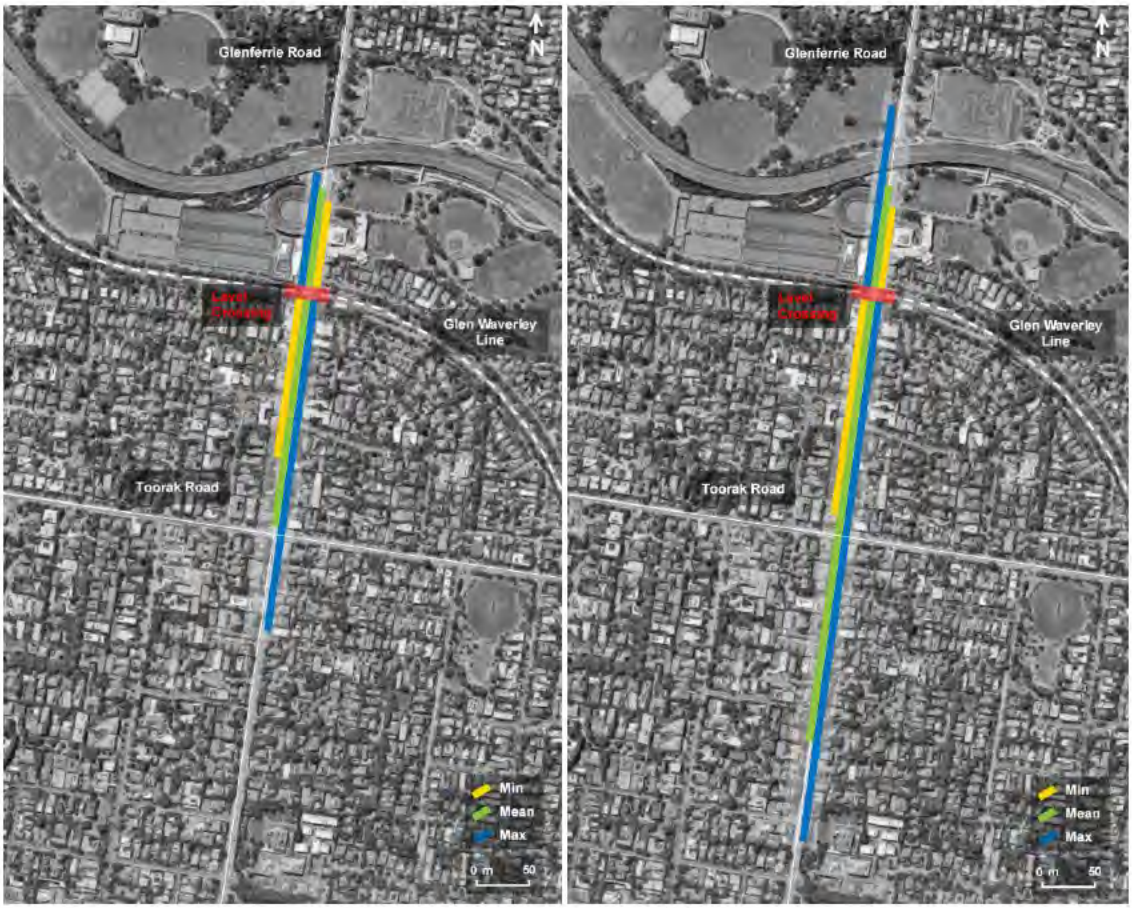
significantly worsen in 2026, especially for northbound traffic, with queues regularly extending past Toorak Road (see Figure 4). When boom gate closures occur close together during periods of high traffic demand, vehicle queues at the level crossing are unable to clear and grow in length.

Trams are subject to the same delays as they do not receive on-road priority along Glenferrie Road and have to share lanes with general traffic. Glenferrie Road is also designated as a Strategic Cycling Corridor (SCC), and links to the nearby cycling corridors on Toorak Road and Gardiner's Creek Trail. Cyclists are also forced to wait amongst trams and motor vehicles in queues at the boom gates.

**Table 2 – Modelled morning peak hour (07:45-08:45) queue lengths for 2018 (base year) and 2026 (future year)**

| Scenario | 2018 queue length (m) | 2026 queue length (m) |
|---|---|---|
| **Northbound** | | |
| Minimum | 308 | 416 |
| Average | 441 | 853 |
| Maximum | 641 | 1043 |
| **Southbound** | | |
| Minimum | 167 | 158 |
| Average | 189 | 197 |
| Maximum | 218 | 349 |

**Figure 4 – Queuing at level crossing along Glenferrie Road for 2018 (left) and 2026 (right)**



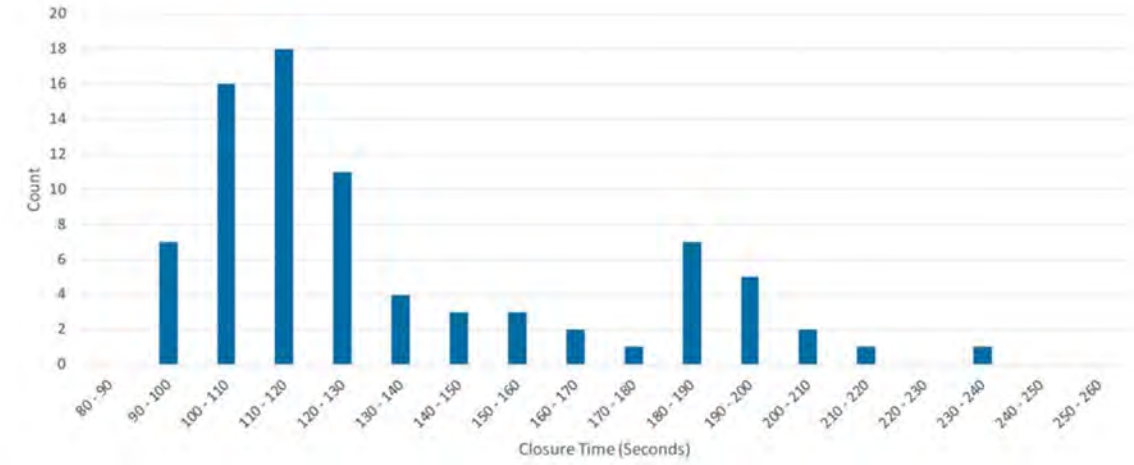
### 1.3.2 The tram square arrangement causes variable boom gate closure durations and unpredictable journey times

The level crossing configuration is distinctive in that it features one of the last remaining 'tram squares' in Melbourne. The complex interlocking systems requires the switching of power between trains and trams, which require 1500 volts and 600 volts respectively. The tram square also necessitates train and tram signals and boom gates operated through a series of old-fashioned levers that were introduced at the beginning of last century. This arrangement is inefficient, unreliable and a major constraint to the significant number of trains, trams, vehicles and cyclists that use the level crossing every day.

**Figure 5 – Glenferrie Road tram square, with trains and trams crossing paths**


The manual operation of the tram square means that the duration of boom gate closures vary significantly, resulting in unpredictable travel times for road-based transport on Glenferrie Road. Boom gate closure variability is also caused by timetable patterns, late running trains and inconsistent dwell times at stations. Figure 6 shows the variability of boom gate closures at Glenferrie Road during the AM two-hour peak period (7am to 9am).[5] Significant variances in boom gate closure intervals and durations are common in both directions, especially during peak periods when boarding and alighting at Kooyong and Heyington are highest.

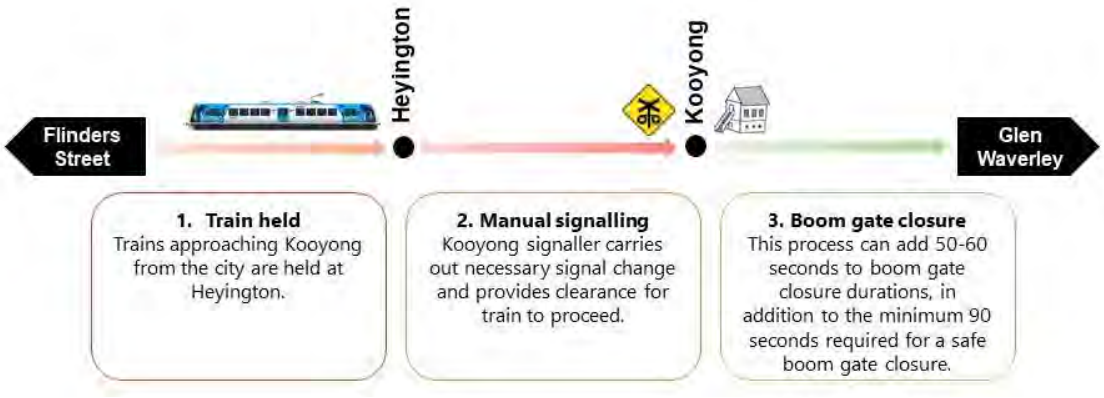
**Figure 6 – Surveyed boom gate closure times at Glenferrie Road level crossing for the 2-hour AM peak period (7am-9am)[6]**




[5] LXRP, 2020. Boom gate closure predictor model outputs
[6] AGJV October 2020. Glenferrie Road Demand Modelling Valida ion and Forecast Report.

An example of how the manual level crossing signalling arrangement leads to lengthy and variable delays can be found in the process involved for trains approaching the station during the weekday morning peak, which requires train drivers to coordinate with the Kooyong signaller positioned at the signal box adjacent to the level crossing. [7] The process involved is demonstrated by Figure 7.

**Figure 7 – Example of manual level crossing signalling process and impact on boom gate closure durations**

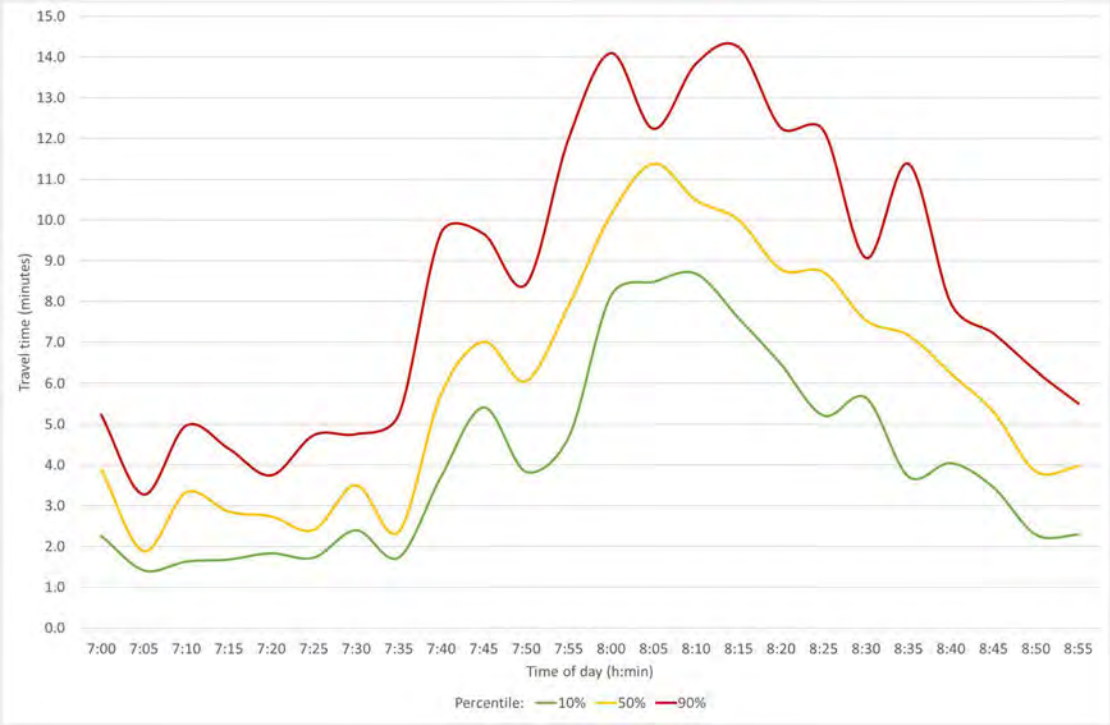



Other issues, such as station crowding, regularly arise and cause the train driver to remain at Heyington Station for longer periods after the boom gate closure at Glenferrie Road has been initiated, further extending delays. A permanent speed restriction of 30km per hour is in place through the tram square, which lengthens journey times and impacts broader network efficiency for approximately 20,000 passengers who travel through Kooyong Station aboard Glen Waverley Line trains every day.[8]

The cumulative effect of variable boom gate closures is causing highly unpredictable travel times for vehicles and trams. Travel time data for Glenferrie Road collected in 2019 using Bluetooth technology confirms that between Toorak Road and Callantina Road, a 1.2 kilometre section, the average travel time varies between 2.5 minutes and 10.5 minutes, based on the average (50$^{th}$ percentile) travel time across the mid-week AM two-hour peak period (see Figure 8). During the AM two-hour peak period, the difference between a “good and bad run” (10$^{th}$ and 90$^{th}$ percentile) along this section of Glenferrie Road can add around seven minutes to your journey time, with some total travel times exceeding 15 minutes.

[7] Metro Trains Melbourne, 2020.
[8] Department of Transport, 2020, Kooyong Station train load data for 2019.

**Figure 8 – Mid-week travel time (various percentiles) on Glenferrie Road between Toorak Road and Callantina Road (northbound)**




### 1.3.3 Regular faults and incidents at the level crossing hinder network efficiency

In instances where trams become defective across the rail corridor they can block train paths until they are cleared. Similarly, trains may experience faults causing boom gates to remain down for periods of 20 minutes or longer, impacting trams and road-based traffic. Consequently, entire parts of the Glen Waverley Line and Route 16 tram are often suspended, causing rolling delays across the entire public transport network.

Operational issues at the tram square are not uncommon and often stem from the uneven track surface or the switching of overhead power supply. These disruptions to both train and tram services can be significant, with long service recovery times. Incidents at the level crossing and the resulting delay between October 2019 and October 2020 are outlined below:

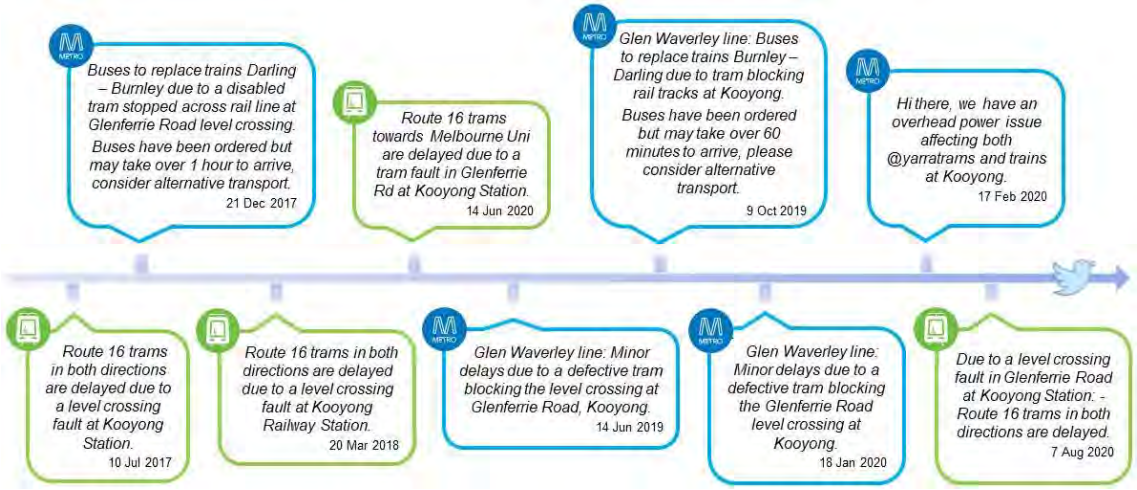
- **October 2019:** train fault (23 minute delay)
- **January 2020**: issue with a power insulator at the tram square resulting in rolling delays to Route 16 tram services across a 10-hour period
- **March 2020**: boom gate failure in March 2020 resulting in a tram that had become defective at the level crossing not moving (60 minute delay)
- **April 2020:** tram infrastructure lodged in overhead power lines at the tram square (6 minute delay)
- **June 2020:** traffic signal fault at the tram square (11 minute delay)
- **September 2020:** tram signal defect resulting (11 minute delay).[9]

During these incidents, entire sections of the Glen Waverley Line can also be delayed or suspended for long periods. Replacement bus services are often required, which have long lead in times and mean train passengers are stranded. Customer service announcements made on Twitter by Metro Trains Melbourne and Yarra Trams during the last three years, a sample of which are shown in Figure

[9] Yarra Trams, 2020, Route 16 Incidents Reported and Delays Recorded at Glenferrie Road, Kooyong.

9, indicate that significant disruptions are frequently experienced at the Glenferrie Road level crossing.

**Figure 9 – Customer service announcements regarding disruptions at the Glenferrie Road tram square [10]**




## 1.4 Problem 2: Excessive boom gate closures cause community severance and reduce local amenity

Boom gate closures at the level crossing form a significant barrier for north-south movement within Kooyong and the surrounding area, with access to local shops, schools, open space and other important community facilities impacted. Delays at the level crossing also increase traffic congestion, which further erodes local amenity.

### 1.4.1 The rail corridor severs Kooyong, dividing neighbourhoods to the north and south

The rail corridor dissects Kooyong and restricts access for pedestrians, cyclists and local traffic, with the level crossing the primary point at which the rail corridor can be crossed. The nearest alternative crossings are:

- A pedestrian and road underpass 400m to the west at Moonga Road, which only provides access to St. Kevin's College and the Kooyong Lawn Tennis Club,
- A pedestrian underpass 400 metres to the east that connects local streets.

The proximity of schools and the connection to the Route 16 tram, which provides access to employment further north or south, generates significant pedestrian flows. This includes those walking to and from the station, and along Glenferrie Road to access shops and other important community facilities. Due to the timing of surveys at the level crossing occurring during COVID-19, movement restrictions and typical pedestrian volumes could not be recorded.

The variable boom gate closures and traffic disruptions at the level crossing, described in Section 1.3, further exacerbate community severance.

The lack of alternative road crossing points also creates issues during incidents. For example, students travelling to Scotch College from the south, or St Kevin's College from the north, face considerable delays and lengthy detours when defective trams, boom gate failures or other incidents close the level crossing for long periods. During disruptions, school drop offs have to be re-routed via Toorak Road, Auburn Road and Riversdale Road, adding approximately four kilometres to the journey.

[10] Metro Trains Melbourne and Yarra Trams, 2017 – 2020, Customer service announcements via Twitter.com

Local amenity is impacted by this constraint to north-south movement. Neighbourhoods to the north of the level crossing have restricted access to the Kooyong Neighbourhood Activity Centre, St. Kevin's College and shops and services on Toorak Road. Neighbourhoods to the south are separated from open space (Sir Zelman Cowan Park), Scotch College and shops and services further north on Glenferrie Road. The level crossing also limits access to the Kooyong Lawn Tennis Club and Vision Australia headquarters, which offers a library and support services to those with vision impairments who may live beyond the local area.

**Figure 10 – Glenferrie Road level crossing surrounding area and key land uses**


### 1.4.2 Poor interchange facilities between trains and trams limits accessibility

Intermodal transfers between trains and trams at Kooyong are challenging and not representative of interchange facilities seen on contemporary public transport systems.

On a normal weekday, approximately 1,100 passengers board or alight trains at Kooyong station. [11] Northbound and southbound tram stops are located on opposite sides of Glenferrie Road, and are separated from station platforms by Glenferrie Road, Talbot Crescent and the level crossing (see Figure 11). At Kooyong station, 11 percent of train passengers boarding or alighting will transfer to tram services on Glenferrie Road. [12]

Depending on their direction of travel, transferring passengers may be held at the pedestrian gates during boom gate closures. For example, city-bound passengers accessing Kooyong Station from the tram stop to the north of the level crossing may miss their connection due to boom gate closures.

The kerb-side type tram stops currently used on Glenferrie Road are being phased out across Melbourne's tram network, as safety issues have been flagged with their design and they are not accessible for people who are movement impaired. It is understood that visitors to Vision Australia will often use the tram stops at Kooyong Station and access the facilities via the Talbot Crescent entrance, rather than use the tram stops further north of Kooyong Station directly outside Vision Australia's main entrance.

Platforms at Kooyong Station also do not meet current network requirements, as they are located on a track curve, which increases the gap between the train and the platform. These arrangements are

[11] Department of Transport, 2020, Kooyong Sta ion loads for May 2018 and May 2019.
[12] Level Crossing Removal Project, 2020, Project Urban Design Assessment for Glenferrie Road, Kooyong.

not compliant with the Disability Standards for Accessible Public Transport (DSAPT), which are legislated under the national Disability Discrimination Act 1992.

The poor interchange between train and trams also requires passengers to cross at least one road for most transfers. [13] Examples of these transfers include:

- **North bound tram to city bound train:** passengers must cross Glenferrie Road using the at-grade pedestrian crossing.
- **South bound tram to city bound train**: passengers must cross Talbot Crescent and the level crossing (with possible delays due to boom gate closures).
- **North bound tram to Glen Waverley bound train:** passengers must cross Glenferrie Road using the at-grade pedestrian crossing and also the level crossing (with possible delays due to boom gate closures).
- **South bound tram to Glen Waverley bound train:** passengers must cross Talbot Crescent.

These transfers result in compromised safety when passengers rush to catch the connecting service, especially when it involves illegally crossing Glenferrie Road, either against traffic signals or by jaywalking, or rushing to beat boom gate closures.

**Figure 11 – Level crossing pedestrian environment showing separation of trams stops and train platforms**


[13] Only one interchange that does not require passengers to cross a road is between southbound trams and Glen Waverley bound train.

## 1.5 Problem 3: Motor vehicle driver, cyclist and pedestrian frustration at level crossing delays invites risk-taking behaviour

Delays at the Glenferrie Road level crossing compromise the safety of motorists, cyclists and pedestrians. As one of Melbourne's last remaining tram squares, it results in a unique conflict between public transport modes. The presence of the level crossing has and will continue to cause a number of safety incidents and near misses.

### 1.5.1 Congestion at the level crossing encourages risk-taking behaviour

The Australian Level Crossing Assessment Model (ALCAM) score measures level crossing safety risk as a relative measure, to allow jurisdictions to prioritise safety treatments. The Glenferrie Road level crossing has lower train speeds of 30km/h, which is a factor that reduces the ALCAM score compared to other sites that have higher train speeds. However, factors which increase risk include congestion around the level crossing, which is exacerbated by the variability of boom gate closure durations at Glenferrie Road.

For many level crossing sites across the network, boom gate closures and the resulting queues and congestion are a source of driver and pedestrian frustration, with long wait times found to encourage risk taking behaviour for motorists, pedestrians and cyclists.[14] Such frustration results in a range of violations, including:

- Motorists, cyclists and pedestrians entering the level crossing while the flashing lights are active, but the boom gates are still lowering or rising
- Motorists becoming stationary on the crossing and then reversing back into traffic when the boom gates are activated to avoid being stuck on the crossing
- Cyclists and pedestrians traversing the crossing when flashing lights are activated and boom gates are down

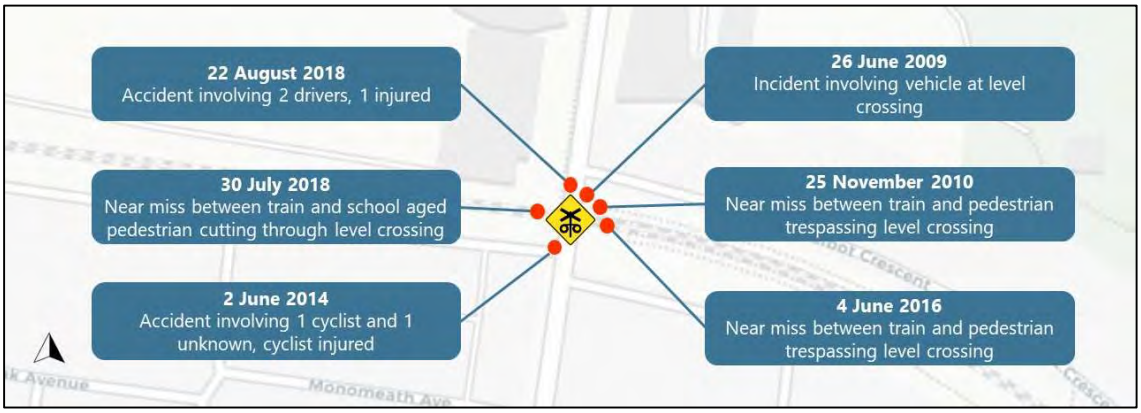
Such risk-taking is expected to occur at sites of higher congestion and boom gate variability, such as the Glenferrie Road level crossing, where single instances of boom gate closures can last anywhere between 90 and 240 seconds.

### 1.5.2 The level crossing has a history of near miss incidents and accidents causing injuries and serious injuries

There have been a number of road accidents on Glenferrie Road at or very close to the level crossing (within 20 metres). Accidents and near misses since 2009 are shown in Figure 12. These incidents include three near misses between trains and pedestrians, one of which involved a student.[15] Pedestrians passing through level crossings will often rush across the rail corridor to 'beat the train' upon activation of warning signals. Some will even enter the rail corridor illegally when the level crossing is in operation in order to catch an approaching train.

[14] City of Stonnington 2020, Response to councillor pe ition for level crossing removal.
[15] Office of he National Rail Safety Regulator 2020, *Department of Transport Network Planning Incident Data*.

**Figure 12 – Accidents and near misses within 20 metres of Glenferrie Road level crossing [16]**




## 1.6 Timing considerations

If funding in the 2021-22 budget is not provided, the problems identified will continue, and may become worse in the medium to longer term, especially since:

- Projections from the Victoria's Department of Transport indicates that the SARS-CoV-2 (COVID-19) pandemic is expected to result in increased private motor vehicle use in the short to medium term due to the community's reluctance to travel on public transport, with journeys spread across the day. [17] This means that variable travel times through the level crossing will continue, both within and outside peak periods, and journeys will remain unpredictable across the day.
- Future service uplifts on the Glen Waverley Line (i.e. to 12 trains per hour) will increase the frequency and duration of boom gate closures whilst the existing level crossing remains in place.
- Future service uplifts and other operational changes on the tram network, including the introduction of longer trams and creation of a trunk route on Glenferrie Road, will continue to be constrained by the poor performance that result from the tram square arrangement, including regular defections.

## 1.7 Consideration of interfaces and broader context

A number of significant road and rail projects are underway or planned that may influence movements through the level crossing. Key projects considered are discussed in Table 3.

**Table 3 – Key projects relevant to the Glenferrie Road level crossing removal**

| Key project | Description | Relationship with Glenferrie Road level crossing |
|---|---|---|
| **Level Crossing Removal Project – 75 level crossing removals in metropolitan Melbourne** | • The Victorian Government's Level Crossing Removal Project has committed to removing 75 level crossings across Melbourne by 2025.<br>• The program is also providing upgrades to rail infrastructure, including stations, stabling yards, tracks and signalling. | In 2018 the Victorian Government prepared the *Prioritising Future Level Crossing Removals: Site Prioritisation Framework*.<br>This framework was used to determine the preferred program for an additional 25 level crossing removals.<br>Glenferrie Road, Tooronga Road and Madden Grove were just outside of the High Need[18] sites identified under the framework, and were not |

[16] Office of the National Rail Safety Regulator 2020, Department of Transport Network Planning Incident Data, and VicRoads 2020, *Interactive Crashstats 2014-2019,* viewed 1 September 2020, < https://www.vicroads.vic.gov.au/safety-and-road-rules/safety-statistics/crash-sta istics> (indicative locations)

[17] Department of Transport, September 2020. COVID-19 impacts on demand forecasts.

[18] 'High need' sites are hose with over 4000 vehicles per day and over 10 trains per hour.

| Key project | Description | Relationship with Glenferrie Road level crossing |
|---|---|---|
| | | included in the selected program of 25 additional crossing removals.<br>This business case has been prepared independently from the Site Prioritisation Framework.<br>It is likely that Glenferrie Road, Tooronga Road and Madden Grove would all be strong candidates in any future work utilising the Site Prioritisation Framework. |
| **Project planning for level crossings removals at Madden Road and Tooronga Road** | • Feasibility studies have been prepared for level crossing removals Tooronga Road and Madden Grove on the Glen Waverley Line. | Feas bility studies for the Tooronga Road and Madden Grove level crossings have being prepared simultaneously with this business case. There is the opportunity for the Tooronga Road level crossing removal to be included, packaged for funding and delivery with the level crossing removal at Glenferrie Road. This would require this Business Case to be updated to incorporate both Glenferrie Road and Tooronga Road.<br>The Madden Grove level crossing presents has complex constraints that requires a longer development phase. However, removal of the level crossing could be programmed such that disruptions on the Glen Waverley Line are minimised. |
| **Land use changes and local planning** | • The City of Stonnington is preparing a draft planning framework for the Kooyong Neighbourhood Activity Centre (NAC), which is immediately adjacent to the level crossing. | Removal of the level crossing would improve access to the NAC and contribute to improvements of the public realm and pedestrian environment. |
| **Future Rail Network** | • Reconfiguration of Melbourne's rail network to create greater capacity, reliability and cross city journeys.<br>• 90-kilometre Suburban Rail Loop (SRL) linking every major rail line from the Frankston Line to the Werribee Line, via Melbourne Airport. The first stage of SRL will be the south-eastern section linking the Frankston, Dandenong, Glen Waverley and Lilydale/Belgrave lines. | Removal of the Glenferrie Road level crossing would support future service uplifts on the Glen Waverley Line, which would otherwise result in more frequent boom gate closures. |
| **Future Tram Network** | • The Melbourne Metro will enable a reorganisation of the tram network as the St. Kilda Road/Swanston Street corridor becomes served by new metro stations at Anzac, Town Hall, Library and Parkville.<br>• It proposes that the Route 16 tram is replaced with the first cross city (North-South) shuttle along Glenferrie Road running from Kew to East Brighton (new Route 68), with connections to the city via other tram routes along the route. | Removal of the Glenferrie Road would improve the performance of tram services and help support the long term outcome for the future Route 68 tram. |

## 1.8 Uncertainty around the Problem

The SARS-CoV-2 (COVID-19) pandemic has had significant implications for transport systems around the world. The crisis has disrupted conventional behaviour that may have long term implications for travel patterns.

As Victoria eases restrictions, sustained impacts of COVID-19 on travel demand may include:

- Shifts in work practices, with increased work from home and flexible arrangements being adopted. Victoria's Department of Transport estimates around 30% of jobs in Victoria can be worked remotely, leading to on average 2-3 days per week working from home for these jobs compared to pre-COVID-19 levels. This would remove around 10 per cent of work commute trips from the transport network each day. [19]
- A greater reliance on cars [20] and an increase in walking and cycling as messages around social-distancing change perceptions of public transport. In October 2020, patronage on Melbourne's public transport had dropped by 70 per cent compared with pre-COVID-19 levels. [21]

However, there is a consensus across Commonwealth and State governments of the need for continued investment in major transport infrastructure projects. [22] The long lead-in times (i.e. planning and development) required for major projects means that it is critical to have a pipeline of infrastructure projects. [23]

This business case has conducted sensitivity testing, based on advice from the Department of Transport, to better understand the impact of COVID-19 on demand forecasts for future years.

[19] Department of Transport, September 2020. COVID-19 impacts on demand forecasts.
[20] Currie, G 2020, *Post-pandemic gridlock fear, with people predicted to shun public transport*, Monash University, <https://lens.monash.edu/@politics-society/2020/08/28/1381113/post-pandemic-gridlock-fear-wi h-people-predicted-to-shun-public-transport>
[21] The Age, October 20, 2020. *Blowout in city travel times predicted as lockdown eases.* https://www.theage.com.au/national/victoria/blowout-in-city-travel-times-predicted-as-lockdown-eases-20201020-p566v3.html
[22] Agreed position of Infrastructure Australia, Infrastructure Victoria, Infrastructure NSW, Building Queensland, Infrastructure SA, Infrastructure WA, Infrastructure Tasmania and governments of the NT and he ACT, as ou lined in keynote address by Infrastructure Australia Chief Executive Romilly Madew on infrastructure-led recovery from COVID-19, 8 September 2020, <https://infrastructuremagazine.com.au/2020/09/08/australias-infrastructure-led-recovery-from-covid-19/>
[23] Infrastructure Australia, 2020, Infrastructure Priority List – August 2020 Update, <https://www infrastructureaustralia gov.au/sites/default/files/2020-08/FINAL_Mid-year%202020%20IPL_low_res pdf>

# 2 Case for Change

## 2.1 Investment drivers

### 2.1.1 Continuous upgrades of the transport network are needed to meet growing travel demand

Benefits to the transport network from removal of the level crossing will accrue at both the local and broader metropolitan levels. Firstly, it will address a poor transport outcome in Kooyong and the inner south-east suburbs. Secondly, it supports the broader transport network and future network configuration.

Removal of the level crossing will provide immediate benefits to local communities, reducing congestion and improving journey times on Glenferrie Road and local roads. The reliability of Route 16 trams will also improve. At the same time, a new station will enable easier intermodal interchanges, and an improved environment for pedestrians and cyclists.

The investment also supports the implementation of broader metropolitan transport strategies, as set out in Melbourne's Tram Plan and consistent with Plan Melbourne.[24] These plans propose integrated metro-style rail corridors and high frequency tram routes that are appropriately separated, providing fast and reliable services. Level crossing removals are important for this desired network state being achieved.

### 2.1.2 Population growth requires fit-for-purpose infrastructure

Addressing legacy infrastructure is important as Melbourne's population continues to grow. This growth demands fit-for-purpose infrastructure that provides better access to community facilities, such as education institutions and shops, and improves urban amenity in the surrounding area.

The removal of Glenferrie Road level crossing is important, since it is located in the fastest growing local government area (LGA) in the inner-south east. [25] There will also be growth in the number of people accessing employment, education and services in the vicinity of the level crossing, further constraining its performance.

### 2.1.3 Level crossing removals deliver significant safety improvements

Although the degree of danger and the history of incidents varies from crossing to crossing, it is known that level crossing removals address unsafe pedestrian and driver environments. Collisions at level crossings in Victoria account for around one third of level crossing collisions between trains and road vehicles, and over half of all collisions between trains and pedestrians, across Australia. [26] It is policy of the Office of the National Rail Safety Regulator (ONRSR) to reduce the number of level crossings across Australia as part of their ongoing efforts to improve community safety [27]

Level crossing removals also provide an opportunity to provide contemporary station and passenger interchange facilities that are compliant with the Disability Discrimination Act and incorporate Crime Prevention Through Environmental Design.

[24] Plan Melbourne 2017 – 2050, Victorian Government.
[25] Victorian Government, 2019, Victoria in Future 2019 – Population Projections 2016 to 2056, <https://www.planning.vic.gov.au/land-use-and-population-research/victoria-in-future>
[26] Victorian Government, 2018, Prioritising Future Level Crossing Removals: Site Prioritisation Framework.
[27] Office of the National Rail Safety Regulator 2019, ONSRN Policy – Level Crossings.

## 2.2 Benefits to be delivered

The benefits that the Glenferrie Road level crossing removal will deliver are summarised in Table 4. The Investment Logic Map and Benefits Management Plan are included in Appendix B.

**Table 4 – Benefits summary**

| Benefit | Description | Measurement |
|---|---|---|
| **Benefit 1: Movement**<br>**Improved productivity from more reliable and efficient transport networks**<br>**45%** | • Travel times and reliability for road-based transport on Glenferrie Road will be improved, as trams, vehicles, cyclists and pedestrians will no longer be delayed by variable boom gate closures that result in congestion.<br>• Removal of the level crossing will reduce delays for cyclists using the Glenferrie Road Strategic Cycling Corridor, providing better access to other cycling corridors on Toorak Road and the Gardiner's Creek Trail.<br>• Conflict between trains and trams will be removed, improving the performance of both modes and improving network resilience. | • KPI 1a: Network efficiency<br>• KPI 1b: Reliability of travel times on the road and rail network<br>• KP 1c: Public transport network improvements |
| **Benefit 2: Place**<br>**Better connected, liveable and thriving communities**<br>**40%** | • Removal of the level crossing will improve the public realm and local environment for pedestrians and cyclists.<br>• Intermodal connectivity between Glen Waverley Line trains and Route 16 trams will be better facilitated, by removing the need for passengers to cross at-grade level crossings.<br>• Removal of the level crossing will reduce delays for pedestrians, thereby improving accessibility to the Kooyong Neighbourhood Activity Centre, adjacent schools, open space and other community facilities. | • KPI 2a: Local area amenity<br>• KPI 2b: Access to education and services<br>• KPI 2c: Public transport intermodal connectivity |
| **Benefit 3: Safety**<br>**Safer communities**<br>**15%** | • Removal of the level crossing will eliminate the risk of accidents and incidents between trains and road users.<br>• Unimpeded travel through the area and a better pedestrian environment will diminish risk-taking behaviour by drivers and pedestrians. | • KPI 3a: Exposure to safety risk |

### 2.2.1 Benefit 1: Improved productivity from more reliable and efficient transport networks

The removal of the Glenferrie Road level crossing will improve the reliability and efficiency of transport networks, both at the local and metropolitan levels. It will enable more efficient use of road space continuous flow of all modes on the designated arterial road.

**KPI 1a: Network efficiency**

Level crossing removals have the immediate effect of unblocking pinch-points on the road network that cause congestion and delays to road-based transport, reducing travel times. Road capacity is also increased by level crossing removals, with the flow of tram, vehicle, cyclist and pedestrian traffic no longer impeded by boom gate closures.

Modelling demonstrates that road capacity (measured here using peak hour volumes across the level crossing) will be reduced between 2018 and 2026 base case scenarios. If the level crossing is removed (project case), the road will be able to carry greater peak hour volumes (see Table 5). Travel times are also expected to reduce under this scenario.

**Table 5 – Northbound and southbound peak hour volumes recorded with (base case) and without level crossing (project case)** [28]

| Scenario | Peak hour volume (min) | Peak hour volume (max) |
|---|---|---|
| **Northbound** | | |
| 2018 base case | 576 | 656 |
| 2026 base case | 537 | 639 |
| 2026 project case | 617 | 721 |
| **Southbound** | | |
| 2018 base case | 609 | 697 |
| 2026 base case | 494 | 534 |
| 2026 project case | 643 | 742 |

**KPI 1b: Reliability of travel times on the road and rail network**

Road-based transport would no longer be subject to boom gate closures of variable and unpredictable durations, making journey times shorter and more reliable. Trams would no longer be caught up in congestion or required to cross the tram square upon which they frequently become defective, which is a major source of disruption to the Glen Waverley Line. Dwell times at preceding stations due to the manual operation of the level crossing, will be reduced.

**KPI 1c: Public transport network improvements**

Removal of the tram square will improve punctuality of tram services, which are moving towards a corridor strategy characterised by high-frequency services, convenient intermodal transfers and greater on-road priority. Grade separation will also support the future train network configuration, with metro-style services running from Wallan to Glen Waverley following the City Loop Reconfiguration, and an interchange to the Suburban Rail Loop at Glen Waverley.

### 2.2.2 Benefit 2: Better connected, liveable and thriving communities

Level crossing removals provide an opportunity to improve the attractiveness of neighbourhoods through improved connectivity and enhanced station and interchange environments. Removal of the Glenferrie Road level crossing would remove the separation created in Kooyong and the surrounding area by the rail corridor.

**KPI 2a: Local area amenity**

Removal of the level crossing would improve the connectivity and permeability of Kooyong: a key determinant of the quality of place from an urban design perspective. [29] Continuous links for both pedestrians and cyclists would be enabled, which supports a policy of *Plan Melbourne* through the provision of quality links that are safe, direct and pleasant to use. Amenity at Kooyong Station will be significantly enhanced through the delivery of a new station with modern facilities and improved access. The Kooyong Neighbourhood Activity Centre will also benefit from less congestion on local roads, and an absence of noise from warning boom gate signals.

**KPI 2b: Access to education and services**

Access to education institutions and important local services would improve if the level crossing was removed. This is especially the case for those students that catch public transport, walk or cycle to school along Glenferrie Road to attend Scotch College and St. Kevin's College. Accessibility to the Kooyong Lawn Tennis Club, Vision Australia and community services located in the Kooyong Neighbourhood Activity Centre would also be improved. This is particularly significant for the vision-

[28] AGJV October 2020. Glenferrie Road Microsimulation Modelling Report.
[29] Stone, J. and Woodcock, I, 2016, *The Benefits of Level Crossing Removals: Lesson's from Melbourne's Historical Experience.*

impaired people who access the Vision Australia headquarters every day via Kooyong Station or adjacent tram stops.

### KPI 2c: Public transport intermodal connectivity

Removal of the level crossing would support convenient and more direct interchanges between public transport services. The development of a new Kooyong Station and the replacement of adjacent tram stops on Glenferrie Road would particularly benefit school children, those with disabilities and older members of the local community, with any new infrastructure compliant with the Disability Standards for Accessible Public Transport (DSAPT).

**Case Study: North Road level crossing removal and new Ormond Station providing a better interchange and improved public realm**

**The situation**

Ormond Station on the Frankston Line opened in 1881 and was located adjacent to the former North Road level crossing. Until the level crossing was removed, the station maintained its original design, which provided a poor station and interchange environment.

**The response**

The North Road level crossing was identified for removal, with a 'rail under' solution chosen. This required the redevelopment of a new Ormond Station.

**The outcome**

The new Ormond station provides a significantly improved interchange experience. It is fully accessible, with lifts and stairs to platforms. The main bus stop for several bus routes has been relocated to the front of the station, where there is also a convenient drop off area and extra bicycle parking. Passengers benefit from improved access to the station (from both sides of North Road), new seating, shelters, real-time information signs, and myki ticketing facilities. The new station was also designed to respond to the local environment, such as surrounding architectural and landscaping features.

Previous station and level crossing

Underpass of previous station

New station provides bus interchange

New station provides improved environment for pedestrians and cyclists

## 2.2.3 Benefit 3: Safer communities

Removal of the Glenferrie Road level crossing will improve community safety, especially for those who frequently cross the rail corridor. Its removal is consistent with the Office of the National Rail Safety Regulator (ONRSR) policy that seeks a reduction in the number of level crossings nationwide.

**KPI 3a: Exposure to safety risk**

Removal of the level crossing will eliminate a point of conflict and remove a source of frustration for road users that culminate in a major safety risk for all transport modes. This will result in fewer incidents and near misses involving trains, trams, motorists, cyclists and pedestrians at or within the immediate vicinity of the level crossing. The Australian Level Crossing Assessment Model (ALCAM) score, which is expressed in terms of an expected number of equivalent fatalities per year, would immediately be reduced to zero once the crossing is removed.

## 2.3 Importance of the benefits to Government

### 2.3.1 Alignment with Commonwealth Government priorities

The benefits achieved through the Glenferrie Road level crossing removal will align with the following key Commonwealth Government priorities.

**Table 6 – Key Commonwealth Government priorities**

| Key priority | Relevance to this project | Benefit 1: Movement | Benefit 2: Place | Benefit 3: Safety |
|---|---|---|---|---|
| **Urban Congestion Fund** The Commonwealth Government is investing in upgrades to the urban road network to reduce congestion and ensure commuters get home sooner and safer. | This fund is expected to include the Glenferrie Road level crossing removal project. This project will meet the objectives of the fund by reducing travel times; reducing vehicle operating costs; delivering a more reliable road network for commuters and freight; and addressing local bottlenecks. | ✓ | ✓ | |

### 2.3.2 Alignment with State Government priorities

The benefits achieved through the Glenferrie Road level crossing removal will align with the following key Commonwealth and State Government priorities.

**Table 7 – Key State Government priorities**

| Key priority | Relevance to this project | Benefit 1: Movement | Benefit 2: Place | Benefit 3: Safety |
|---|---|---|---|---|
| **Transport Integration Act, 2010** Victoria's principal transport policy, which provides a framework for an integrated and sustainable transport system. | This investment would better integrate train and tram services in Kooyong, aligning with a key objective of the Act. It would also support the safety, health and wellbeing and social and economic inclusion objectives of the Act. | ✓ | ✓ | ✓ |
| **Plan Melbourne, 2016 - 2050** Metropolitan planning strategy to manage growth and change in Melbourne to the year 2050. | This investment aligns with transportation policies within the plan, which promotes separated road and rail crossings. It also aligns with one of its key outcomes, which is to have an integrated transport system that connects people to jobs and services and the goods to market. | ✓ | ✓ | ✓ |
| **Infrastructure Victoria, Victoria's 30-year Infrastructure Strategy, 2016** Identifies initiatives to meet the infrastructure needs for Victoria. | This investment aligns with a recommendation of the strategy, which is to remove priority level crossings beyond current government commitments. | ✓ | ✓ | |

| Key priority | Relevance to this project | Benefit 1: Movement | Benefit 2: Place | Benefit 3: Safety |
|---|---|---|---|---|
| **Melbourne's Tram Plan, 2019**<br>Overarching plan for investment, reorganisation and extension of the metropolitan tram network. | This investment aligns with the plan through an improved infrastructure arrangement for the Route 16 tram (i.e. removal of the tram square), which would support its performance and resilience. It would also support the future tram network set out in the plan, which includes a new Route 68 from Kew to East Brighton that would travel along Glenferrie Road. | ✓ | | ✓ |
| **Trunk Corridor Strategy, 2018**<br>Trunk corridor movement strategy, incorporating the future tram network as set out in Melbourne's Tram Plan. | This investment aligns with the strategy established in Melbourne's Tram Plan, including a new Route 68 north-south shuttle from Kew to East Brighton on Glenferrie Road. | ✓ | | ✓ |
| **Victoria's Road Safety Strategy, 2016-2020**<br>Overarching road safety for Victoria that seeks a 20 percent reduction in deaths and 15 percent reduction in serious injuries over five years. | This investment aligns with the removal of congested and dangerous level crossings, which the strategy prioritises as a road safety measure. | | | ✓ |
| **State Planning Policy Framework, 2020**<br>Suite of state government planning policies to manage planning and land use decisions. | This investment aligns with the land use and transport planning objectives of the framework, which seek the creation of a safe and integrated transport system. | ✓ | ✓ | ✓ |
| **Victorian Cycling Strategy, 2018-2028**<br>Provides a guide to planning and investing in cycling, with the goal of encouraging more people to cycle for transport. | This investment is consistent with a goal of the strategy, which is to incorporate new cycling infrastructure in major transport projects, including level crossing removals. It would also align with the goal of prioritising investment in Strategic Cycling Corridors. | ✓ | ✓ | ✓ |
| **Disability Standards for Accessible Public Transport, 2002**<br>Provides standard for public transport compliance with the Disability Discrimination Act 1992. | This investment aligns with the standard as it would provide a new compliant station and a fully access ble train and tram interchange, replacing the existing arrangement that is not consistent with the DDA. This would provide direct benefits to users from the schools of the Vision Australia facility located nearby and adjacent to the station. | ✓ | | ✓ |
| **Victorian Department of Transport Strategic Plan, 2019-2023**<br>Provides a vision to meet the aspirations of Victorians for their transport system. | This investment aligns with initiatives set out in the plan, including the removal of dangerous level crossings and delivery of better information and interchanges that help people make better travel decisions and use multiple transport modes to get where they need to go. | ✓ | ✓ | ✓ |

### 2.3.3 Alignment with Local Government Priorities

The benefits achieved through the Glenferrie Road level crossing removal will align with the following key Local Government priorities.

**Table 8 – Local Government priorities**

| Key priority | Relevance | Benefit 1: Movement | Benefit 2: Place | Benefit 3: Safety |
|---|---|---|---|---|
| **Stonnington Public Transport Advocacy: Reference Document (2018)**<br>Establishes council's priorities for public transport investment and improvements. | The investment directly relates to a council priority, which is to prepare grade separation design for the Glenferrie Road level crossing. | ✓ | | ✓ |
| **Stonnington Integrated Transport Plan (2019)**<br>Council's overarching transport strategy. | The investment directly relates to a key action of the plan, which is to advocate for the grade separation of the Glenferrie Road level crossing. | ✓ | ✓ | ✓ |
| **Stonnington Planning Scheme**<br>Statutory planning regulations for managing land use changes and development. | Investment directly relates to key issue identified, which is to address safety, accessibility, mobility and parking for all forms of transport modes and their integration with land use planning and development, especially in activity centres. | ✓ | ✓ | ✓ |

# 3 Strategic Response Options

## 3.1 Method and criteria

This chapter addresses how the problems identified in Chapter 1 will be addressed and how the benefits identified in Chapter 2 would be realised. It sets out a suite of wide-ranging potential 'strategic interventions' aimed at reducing demand, improving productivity or increasing supply. The strategic interventions are then grouped in to 'strategic response options' that set out alternative investment approaches that the government may pursue.

Each of the strategic response options has been subject to an evaluation that has regard to its ability to deliver the identified benefits and any associated risks, dis-benefits, uncertainties, cost and timing considerations. Based on this assessment, a recommended response option can be established.

An outline of the response option development process is provided in Figure 13.

**Figure 13 – Approach to determining the recommended strategic response**


## 3.2 The base case

The 'base case' defines what will occur under a 'business as usual' scenario. The base case for this business case is maintaining the existing level crossing and tram square arrangement at Glenferrie Road. The at-grade crossing of the rail corridor and Glenferrie Road would not be separated, and the existing Kooyong Station and Route 16 tram stops would remain unchanged. Funded road and rail projects in the vicinity of the level crossing would continue as planned, which will exacerbate the problems identified at the level crossing through increased vehicle and train volumes.

## 3.3 Strategic interventions and response options

Ten strategic interventions were identified as being available to government to respond to the problems identified in Chapter 1 and realise the benefits described in Chapter 2. Table 9 outlines these potential strategic interventions.

**Table 9 – Summary of strategic interventions**

| Strategic Intervention | Description |
|---|---|
| 1. Make no changes to address problem | Existing level crossing and tram square arrangement is maintained. |
| 2. Separate road and rail networks | Road and rail transport corridors are grade separated, removing the conflict that arises at the level crossing. |
| 3. Encourage traffic on alternative routes | Traffic is encouraged, through various on-road treatments, to use other north-south arterial roads that do not have level crossings (e.g. Auburn Road between Riversdale Road and Toorak Road). |
| 4. Optimise station access | Treatments are introduced to better manage traffic around the level crossing and facilitate efficient and safe access to Kooyong Station for pedestrians. |
| 5. Increase road capacity | Capacity of Glenferrie Road is increased for northbound and southbound road-based transport, especially during peak periods. |

| Strategic Intervention | Description |
|---|---|
| 6. Implement complementary transport network improvements | A combination of various network investments for all modes, such as improved interchange facilities between trams and trains at Kooyong Station, to address some of the problems identified at the level crossing. |
| 7. Improve the urban amenity and physical integration of activity precincts and communities along rail corridors | An improved urban environment that better connects and integrates Kooyong Station, the Kooyong Neighbourhood Activity Centre, other important community facilities, and the surrounding residential neighbourhoods. |
| 8. Optimise traffic and train signalling to improve flow | Road and rail signalling are upgraded to improve the performance of movement through the level crossing. |
| 9. Upgrade tram square with modern systems to mitigate failures | The existing manually operated tram square system is upgraded with modern and optimised power supply and track infrastructure. Delays caused by defections of tram and train failures would be avoided. |
| 10. Implement travel demand management for surrounding land uses to spread peak loads | Journeys to schools, businesses and community facilities in the local area are retimed or rerouted to reduce vehicle volumes passing through the level crossing during peak periods. It is anticipated that lasting effects of COVID-19 on travel behaviour may also contribute to the spreading of peak loads. |

By packaging together complementary strategic interventions, two strategic response options in addition to the base case option were developed. The strategic response options are described in Table 10.

**Table 10 – Summary of response options**

| Strategic Response option | Description |
|---|---|
| Do nothing (base case) | No change to the existing level crossing and tram square arrangement. |
| Reduce demand & improve productivity | This option seeks to reduce the impact of the level crossing by:<br>• Reducing and managing the demand of traffic flows. Traffic would be redirected to alternative routes and travel demand management techniques would be deployed to spread peak traffic volumes<br>• Increasing capacity for road-based transport on Glenferrie Road, enabling improvements to traffic flow to compensate for boom gate closures. |
| Remove level crossing (increase supply) | This option seeks to increase the capacity of the transport network. It would provide for the grade separation of the Glen Waverley Line and road-based transport on Glenferrie Road. A new Kooyong Station and better integrated tram stops would be provided. |

The strategic interventions have been given a weighting to demonstrate their likely contribution to implementing the associated strategic response option to deliver the project benefits.

**Table 11 - Strategic interventions and response options**

| Strategic intervention | Strategic Response Option 0 Do nothing (base case) | Strategic Response Option 1 Manage demand and improve productivity | Strategic Response Option 2 Remove level crossing (increase supply) |
|---|---|---|---|
| 1. Make no changes to address problem | ✓ | | |
| 2. Separate road and rail networks | | | ✓ |
| 3. Encourage traffic on alternative routes | | ✓ | |
| 4. Optimise station access | | ✓ | |
| 5. Increase road capacity | | ✓ | |
| 6. Implement complementary transport network improvements | | | ✓ |
| 7. Improve the urban amenity and physical integration of activity precincts and communities along rail corridors | | | ✓ |
| 8. Optimise traffic and train signalling to improve flow | | ✓ | |
| 9. Upgrade tram square with modern systems to mitigate failures | | ✓ | |
| 10. Implement travel demand management for surrounding land uses to spread peak loads | | ✓ | |

## 3.4 Ranking of strategic response options

Each of the strategic response options have been subject to comparative quantitative and qualitative assessments having regard to:

- Benefits (the extent to which the response option will deliver the benefits outlined in Chapter 2)
- Cost range (high level estimate only)
- Timeframe for delivery

Key risks or disbenefits that might result in the delivery of benefits being significantly different to expectations have also been identified. These are rated as 'high', 'medium' or 'low' in terms of likelihood and consequence.

The Weighted Benefit Score for each response option, shown in Table 12, indicates the extent to which each option is likely to deliver the benefits, and is calculated by:

- Identifying strategic interventions in each response option that contribute to achieving the benefit KPIs
- Assigning a score to those strategic interventions based on their relative contribution
- Multiplying the total score by the weighting of each benefit KPI.

**Table 12 – Assessment of strategic response options**

| | | Option 0<br>Do nothing (base case) | Option 1<br>Manage demand and improve productivity | Option 2<br>Remove level crossing (increase supply) |
|---|---|---|---|---|
| **Benefit 1** (45%) | Movement: Improved productivity from more reliable and efficient transport networks | 0% | 40% | 45% |
| **Benefit 2** (40%) | Place: Better connected, liveable and thriving communities | 0% | 25% | 40% |
| **Benefit 3** (15%) | Safety: Safer communities | 0% | 0% | 15% |
| **Weighted Benefit Score (100%)** | | **0%** | **65%** | **100%** |
| **Cost range** | | **$0** | **$100-200 million** | **$300-400 million** |
| **Timeframe for delivery** | | **-** | **1-2 years** | **2-3 years** |
| **Overall ranking** | | **-** | **2nd** | **1st** |
| Risk 1 | Community and stakeholder expectations | **High risk**<br>Negative community and stakeholder reactions likely if no changes made. | **High risk**<br>Negative community and stakeholder reactions possible if investment does not deliver significant benefits. | **Medium risk**<br>Community will become vocal if the grade separation design and new station environment does not meet expectations. |
| Risk 2 | Constructability and deliverability | **Low risk**<br>No works undertaken. | **Medium risk**<br>Some works to be undertaken. | **High risk**<br>Grade separation requires a complex design solution that responds to the context of the rail corridor and urban environment. |
| Risk 3 | Environmental risks (i.e. noise, disruption, ecology, flood risk) | **Low risk**<br>No works undertaken. | **Low risk**<br>Some works to be undertaken. | **High risk**<br>Grade separation must consider geological environmental conditions. |
| Risk 4 | Unknown impact of COVID-19 on travel behaviour | **Medium risk**<br>Changes to travel behaviour could lead to unpredictable travel demand. | **Medium risk**<br>Changes to travel behaviour could lead to unpredictable travel demand. | **Low risk**<br>Grade separation provides certainty in face of changing travel behaviour and demand. |
| Disbenefit 1 | Existing levels of congestion deteriorate further | Congestion will worsen over time due to population and trip growth. | Interventions to increase capacity and reduce demand will not sustain benefits in the long term. | Grade separation will increase road capacity, although demand may increase and erode some benefits. |
| Disbenefit 2 | Urban amenity worsens | Urban amenity will worsen due to greater congestion at the level crossing | Station access will improve, but other interventions will not address amenity | Grade separation and other interventions will improve urban amenity |

## 3.5 Recommended strategic response option

Based on the strategic response options assessment, **removing the level crossing** is recommended given its potential to maximise the desired benefits and most effectively address the identified problems. Table 13 details the rationale behind the ranking of each strategic response option.

**Table 13 – Evaluation of strategic options**

| Rank | Strategic Response Option | Rationale |
|---|---|---|
| 1st | Remove level crossing (increase supply) | This response option has the highest potential to deliver the desired benefits.<br>**Advantages**<br>• Resolves conflicts between the rail corridor and road-based transport on Glenferrie Road.<br>• Provides increased capacity for road-based transport, while also removing speed restrictions for Glen Waverley Line services.<br>• Provides a new station and interchange environment that would be compliant with the Disability Standards for Accessible Public Transport (DSAPT) and better connected to the surrounding neighbourhood and land uses.<br>**Disadvantages**<br>• Requires significant capital investment. |
| 2nd | Reduce demand and improve productivity | This response option is likely to provide only some benefits.<br>**Advantages**<br>• Reduced traffic flows and congestion at the level crossing, with vehicles encouraged to use alternative routes, or travel outside of peak times.<br>**Disadvantages**<br>• The benefits gained may not be significant enough to noticeably overcome the congestion currently occurring at the level crossing.<br>• The benefits gained will be short term only. Population and travel growth will likely result in benefits from this option being eroded over the longer term.<br>• A technological solution to achieve optimisation of the tram square may require further investigation and investment.<br>• The solution will only reduce, and not overcome, conflicts that arise from trains, trams and vehicles crossing paths.<br>• Potential negative community reaction to some measures (eg. clearways). |

# 4 Project Options Assessment

## 4.1 Methodology

Removal of the level crossing is the only strategic response option that would adequately address the problems at this site. As outlined in Chapter 3, removal of the level crossing has the following advantages over other strategic response options:

- Resolves the conflict between the rail corridor and road-based transport on Glenferrie Road.
- Provides increased capacity for road-based transport on Glenferrie Road.
- Removes speed restrictions for Glen Waverley Line trains.
- Provides of a new station and interchange environment.

Other strategic response options, with more modest capital investment interventions such as travel demand management, were found to provide limited benefits and do not adequately resolve the conflict between the rail corridor and road-based transport.

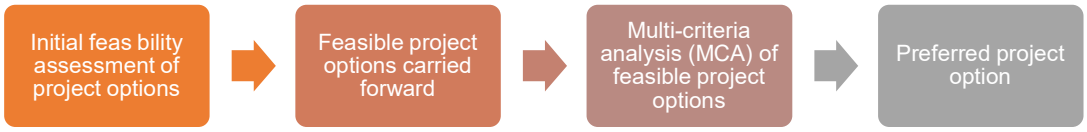
This chapter identifies how the preferred strategic response option to remove the level crossing, can be delivered through a range of project options. It sets out those project options that have been identified, assesses their relative merits and recommends a preferred project option to be progressed for further development.

Project Options for the Glenferrie Road level crossing removal have been assessed against the *LXRP Options Assessment Framework*, which provides a standardised approach for identifying preferred solutions for level crossing removals under *Victoria's Level Crossing Removal Program*.

This Framework ensures that the assessment of project options is comprehensive, transparent, and consistent by taking the following approach (shown in Figure 14):

- An initial feasibility assessment is conducted to rule out non-feasible options and short-list only feasible options
- Multi-criteria analysis (MCA) is conducted for short-listed options only to identify a preferred option

**Figure 14 – Approach to determining the preferred project option**




## 4.2 Project objectives

The Glenferrie Road level crossing removal project objectives have been developed (see Table 14), which are aligned to the *LXRP Options Assessment Framework* and categorised as follows:

- **Benefits:** Core benefits to be delivered
- **Project Outcomes:** Project execution and value, network integration and integrity
- **Project Impacts:** Impacts on the environment and people

**Table 14 – Glenferrie Road level crossing removal project objectives**

| Project Objective | Description |
|---|---|
| **Benefits** | |
| **Movement:** Improved productivity from more reliable and efficient transport networks | Improve the reliability of the rail and on-road public transport network and reduce travel times for all road users. |
| **Place:** Better connected, liveable and thriving communities | Provide better access to community facilities, such as nearby schools and local shops, through the removal of the level crossing and improved urban design. |
| **Safety:** Safer communities | Eliminate the conflict risk due to the level crossing. Reduce delays for drivers, cyclists and pedestrians, to diminish risk-taking behaviour that would have previously resulted in serious incidents. |
| **Project Outcomes** | |
| **Capital Cost** | Minimise, where possible, the capital expenditure (CAPEX) required to deliver the project and identify opportunities to achieve value-for-money outcomes. |
| **Whole of Life Cost** | Achieve a positive net change to annual operational expenditure (OPEX) for rail and on-road public transport networks that is sustainable long-term. |
| **Timeframe** | Meet a project delivery timeline that is considered realistic and acceptable. |
| **Delivery Risk and Uncertainty** | Address potential impacts, issues and risks associated with both construction and the characteristics of the site and its surrounds (e.g. topography, groundwater). |
| **Opportunities** | Maximise potential opportunities for optional investment delivering additional project outcomes. |
| **Compliance with Standards** | The project meets relevant design standards and industry best practice. |
| **Alignment with Strategy, Future Proofing** | The project aligns with existing transport and land use strategies and does not adversely impact on the ability to deliver future transport projects. |
| **Project Impacts** | |
| **Land Use Impacts** | Minimise or avoid compulsory land acquisition and other adverse impacts for residents, businesses and community groups. |
| **Environmental Impacts** | Avoid adverse impacts on the environment and minimise noise, air or light pollution. |
| **Temporary (Construction) Impacts** | Limit disruption for public transport users, nearby residents and businesses, and community infrastructure during construction. |

## 4.3 Project options

### 4.3.1 Initial feasibility assessment

A brief summary of the project options and the outcome of the initial feasibility assessment is shown in Table 15.

**Table 15 – Project Option identification and initial feasibility assessment for Glenferrie Road**

| Project Option | Description | Initial feasibility | Rationale |
|---|---|---|---|
| 0. **Do nothing (base case)** | Existing level crossing and tram square arrangement is maintained. | N/A | Inclusion of base case is a requirement for baseline comparison. |
| 1. **Rail under road** | Provide new rail cutting with new road bridge and a new Kooyong Station. | **Option carried forward** | Considered feasible to deliver. |
| 2. **Road over rail** | Provide new road overpass with existing rail line to remain. | **Option set aside** | Significant impacts to properties fronting Glenferrie Road requiring land acquisition and disconnection of local road intersections. Not feasible. |
| 3. **Rail over road** | Provide new rail overpass and a new Kooyong Station, with existing road level to remain. | **Option carried forward** | Considered feasible to deliver. |
| 4. **Road under rail** | Provide new road underpass with new rail bridge to retain existing rail levels. | **Option set aside** | Significant technical challenges due to road and tram grades which are already non-compliant, significant impacts to properties fronting Glenferrie Road requiring land acquisition and disconnection of local road intersections. Not feasible. |
| 5. **Road closure / nearby improvements** | Close level crossing (and upgrade alternative routes). | **Option set aside** | Complete loss of functionality of major arterial road and important north-south arterial, with additional adverse impacts on surrounding road network. Not feasible. |
| 6. **Hybrid / alternative** | None identified. | **Option set aside** | Highly disruptive to both road and rail networks during construction and more complex without providing advantages compared to feasible rail or road options. |

### 4.3.2 Project options carried forward

The feasible options carried forward are described in Table 16. These include a base case ('do nothing') option and two level crossing removal solutions – 'rail under road' and 'rail over road', which are illustrated in Figure 15 and Figure 16 respectively.

**Table 16 – Shortlisted Project Options**

| Services | Project Option 0: Base case / 'do nothing' | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| **Description** | • No investment – existing level crossing and tram square arrangement is maintained. | • Provide new rail cutting with new road bridge and a new Kooyong Station. | • Provide new rail overpass and a new Kooyong Station, with existing road level to remain. |
| **Rail** | • Existing rail corridor and at-grade level crossing maintained. | • Rail line is lowered into a 760 metre long trench.<br>• New track, overhead traction power and signalling infrastructure installed. | • Rail line is elevated for approximately 980 metres using a combination of U-trough structures and embankments.<br>• New track, traction power and signalling infrastructure installed. |
| **Kooyong Station** | • Existing station maintained. | • New Kooyong Station to be delivered. | • New Kooyong Station to be delivered. |
| **Road** | • No changes to Glenferrie Road or adjacent roads. | • Regrading of Glenferrie Road.<br>• Modifications to adjacent roads. | • Regrading of Glenferrie Road.<br>• Demolition and replacement of bridge at Moonga Road that provides access to St Kevin's College and the Kooyong Lawn Tennis Club.<br>• Modifications to adjacent roads. |
| **Tram** | • Existing tram infrastructure and tram stops maintained. | • Removal of tram square.<br>• New tram track and overhead traction power installed. | • Removal of tram square.<br>• New tram track and overhead traction power installed. |
| **Utilities** | • No changes to existing utilities. | • Utilities relocated and protected. | • Utilities relocated and protected. |
| **Compulsory acquisition** | • No compulsory acquisition required. | • No compulsory acquisition required. | • Likely acquisition of road reserve adjacent to Warra Street and hand back for transport use of land currently leased by Kooyong Lawn Tennis Club. |

**Figure 15 – Option 1: Rail under road (looking south-west, illustrative purposes only)**


**Figure 16 – Option 3: Rail over road (looking south-west, illustrative purposes only)**

## 4.4 Multi-criteria analysis

The two feasible project options (Project Option 1 and Project Option 3) have undergone a detailed multi-criteria analysis (MCA). The purpose of the MCA is to critically assess the ability of the project options to deliver project benefits, achieve desirable project outcomes and minimise project impacts.

Project options are evaluated against each of the 14 criteria, which fall under one of the following categories:

- Alignment with project benefits
- Project outcomes
- Project impacts

The MCA was completed in-line with the LXRP Options Assessment Framework. In undertaking the MCA, a detailed stakeholder workshop was held involving representatives from LXRP, Department of Transport, Public Transport Victoria, Metro Trains Melbourne, Yarra Trams and VicTrack, together with the project's strategic and technical advisors.

### 4.4.1 Alignment with project benefits

Table 17 evaluates how each of the project options align with the project benefits described in Chapter 2, which form the first three criteria of the MCA.

**Table 17 – Assessment of project options against benefit criteria**

| Criteria | Considerations | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Movement: more reliable and efficient transport networks | • Local network efficiency<br>• Local network reliability<br>• Rail capacity | **Clear improvement**<br>• Removal of level crossing that causes delays to trains, trams, vehicles, cyclists and pedestrians.<br>• Grade separation eliminates boom gate closures that cause queuing and delays during boom failures and incidents at the tram square.<br>• Provision of new Kooyong Station and repositioning of tram stops. | **Clear improvement**<br>• Removal of level crossing that causes delays to trains, trams, vehicles, cyclists and pedestrians.<br>• Grade separation eliminates boom gates closures that cause queuing and delays during boom failures and incidents at the tram square.<br>• Provision of new Kooyong Station and repositioning of tram stops. |
| Place: Better connected, liveable and thriving communities | • Local area amenity<br>• Urban renewal along rail corridor<br>• Access and connectivity across rail corridor | **Clear improvement**<br>• Improved pedestrian environment and public realm, including station entrance and forecourt.<br>• Relocated Kooyong Station improves accessibility to St. Kevin's College, the Kooyong Lawn Tennis Club and the Kooyong Neighbourhood Activity Centre.<br>• New Kooyong Station and repositioning of tram stops. | **Marginal improvement**<br>• Improved pedestrian environment and public realm, including station entrance and forecourt.<br>• Land uses adjacent to elevated rail may experience some overshadowing, or perceived overlooking and visual bulk.<br>• Relocated Kooyong Station improves accessibility to St. Kevin's College, the Kooyong Lawn Tennis Club and the Kooyong Neighbourhood Activity Centre.<br>• New Kooyong Station and repositioning of tram stops |

| Criteria | Considerations | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Safety: Safer communities | • Frequency and severity of incidents<br>• Pedestrian and cyclist exposure to risk<br>• Road and rail commuter exposure to risk | **Clear improvement**<br>• Removal of level crossing and tram square reduces risks of collisions for trains, trams, vehicles, cyclists and pedestrians.<br>• Reconstructed station would be compliant with Disability Standards for Accessible Public Transport and improve and remove risks associated with curved platforms and gaps to carriage. The pedestrian environment for vision impaired people visiting the Vision Australia headquarters would be improved. | **Clear improvement**<br>• Removal of level crossing and tram square reduces risks of collisions for trains, trams, vehicles, cyclists and pedestrians.<br>• Reconstructed station would be compliant with Disability Standards for Accessible Public Transport and improve and remove risks associated with curved platforms and gaps to carriage. The pedestrian environment for vision impaired people visiting the Vision Australia headquarters would be improved. |

### 4.4.2 Project outcomes

Table 18 evaluates how each of the project options address the MCA project outcomes criteria. The assessment of project options in the MCA considered preliminary cost estimates only.

**Table 18 – Assessment of project options against project outcomes criteria**

| Criteria | Considerations | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Capital cost | • Preliminary order of magnitude cost range | **$320-370 million** | **$340-390 million** |
| Whole of life cost | • Qualitative assessment of long-term maintenance and operational costs | **Average performance**<br>• Reduced maintenance requirement of existing tram square and level crossing outweighed by maintenance requirements of new station facilities (i.e.) lifts and rail structures (i.e. retaining walls).<br>• Additional track drainage and pumping solution may require maintenance. | **Average performance**<br>• Reduced maintenance requirement of existing tram square and level crossing outweighed by maintenance requirements of new station facilities (i.e.) lifts and rail structures (i.e. piers, U-troughs). |
| Opportunities | • Potential for integrated development opportunities (IDO) and other value capture and creation opportunities | **Strong performance**<br>• Potential IDO on the east side of Glenferrie Road – currently assessed as feasible but will likely require decking over the lowered rail line. | **Average performance**<br>• Potential IDO opportunity on the north east side of Glenferrie Road – currently assessed as feasible, but subject to potential constraint of land post rail realignment. |
| Timeframe | • Estimated length of the project delivery program<br>• Construction flexibility (e.g. rail occupation constraints) | **Average performance**<br>• Approximately 24-30 months for overall delivery.<br>• Retaining wall works can be undertaken offline, however major rail occupation will be required for bulk excavation and new track works. | **Average performance**<br>• Approximately 24-30 months for overall delivery.<br>• Retaining wall works mostly done online with increased impact to rail operations. |

| Criteria | Considerations | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Delivery risks | • Regulatory and planning approvals<br>• Design and construction risk<br>• Permanent impacts on adjacent assets (e.g. services, local roads) | **Average performance**<br>• Flooding/hydrology risk anticipated.<br>• Increased interface risk to coordinate works/disruptions with Yarra Trams.<br>• Sewer requires relocation, and new drainage solution required.<br>• Interface risk to coordinate works/disruptions with Yarra Trams | **Poor performance**<br>• Risk with resident interface on Turnbull Avenue with existing retaining walls at the rear of properties (in poor condition) impacted by retaining walls.<br>• Potential signal sighting issue with high retaining walls on horizontal rail curve at Moonga Road impeding train driver views.<br>• May have difficult truck and crane access for installation of U-troughs along local roads (i.e. Warra Street).<br>• Minor interface risk to coordinate works/disruptions with Yarra Trams.<br>• Increased occupation risk with critical activities undertaken during main occupation (i.e. piling, retaining walls, U-trough installation).<br>• Increased utility service risk due to significant number of services under Moonga Road requiring relocation. |
| Compliance with design and best practice | • Gradient and configuration of rail/road geometry<br>• Road and rail standards<br>• Accessibility standards | **Average performance**<br>• Not known at this stage but anticipate at least one minimum standard to be adopted. | **Average performance**<br>• Not known at this stage but anticipate at least one minimum standard to be adopted. |
| Protection of future assets | • Future rail network requirements<br>• Future road network requirements<br>• Future utility service requirements | **Average improvements**<br>• Construction of Yarra Trams substation on Warra Street will not be precluded.<br>• Proposed auto-power switching project for tram square will no longer be required with level crossing removed.<br>• Should any future major utility connections be required in the area, they would be l kely precluded from crossing the rail trench | **Strong improvements**<br>• Construction of Yarra Trams substation on Warra Street will not be precluded.<br>• Proposed auto-power switching project for tram square will no longer be required with level crossing removed.<br>• No known utility service provisions but no constraints as part of proposed solution. |

### 4.4.3 Project impacts

Table 19 evaluates how each of the project options address the MCA project impacts criteria.

**Table 19 – Assessment of project options against project impacts criteria**

| Criteria | Considerations | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Land acquisition impacts | • Land acquisition<br>• Avoidance of land acquisition of socially significant land | **Strong performance**<br>• No permanent acquisitions required. | **Average performance**<br>• Possible permanent impacts/ acquisition of portions of Warra Street and hand back for transport use of land currently leased by Kooyong Tennis Club. |
| Land use impacts | • Impacts on residential land use<br>• Impacts on community infrastructure<br>• Impacts on businesses | **Strong performance**<br>• New local Kooyong station on east side of Glenferrie Road with platforms on the western side, improving connectivity to Kooyong Tennis Club, St Kevin's College, and the Kooyong Neighbourhood Activity Centre.<br>• Opportunity for a second station entrance on the east side of Glenferrie Road.<br>• Some temporary construction impacts to Kooyong Tennis Club carparking area which is currently on lease from VicTrack.<br>• Adverse impact for residents on Warra Street with station moving to west side of Glenferrie Road. However, this will be offset by the likely improved amenity for residents on Talbot Crescent and Monaro Road with station moving away from the area.<br>• Some Warra Street properties may be eligible for special consideration for Voluntary Purchase Scheme (VPS). | **Average performance**<br>• New local Kooyong Station on the west side of Glenferrie Road, improving connectivity to Kooyong Tennis Club, St Kevin's College, and the Kooyong Neighbourhood Activity Centre.<br>• Some temporary and permanent impacts to Kooyong Tennis Club carparking area which is currently on lease from VicTrack, as well as Warra Street.<br>• Significant change to amenity for residents on Warra Street with station moving to west side of Glenferrie Road.<br>• Some Warra Street properties may be eligible for special consideration for Voluntary Purchase Scheme (VPS).<br>• Amenity impacts along Talbot Crescent and Monaro Road with prominent retaining walls/ elevated structure. |
| Environmental impacts | • Flora and fauna<br>• Aboriginal cultural heritage<br>• European heritage impact<br>• Other environmental impacts (e.g. contamination, noise) | **Average performance**<br>• Extensive impact to native vegetation.<br>• Limited opportunity to replant vegetation in rail reserve after lowering of rail line.<br>• Removal/relocation impact to heritage listed Kooyong Signal Box.<br>• Minor operational noise impacts for properties south of the corridor on west side of Glenferrie Road due to location of new station platforms, but overall reduced noise with rail line lowering and cars no longer stopping frequently at level crossing. | **Average performance**<br>• Extensive impact to native vegetation, particularly on the west side of Glenferrie Road with the extent of elevated rail.<br>• Extended area of vegetation removal due to extended limit of works, particularly on eastern side.<br>• Greater opportunity to replant vegetation in rail reserve around/ beneath elevated rail line.<br>• Removal/relocation impact to heritage listed Kooyong Signal Box with – opportunity to retain beneath elevated structure.<br>• Operational noise impacts increased for west side due to location of new station platforms of Glenferrie Road but overall reduced noise with cars no longer |

| Criteria | Considerations | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| | | | stopping frequently at level crossing. |
| Temporary impacts | • Disruption to rail commuters during construction<br>• Disruption to road users during construction<br>• Business and residential impacts during construction<br>• Disruption to major utility services during construction | **Average performance**<br>• Temporary construction impacts to Kooyong Tennis Club carpark (on lease from VicTrack) and access/driveway.<br>• Temporary station impacts with likely full station/platform closures required for up to 12 weeks to enable retaining wall works.<br>• Impact to mechanical signal box/ tram square during disruptions – however there is an opportunity to align tram line renewal/maintenance works with level crossing removal works.<br>• Four week road closure for bridge, and seven to eight weeks for main rail occupation.<br>• Driver training possibly required for both trains and trams. | **Poor performance**<br>• Temporary construction impacts to Kooyong Tennis Club carpark (on lease from VicTrack) and access/ driveway.<br>• Temporary station impacts with likely full station/platform closures required to enable retaining wall works.<br>• Impact to mechanical signal box/ tram square during disruptions, but there is an opportunity to align tram line renewal/maintenance works with level crossing removal works.<br>• Higher occupation (nine to ten weeks) for main rail occupation as retaining wall works need to occur online.<br>• Moonga Road retaining wall/bridge works impact both St Kevin's College and Kooyong Tennis Club – disruption difficult to manage due to school holiday clash with tennis events.<br>• Temporary construction and permanent retaining wall impacts to residents on Turnbull Avenue.<br>• Higher impacts to utility services requiring relocation at Moonga Road. |

## 4.5 Stakeholder identification and consultation

The key stakeholders in Table 20 have been identified as groups potentially impacted by the Glenferrie Road level crossing removal project.

The project has initially consulted the Commonwealth Government, the Victorian Department of Transport, the City of Stonnington, Metro Trains Melbourne, Yarra Trams and VicTrack. No specific consultation on project options has been undertaken, although inputs from these stakeholders has informed the MCA.

As part of the detailed design process subsequent to this business case, comprehensive stakeholder and community engagement will be undertaken.

**Table 20 – Key stakeholder identification and position**

| Stakeholder | Interest in the project | Position on project |
|---|---|---|
| **Commonwealth Government** | Funding the business case and delivery of the level crossing removal. | Committed to removal of the level crossing by a rail under road solution. |
| **Department of Transport** | Department responsible for Melbourne's arterial roads, rail network and project integration. | Supports the removal of level crossings across Me bourne. |
| **City of Stonnington** | Local government area in which the level crossing is located that is responsible for statutory approvals and local road management. | Supports the removal of level crossings within the municipality. Further details on Council's position and community engagement is provided below. |
| **Metro Trains Melbourne** | Operator of Melbourne's passenger rail network, including the Glen Waverley Line. | Supports removal of the level crossing, including the tram square that currently requires regular maintenance. |
| **Yarra Trams** | Operator of Melbourne's tram network. | Supports removal of the level crossing, including the tram square that currently requires regular maintenance. |
| **VicTrack** | Owner of rail corridor land and infrastructure. | Supports grade-separations as they result in upgrades of existing assets. |
| **Utility companies** | Owners of utility infrastructure located in the vicinity of the level crossing. | Likely to support the project if utilities can be relocated or protected. |
| **St Kevin's College** | School in immediate vicinity of level crossing with secondary access via Moonga Road. | Likely to support the project if access to the school is maintained and temporary access is provided during construction. |
| **Vision Australia** | Major community facility located immediately adjacent to level crossing that supports visually impaired people. | Likely to support the project as level crossing provides a dangerous environment for visually impaired staff and visitors. |
| **Kooyong Lawn Tennis Club** | Major sports and community facility located immediately adjacent to the level crossing. | Likely to support the project providing accessibility to the club is maintained. |

Stonnington Council has provided a written submission on its advocacy for the project, which is included as a Supplementary Report in Attachment G. This includes Stonnington Council's position on level crossing removals which are as follows:

- Concurrent removal of all three Glen Waverley Line level crossings within the City of Stonnington (Glenferrie Road, Tooronga Road, High St Glen Iris).
- Inclusion of the level crossing at High Street, Glen Iris in the business case process.
- Collaborative engagement with Council, residents, businesses and the local community as designs are developed.

- Avoid poorly designed solutions (either for rail-over or rail-under).
- Inclusion of DDA compliant infrastructure, complemented by direct connections, pedestrian crossing points, lighting, wayfinding and public realm improvements
- Complementary safety improvements at Heyington train station due to school patronage

## 4.6 Financial comparison

Preliminary capital cost estimates for each project option have been prepared and are provided in Table 21. The preliminary costings have been used for comparative purposes and to inform a rapid cost-benefit analysis comparison.

The preferred option has been fully costed, using a Full Probabilistic P50/90 Estimate, which is outlined in Section 9. This has informed the Detailed Cost-Benefit Analysis for the project.

**Table 21 – Capital cost estimates for project options**

| Item | Project option 1: Rail under road | Project option 2: Rail over road |
|---|---|---|
| **Preliminary Cost Estimate** | | |
| Direct Construction | $136m | $142m |
| Total Construction (excl. risk & escalation) | $220m | $231m |
| Total Project (excl. risk & escalation) | $265m | $278m |
| **Total Project Estimate (excl. escalation)** | **$320-370 million** (20-40% risk) | **$340-390 million** (20-40% risk) |
| **Detailed Cost Estimate (Probabilistic)** | | |
| Direct Construction Cost | $147m | - |
| Total Construction Cost (excl. risk & escalation) | $245m | - |
| Total Project (excl. risk & escalation) | $294m | |
| **TEI P50** (excl. escalation) | **$330m** | - |
| **TEI P90** (excl. escalation) | **$360m** | - |
| **TEI P90** (incl. escalation) | **$380m** | |

## 4.7 Integrated analysis and options ranking

Based on the MCA outcome, the preferred option is grade separation by lowering the rail corridor under Glenferrie Road (rail under road). A summary of the MCA is provided in Table 22.

**Table 22 – Project options assessment outcome**

| | Project Option 0: Base case | Project Option 1: Rail under road | Project Option 3: Rail over road |
|---|---|---|---|
| Description | No investment | Rail cutting with new road bridge and a new Kooyong Station | Rail overpass and a new Kooyong Station |
| **Alignment with project benefits** | | | |
| Movement: more reliable and efficient transport networks | No improvement | Clear Improvement | Clear Improvement |
| Place: Better connected, liveable and thriving communities | No improvement | Clear Improvement | Marginal Improvement |
| Safety: Safer communities | No improvement | Clear Improvement | Clear Improvement |
| **Project outcomes** | | | |
| Preliminary Cost Estimate excl. escalation | - | $320m - $370m | $340m - $390m |
| Rapid BCR (based on preliminary estimate) | | **0.45 - 0.52** | **0.43 – 0.49** |
| **TEI Detailed Cost Estimate** (P90) | - | **$360m** excl. escalation **$380m** incl. escalation | - |
| Whole of life cost | - | Average Performance | Average Performance |
| Opportunities | - | Strong Performance | Average Performance |
| Timeframe | - | Average Performance | Average Performance |
| Delivery risks | - | Average Performance | Poor Performance |
| Compliance with design and best practice | - | Average Performance | Average Performance |
| Protection of future assets | - | Average Performance | Strong Performance |
| **Project impacts** | | | |
| Land acquisition impacts | - | Strong Performance | Average Performance |
| Land use impacts | - | Strong Performance | Average Performance |
| Environmental impacts | - | Average Performance | Average Performance |
| Temporary impacts | - | Average Performance | Poor Performance |
| **MCA outcome** | | | |
| Recommendation | **Not acceptable** | **Preferred Option** | **Acceptable alternative** |

The **rail under road** option is the preferred option, when compared with the rail over road option. Generally, the benefits, impacts and costs between the two options are similar, and both options are acceptable. However, there are marginally lower costs and impacts for the rail under option, and on balance this option is preferred due to the following reasons:

- Both options provide benefits, with clear improvement to movement (road and tram travel time and reliability) and safety.
- The rail under option will provide greater place benefits.
- No compulsory land acquisition or business relocation is required to deliver the rail under option, whereas the rail over option may require some land acquisition.
- The rail under option has less overall disruption to rail users, with a shorter major rail occupation duration. By comparison, the rail over road option will have a significantly longer major rail occupation duration.
- The rail over option has a more significant impact on vegetation removal at the western end of the works.
- The rail under option will have a lower capital cost than the rail over option.
- All stakeholders involved in the development and assessment of options (LXRP, Department of Transport, Metro Trains Melbourne, Yarra Trams) support this option.

## 4.8 Economic appraisal

### 4.8.1 Cost-benefit analysis

For this project, a rapid cost-benefit analysis (CBA) is included for multiple project options, in order to help identify the recommended option. The findings of the Rapid CBA are included in the supplementary economic appraisal report for this project.

A detailed cost-benefit analysis completing cost-benefit analysis on multiple options was not considered necessary, since:

- There are limited grade separation options to implement the solution (rail over/under, road over/under, hybrid)
- The shortlisted options have a very similar cost profile
- The shortlisted options have an extremely similar economic benefits profile.

A full cost-benefit analysis has been completed for the preferred option only (rail under road) in order to inform the final investment decision.

The core benefits include travel time savings, reduced vehicle operating costs, road travel reliability benefits, public transport user benefits, and avoided collisions.

The Benefit Cost Ratio (BCR) has been calculated using a standard appraisal methodology, which excludes other significant benefits that this project can be expected to deliver, including:

- Improved network resilience to incidents
- Local precinct amenity and accessibility benefits
- Benefits for emergency services.

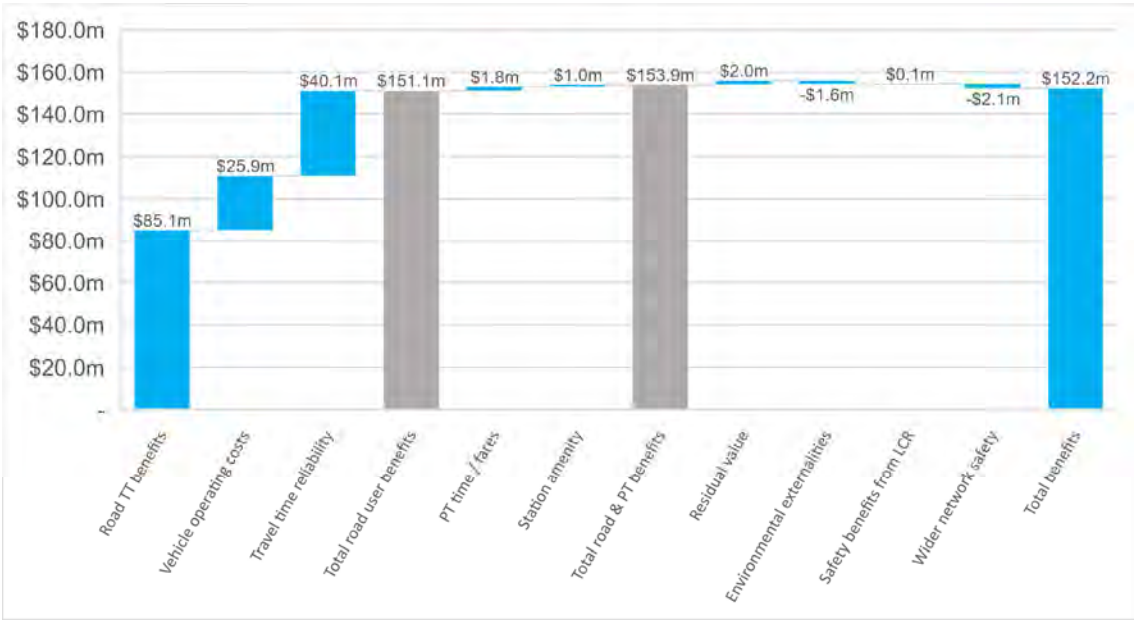
In accordance with other major transport investments being undertaken by the Australian Government, the appraisal uses the standard discount rate of 7 per cent (real). A summary of the economic appraisal outcome is provided in Table 23, while the benefits bridge outline is shown in Figure 17.

**Table 23 – Economic appraisal outcome**

| Item | $m | Subtotal $m |
|---|---|---|
| **Road user Benefits** | | **$151.1** |
| Travel time and reliability savings | $85.1m | |
| Vehicle operating cost savings | $25.9m | |
| User charges – tolls | | |
| Travel time reliability | $40.1m | |
| **Public transport User Benefits** | | **$2.8** |
| PT Travel time savings & user charges – fares | $1.8 | |
| Station upgrade amenity benefits | $1.0 | |
| Interchange Improvement | | |
| **Other benefits** | | **-$1.7** |
| Residual value | $2.0 | |
| Environmental externalities | -$1.6 | |
| Safety Benefits: Level Crossing Removal | $0.1 | |
| Wider Network Safety Outcomes | -$2.1 | |
| Construction Disruption | $0.0 | |
| **Total Benefits (PV 7% discount rate)** | | **$152.2** |

| **Cost-Benefit Appraisal** | |
|---|---|
| PV (7%) Cost (P50) | $289.5 |
| **NPV (7%)** | -$137.3 |
| **BCR (7%)** | **0.52** |

**Figure 17 – Benefits bridge outline (PV 7% discount rate)**



### 4.8.2 Sensitivity tests

A number of sensitivity tests have been carried out for this project, including:

- In recognition of current market rates and COVID, a discount rate of 4 per cent.
- In recognition of the unique benefits of level crossing removal projects, a further sensitivity test has been undertaken that includes local amenity benefits. This is based on the expected increase in nearby land value resulting from the project, representing increased willingness to pay for enhanced local amenity and accessibility. These benefits have been estimated based on controlled observation of increases in land value that have occurred at other nearby recent level crossing removals.
- Other standard sensitivity tests.

**Table 24 – Economic Sensitivity Tests**

| Sensitivity tests | PV benefits | PV costs | NPV | BCR |
|---|---|---|---|---|
| **Core assessment** (7% discount rate, P50 cost estimate) | $152.2m | $289.5m | -$137.3m | 0.52 |
| **Key sensitivity tests** | | | | |
| **4% discount rate** | $288.8m | $308.9m | -$20.1m | 0.93 |
| **Other sensitivity tests** | | | | |
| **+20% benefits** | $182.6m | $289.5m | -$106.8m | 0.63 |
| **-20% benefits** (proxy test for lower traffic volumes) | $121.8m | $289.5m | -$167.7m | 0.42 |
| **P90 costs** | $152.3m | $306.7m | -$154.4m | 0.49 |
| **+20% costs (P50)** | $162.0m | $346.8m | -$184.9m | 0.46 |
| **-20% costs (P50)** | $151.8m | $232.1m | -$80.3m | 0.65 |
| **Basic Reliability Benefits Only** (VITM based, excluding detailed VISSIM analysis) | $123.6m | $289.5m | -$165.9m | 0.42 |
| **Alternative VOC parameters (IA recommended)** | $130.6m | $289.5m | -$158.8m | 0.45 |
| **Amenity Scenarios** | | | | |
| **Central estimate** | $296.2m | $144.1m | $6.8m | 1.02 |
| **Low range** (minus one standard error) | $218.7m | $66.5m | -$70.8m | 0.75 |
| **High range** (plus one standard error) | $373.8m | $221.6m | $84.3m | 1.29 |

# Part 2: Delivery Case

VICTORIA State Government | Department of Transport

# 5 Project Solution

## 5.1 Project scope

The preferred project option, a **rail under road** solution, has been subject to a detailed Preferred Option Development process.

The project solution, a grade separation of the level crossing and tram square at Glenferrie Road using a rail under road solution, will comprise:

- A rail trench with new road bridge
- A new Kooyong Station, including new platforms
- Improved interchange between Glen Waverley Line Trains and Route 16 trams.

**Figure 18 – Project solution (rail under road)**


**Table 25 – Project solution key scope of works**

| Area | Key scope |
|---|---|
| **Rail trench** | • A rail cutting approximately 800 metres long |
| **Station and surrounds** | • New local station on east side of Glenferrie Road, with walkway underneath new Super T road bridge connecting to 160m long platforms on west side of Glenferrie Road.<br>• No net loss of commuter carparking (retain 69 car parks), with carparking to be reconstructed in current location on east side of Glenferrie Road. |
| **Interchange** | • Existing Yarra Trams Route 16 tram Stop 65 will be upgraded to an Easy Access stop, to retain two traffic lanes each way on Glenferrie Road, with one lane shared with trams per existing functionality (*subject to stakeholder confirmation).*<br>• Existing tram Stop 66 (located between Kooyong Lawn Tennis Club and Vision Australia) will be removed to optimise tram movements.<br>• New pedestrian and cycling connection to be provided along Talbot Crescent connecting the station precinct to the existing pedestrian underpass on Talbot Crescent, Sir Zelman Cowen Park and Gardiners Creek Trail. |

The detailed scope for the project solution at Glenferrie Road is provided in Appendix C. A summary of the Project Development and Due Diligence (PDDD) activities are included in Appendix D.

## 5.2 Interdependencies and interfaces

Table 26 identifies key interdependencies and interfaces for this project.

**Table 26 – Project interdependencies and interfaces**

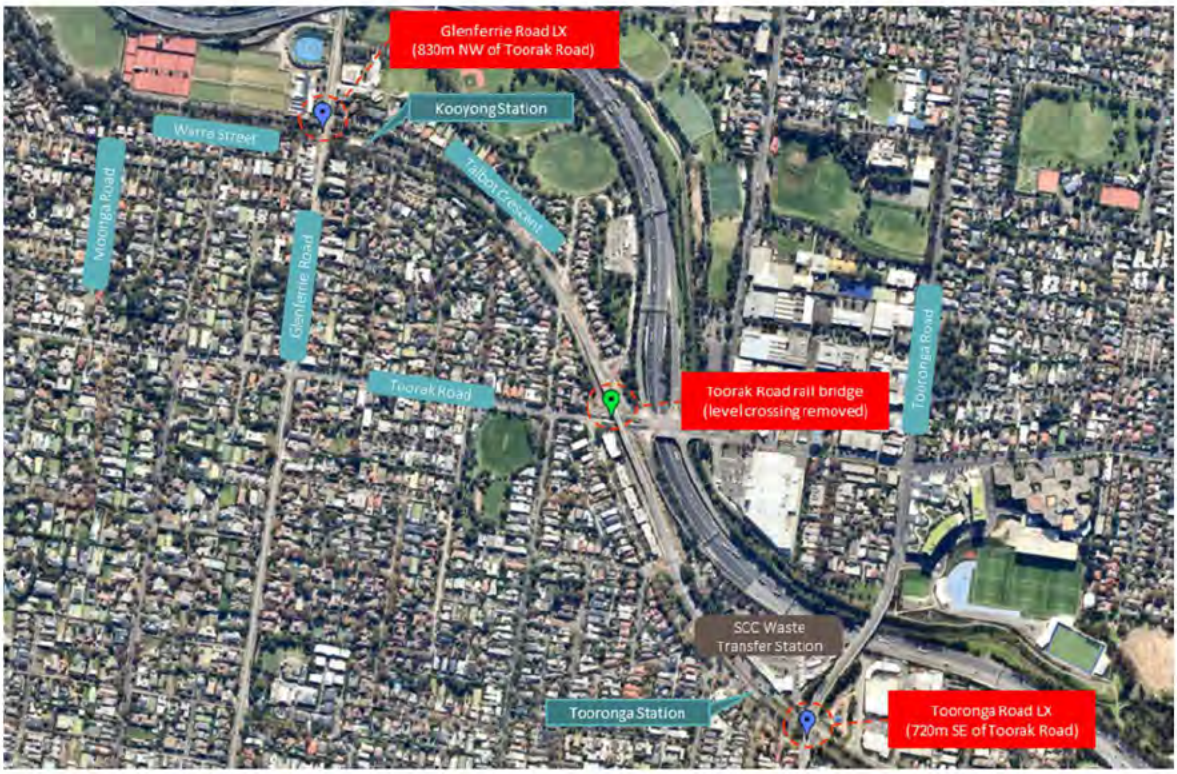
| Interdependency | Description | Implication for Project Solution |
|---|---|---|
| **Future rail network** | Interfacing projects on Melbourne's rail network include:<br>• The linking of the Glen Waverley and Upfield/Wallan Lines.<br>• The development of the Suburban Rail Loop (SRL) linking every major rail line from the Frankston Line to the Werribee Line, via Melbourne Airport, including an interchange at Glen Waverley. Construction of the Suburban Rail Loop is due to commence in 2022 | These future projects are not expected to materially impact the design and construction of the Glenferrie Road level crossing removal. |
| **Future tram network** | Route 16 tram to be replaced with the first cross city (North-South) shuttle along Glenferrie Road running from Kew to East Brighton (new Route 68), with connections to the city via other tram routes along the route. | There were plans for a tram terminus (spur) into the rail corridor at Kooyong Station. The project does not allow for this and an alternative terminus arrangement will need to be found. This has been raised with the Department of Transport (Victoria). |
| **Strategic Cycling Corridors (SCC)** | DoT (Network Planning) is currently finalising routes for SCCs in metropolitan Melbourne, including those on Glenferrie Road, Toorak Road and the Gardiners Creek Trail. This is being undertaken in consultation with local governments. | The final designation of SCCs in the vicinity of the level crossing will influence the extent to which improvements to cycling networks can be realised. |

## 5.3 Scalability of the project solution

A key consideration in this Business Case is whether he project solution can be scaled up by including the removal of the other nearby level crossings to realise a combined delivery efficiency.

| Site | Status |
|---|---|
| **Tooronga Road** | A feas bility study for this level crossing removal has been completed, which has been funded by the Commonwealth Government<br>There would be opportunities for efficiencies through a combined delivery with Glenferrie Road.<br>Further details are provided below |
| **Madden Grove** | A feas bility study for this level crossing removal has been completed, which has been funded by the Commonwealth Government.<br>Whilst there may be an opportunity for combined delivery efficiencies, this level crossing has significant site constraints and complexities, that will require very long lead times for approvals and delivery. |

**Figure 19 – Glenferrie Road, Toorak Road and Tooronga Road level crossing removal projects**




The Tooronga Road level crossing is located in Malvern on the Glen Waverley Line, further down the line from Glenferrie Road also located in the City of Stonnington municipality. Tooronga Road is an arterial road, which passes over the Monash Freeway, and carries 18,000 vehicles each day. The level crossing is located between the arterial roads of Toorak Road (550m to the north) and Malvern Road (350 m to the south).

An assessment of options has been completed by applying the *LXRP Options Assessment Framework* outlined in Section 4.1.

An initial feasibility assessment, outlined in Table 27, determined that road over rail and rail over road options were considered feasible to deliver.

**Table 27 – Project Option identification and initial feasibility assessment for Tooronga Road**

| Option | Description | Outcome | Rationale |
|---|---|---|---|
| 1. **Rail under Road** | Provide new rail cutting with new road bridge, and a new Tooronga Station west of Tooronga Road | **Option set aside** | Significant technical challenges due to drainage works required to maintain floodwater flow and increase in flooding risk |
| 2. **Road over Rail** | Provide new road overpass with existing rail line to remain | **Option carried forward** | Considered feasible to deliver. |
| 3. **Rail over Road** | Provide new rail overpass with existing road level to remain, and a new Tooronga Station west of Tooronga Road | **Option carried forward** | Considered feasible to deliver. |

| Option | Description | Outcome | Rationale |
|---|---|---|---|
| 4. **Road under Rail** | Provide new road underpass with new rail bridge to retain existing rail levels | **Option set aside** | Significant technical challenges due to drainage works required to maintain floodwater flow and increase in flooding risk, property access issues to properties fronting Tooronga Road requiring land acquisition, and disconnection of local road intersections. |
| 5. **Road Closure/ Nearby Improvements** | Close level crossing (and upgrade alternative routes) | **Option set aside** | Loss of functionality of major arterial road and adverse impact on surrounding road network.<br>Given the importance of Tooronga Road as a major north-south arterial, truncating the road at the level crossing is not deemed to be acceptable. |
| 6. **Hybrid/ Alternative** | Road Over Rail with partial rail lowering<br>Rail Over Road with partial road lowering | **Option set aside** | Highly disruptive to both road and rail networks during construction and more complex without providing advantages to rail or road only options. Note that hybrid options were pursued considerably but were ultimately not considered feasible. |

A Multi-Criteria Assessment completed for the two feasible options found that a **rail over road** option is the preferred option for the Tooronga Road level crossing removal due to the following reasons:

- Although the cost of the rail over option is of higher cost, it provides clear benefits for movement and place, and includes delivery of a new Tooronga Station. Conversely, the road over option provides only marginal benefits.
- The rail over option has clear improvements for safety with the removal of the level crossing, three pedestrian crossings, and the curved station platforms. Conversely the road over option would provide safety benefits but to a slightly lesser degree as curved station platforms would remain as well as one pedestrian level crossing.
- No compulsory land acquisition or business relocation required to deliver the rail over option, whereas the road over option requires acquisition of five adjacent residential properties and acquisition of the site used by the Melbourne Bricks business.
- The rail over option has a reduced road disruption profile and a large portion of rail and station works can occur offline, reducing the required rail line occupation.
- While the elevated rail structure and retaining walls present a visual amenity impact to adjacent residents, the rail line is separated from residents by a road (Milton Parade) with an opportunity to minimise visual impacts through vegetation planting and architectural finishes.
- All stakeholders involved in the development and assessment of options (LXRP, Victorian Department of Transport, Metro Trains Melbourne, VicTrack) generally support the rail over option.
- While no community engagement and only limited Council engagement has been undertaken at this stage, the option is likely to be supported due to the minimal impacts to local businesses and residents, and overall benefits to the precinct.

**Figure 20 – Preferred option at Tooronga Road (rail over road level crossing removal)**


The preliminary scope of works for the rail over road option would include:

- Elevated rail line (approximately 800 metres in length)
- New Tooronga Station on the west side of Tooronga Road.
- New rail infrastructure including track, overhead line equipment and signalling.
- Modifications to adjacent local roads to better integrate with the works.
- Removal of the pedestrian bridge over the rail line at Edgar Street (east of the level crossing), with an opportunity to provide a pedestrian link beneath the elevated rail line closer to Tooronga Road.

The preliminary cost estimate for the rail over road solution is between $290 million to $340 million.

The removal of Tooronga Road level crossing together with the Glenferrie Road level crossing presents a significant efficiency opportunity that will reduce these project costs. The efficiencies that can be realised through combined delivery and the associated cost impact are outlined in Table 28.

**Table 28 – Efficiency opportunities for combined delivery**

| Efficiency area | Opportunity | Cost impact |
|---|---|---|
| **Likely Efficiencies** | | |
| **Disruption** | • Avoidance of additional rail occupations otherwise required if Tooronga Road was removed as a subsequent project<br>• Reduced disruption to rail commuters and road users due to reduction of rail occupations and associated replacement buses<br>• Reduced impacts to public open space and local roads used for construction laydown<br>• Minimised construction fatigue for local residents and businesses | 40-60 additional days of rail and road disruptions avoided<br><br>$19 million cost savings |
| **Contractor Project Management** | • Single site establishment<br>• Optimisation of management, communications and support staff resourcing<br>• Reduced Contractor Overheads | $22 million cost savings |
| **Overall Project Management and Administration** | • Reduced Overall Project Management & administration, including single land planning and approvals pathway<br>• Single procurement process for combined projects | $8 million cost savings |
| **TOTAL** | | **$49 million** excl. escalation<br>**$53 million** Incl. escalation |

| Efficiency area | Opportunity | Cost impact |
|---|---|---|
| **Other Potential Efficiencies** *Not included in Estimate, to be determined in next phase of project)* | | |
| **Other** | • Reduced exposure to escalation cost if both projects were delivered concurrently, assuming there would otherwise be significant separation between the delivery of each project<br>• Potential opportunity for cost savings through buying power attributed to the larger quantities of materials required to be delivered at the same time<br>• Potential opportunity to utilise fill from Glenferrie Road rail trench for Tooronga Road bridge embankments | |

With these efficiencies realised, a preliminary estimate of the combined costs for removing Tooronga Road and Glenferrie Road, are outlined below:

| Item | Excluding Delivery Efficiency | | Including Delivery Efficiency | |
|---|---|---|---|---|
| | **Glenferrie Road: Rail Under** *Detailed Estimate* | **Tooronga Rd: Rail Over** *Preliminary Estimate Only* | **Likely Delivery Efficiencies** *Preliminary Estimate Only* | **Combined Cost Total** *Preliminary Estimate Only* |
| **Base Construction** *Excl. Risk & Escalation* | **$245m** | **$218m** | **$41m** | **$422m** |
| **TEI Excluding escalation** | | **Low $290m** | | |
| | **$330m** *P50 unescalated* | **Mid $311m** | **$49m** | **Mid $592m** |
| | **$360m** *P90 unescalated* | **High $340m** | **$49m** | **High $651m** |
| **TEI Including escalation** | | | | |
| | **$349m** *P50 escalated* | **Mid $329m** | **$53m** | **Mid $626m** |
| | **$380m** *P90 escalated* | **High $358m** | **$53m** | **High $685m** |

A rapid economic appraisal has also been completed for the removal of Glenferrie Road and Tooronga Road together, which has determined there would be a BCR of **0.45** for combined delivery (7% discount rate). Further details are below:

**Table 29: Preferred option and Tooronga Rd Scenario Analysis**

| Benefits, costs & performance indicators | Glenferrie Standalone | Combined Glenferrie & Tooronga | Tooronga (Standalone) | Delta (%) |
|---|---|---|---|---|
| Project benefits (PV @7% discount rate) | | | | |
| Road & public transport benefits from VITM | | | | |
| Road travel time savings | $86.0m | $134.1m | $48.1m | *56%* |
| Vehicle operating cost (VOC) savings | $27.3m | $43.8m | $16.5m | *60%* |
| PT travel time savings & user charges - fares | $1.8m | $2.6m | $0.8m | *43%* |
| Total benefits estimated from VITM | $115.1m | $180.5m | $65.4m | *57%* |
| Other benefit estimates (approx.) | | | | |
| Road travel time reliability improvements | $40.6m | $63.3m | $22.7m | *56%* |
| Station upgrade amenity benefits | $1.1m | $2.1m | $1.1m | *100%* |
| Other benefits (residual value, safety, emissions) | -$1.5m | -$3.0m | -$1.5m | *100%* |
| Total other benefit estimates | $40.2m | $62.5m | $22.3m | *83%* |
| Total VITM based and approx. other benefits | $155.3m | $243.0m | $87.7m | *70%* |
| Project benefits (PV @7% discount rate) | | | | |
| Capital expenditure (P50) | $324.6m | $582.7m | $305.9m | *79%* |
| Additional operating costs | $2.9m | $5.1m | $2.3m | *79%* |
| Total project costs | $327.5m | $587.8m | $308.2m | *79%* |
| Key performance indicators (7% discount rate) | | | | |
| **NPV** | **-$172.2m** | **-$344.8m** | **-$220.5m** | |
| **BCR** | **0.47** | **0.45** | **0.28** | |

## 5.4 Value creation and capture opportunities

Victoria's *Value Creation and Capture (VCC) Framework* encourages project sponsors to maximise the environmental, social and economic value of government capital investments. by leveraging projects *above and beyond* the core scope, to provide additional value to the community and realise government policy objectives.

**Value creation** refers to actions, activities or policies to deliver enhanced public value from projects, in terms of economic, social and environmental outcomes, beyond what would ordinarily be achieved as a direct consequence of the investment.

**Value capture** refers to actions by government to collect from private beneficiaries a portion of the incremental economic value created by government investments and activities. These actions may generate revenue streams, assets or other financial value for government.

A detailed VCC Plan has been prepared for this project (refer to Appendix F).

### 5.4.1 Value creation

Potential value creation opportunities have been identified and are outlined in Table 29 and shown in Figure 21.

**Table 30 - Value creation opportunities**

| Opportunity | Preliminary cost | Description |
|---|---|---|
| **Pedestrian underpass upgrade** | $3.5 million | There is an existing pedestrian underpass connecting Talbot Crescent north of the rail corridor with Norford Grove to the south. The underpass, which allows pedestrians to cross the rail corridor beneath the tracks, is just beyond the extent of works for the core project scope. Upgrading the underpass will make it compliant with current standards through extended ramps with gentle grades for pedestrians and cyclists, widening of the existing underpass, improved lighting and improved wayfinding. |

These opportunities will provide significant benefit that contribute directly to the project objectives, such as a safer pedestrian environment and improved urban amenity, at a relatively low cost.

**Figure 21 – Value creation opportunity location**

### 5.4.2 Value capture

There is a value capture opportunity for property development at the level crossing removal site, which has been examined in an Integrated Development Opportunity (IDO) feasibility assessment.

IDO options have been considered east of the Glenferrie Road level crossing removal, with the most feasible option shown below

**Figure 22 – Potential IDO at Glenferrie Road**

This IDO option could comprise:

- Mixed commercial and residential development (minimum six levels) that will abridge the rail corridor
- Kooyong Station and surrounds situated at lower level than residences in Monaro Road and Talbot Crescent
- Ground level retail space fronting Glenferrie Road
- Upper levels containing residential apartments with appropriate setback
- On-site residential car parking and bicycle parking.

A preliminary assessment has indicated that there would be approximately $1m of enabling costs required to provide the foundations and bridging across the rail line. Assuming a six storey development, there would be approximately $23m of building costs. This option could provide a nett return of $2.7m.

Key benefits arising from this IDO include;

- The IDO will provide passive surveillance and sight lines to the new station precinct seven days a week, adding to perceptions of greater safety by commuters as well as providing extra commuters/patronage for the new Kooyong Station;
- The IDO will offer greater diversity and affordability of high-quality housing options in the highly sought-after Kooyong area. Future residents of the IDO will be close to the nearby Glenferrie Road retail strip (20m away) and numerous local parks and recreational areas (100m away), as well being able to access private schools and the Kooyong Tennis Club without the need to use a motor vehicle.
- Encouraging active transport through the use of public transport, walking and cycling Public transportation options include rail and the proposed new tram stop on Glenferrie Road directly in front of the IDO.
- New retail space/service for residents around the station precinct as well as public transport commuters;

- Increased economic activity and employment will result from the construction of the IDO both through direct construction jobs and activity, as well as to the local retail strip on Glenferrie Road
- Supporting reduction of urban sprawl;

However, there are a number of uncertainties and risks associated with this proposal. Some of these include:

- Planning constraints due to local height controls in the area
- Community sensitivities due to the location of a development in surrounding houses
- Full assessment of design and impacts would still be required, including finalising the costs of any enabling works
- Multiple interfaces with Federal, State and Local government for the development.

Should the Australian Government pursue this IDO, it is recommended that further development would be required to resolve these risks, with a separate funding submission to proceed with any enabling works and implementation of the proposal.

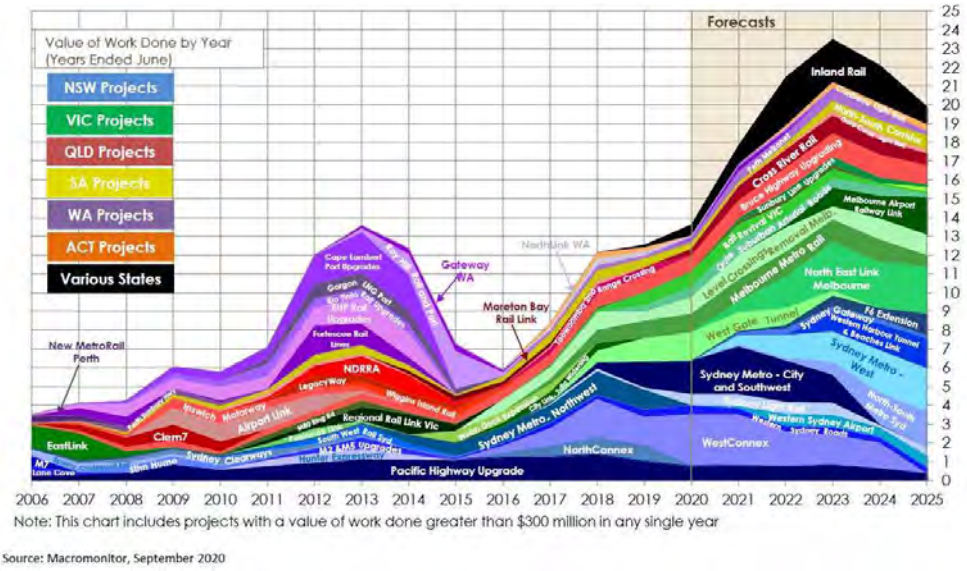
# 6 Commercial and Procurement

## 6.1 Context

### 6.1.1 Market context

Commitments to major transport infrastructure projects across Australia will result in high activity in the coming years. Figure 23 represents an estimated value of work based on commitments made prior to COVID-19, which are expected to continue during the recovery period. Many of these are rail projects that demand a high proportion of experienced major project delivery resources and specialised rail resources.

**Figure 23 – Major transport infrastructure projects across Australia [30]**




Source: Macromonitor, September 2020

Analysis [31] on capacity and capability to deliver projects in the investment pipeline, has identified many areas of likely constraints:

- Professional services: project directors, commercial/ legal directors, communications directors and senior managers;
- Technical services: signalling, tunnelling, transport planning, intelligent transport systems, cost engineers and quantity surveyors; and
- Potential other labour supply chain issues: utility authorities, interdependent government bodies, and Tier 1 geotechnical engineering firms.

### 6.1.2 Victorian major rail infrastructure projects

In Victoria, the Major Transport Infrastructure Authority (MTIA) is responsible for delivering large-scale transport projects. Within MTIA, major rail projects are delivered by: Rail Projects Victoria, the Level Crossing Removal Project and the Suburban Rail Loop Project.

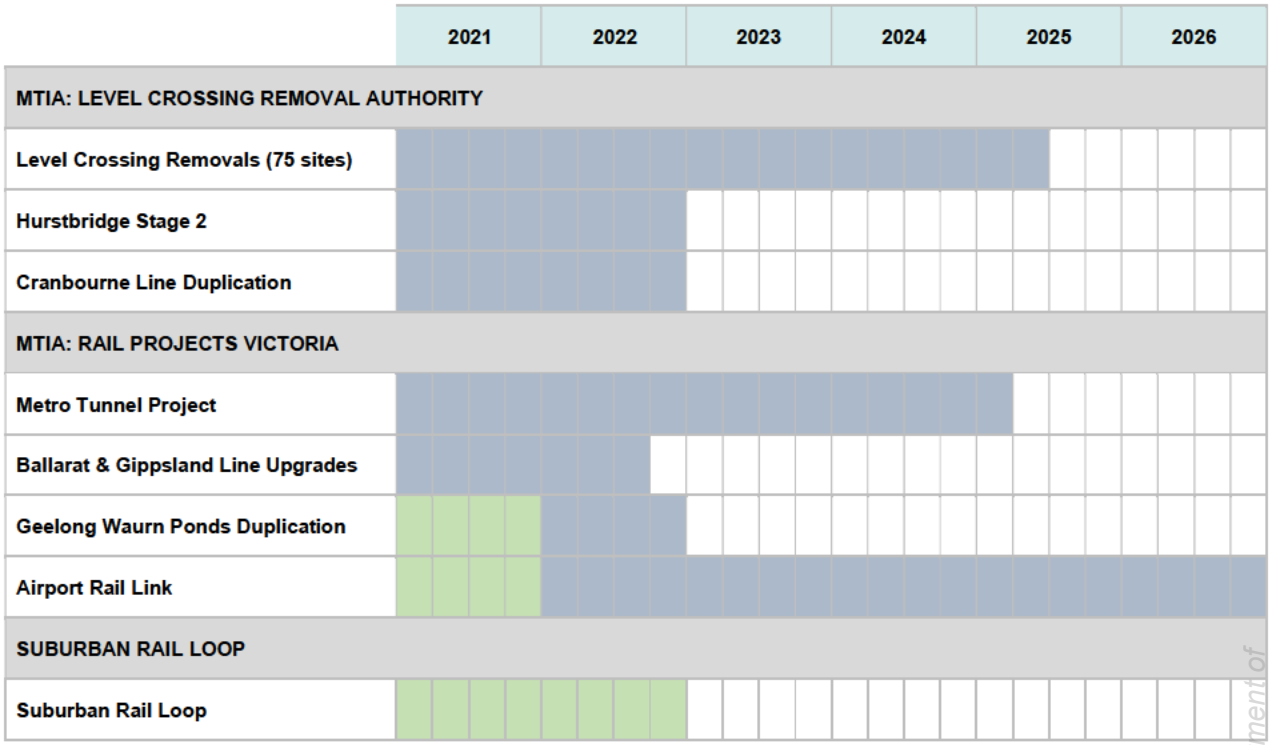
Outside of MTIA, the operators Metro Trains Melbourne (MTM), VicTrack and V/Line deliver smaller scale rail infrastructure upgrades.

30 Macromonitor. Australian construction outlook 2020 - Transport Infrastructure, 2020.

31 EY. Industry Capacity and Capability Study, 2016, undertaken on behalf of the Victorian Department of Economic Development, Jobs, Transport and Resources.

The scale of projects occurring across the Victorian rail sector are significant, representing considerable challenges across a range of areas, in particular for: capacity and capability, resourcing, supply chains, and coordination of rail occupations across the network. A list of key projects occurring broadly across the network are shown in Figure 24.

**Figure 24 - Project Construction Pipeline: Committed (Indicative Timeframes Only)**




## 6.2 Delivery agency

For the Glenferrie Road level crossing removal, it is recommended that the Delivery Agency is the Level Crossing Removal Project (MTIA-LXRP), because:

- MTIA-LXRP has been established as a dedicated project focussed on removing level crossings in Victoria. The project has a wide range of capability, resources, systems and processes for undertaking this task efficiently, building upon continuous learnings through its program of 75 level crossing removals;
- MTIA-LXRP has successfully removed other nearby level crossings on the Glen Waverley Line at Toorak Road and Burke Road, and is familiar with the site context and stakeholders.

## 6.3 Procurement strategy

### 6.3.1 Overview

The Glenferrie Road Level crossing removal project is proposed to be delivered utilising an existing LXRP Program Alliance, with MTIA-LXRP following its established processes to allocate, assess and award the Glenferrie Road Level Crossing Removal as an Additional Works Package under an LXRP Program Alliance. This strategy aligns with:

- The broad market approach to establish the five LXRP Program Alliances in 2016 and 2017; and
- The Portfolio Procurement Strategy Update endorsed by Victorian Cabinet in February 2019 that:
    - sets out that additional level crossing removals projects across the network will be delivered by LXRP Program Alliances; and
    - outlines the Allocation Framework that is used to determine which LXRP Program Alliance is the preferred delivery vehicle.

The following sections provide details on the LXRP Program Alliances, the Allocation Framework and how the State ensure value for money outcomes.

### 6.3.2 LXRP Program Alliances

In 2016 and 2017, the LXRP Program Alliances were established following competitive tender processes in which the market was approached with a broad opportunity to undertake:

- Initial Works Packages for Level Crossing Removals;
- Additional Works Packages for Level Crossing Removals; and
- Additional Works Packages for Network upgrades or Integrated Development Opportunities (IDOs).

The Program Alliances shown in Figure 25 each have a five-year term, with a five-year extension option.

**Figure 25 – LXRP Program Alliances including participants**


The Accredited Rail Operator (ARO), MTM, is a participant in each Program Alliance, and is subject to the same commercial arrangements as all other non-owner participants. This is due to the inputs MTM must provide to enable brownfield rail projects to proceed, including: design review, access management (occupations), customer communications, and specialist work that only MTM can provide (eg. traction power, updates to train control systems, certifying infrastructure for use, driver training, and driver acceptance of new infrastructure).

### 6.3.3 Procurement Assessment Summary

Prior to the establishment of Program Alliances, procurement assessments have been undertaken to evaluate the strategy for delivery of level crossing removals.

In **2016**, an assessment of the data, packaging, delivery models, and validation, recommended the Program Alliance model. This considered other models such as collaborative Design & Construct, and Early Contractor Involvement.

A qualitative assessment of procurement models against the procurement objectives was undertaken using the following rating system:

| Rating | Assessment Score | Description |
|---|---|---|
| ✓✓✓ | 3 | Procurement option is extremely effective in satisfying the requirements of the criterion. |
| ✓✓ | 2 | Procurement option is effective in satisfying the requirements of the criterion. |
| ✓ | 1 | Procurement option just satisfies the requirements of the criterion. |
| × | 0 | Procurement option is ineffective in satisfying the requirements of the criterion. |
| ×× | -1 | Procurement option is extremely ineffective in satisfying the requirements of the criterion. |

In order to score and rank each option, a weighted score is calculated by multiplying the 'Assessment Score' by the 'Importance' weightings: High = 3, Medium = 2 and Low = 1.

| Procurement objective | Importance Weighting | Assessment Score | | | |
|---|---|---|---|---|---|
| | | Traditional D&C | D&C (risk allocated/ collaborative) | Alliance | ECI |
| Price | ✓✓✓ | ✓✓ | ✓✓ | ✓ | ✓✓ |
| Time | ✓✓✓ | ×× | × | ✓✓✓ | × |
| Continuous Improvement | ✓✓ | ✓ | ✓✓ | ✓✓ | ✓✓ |
| Management of disruption | ✓ | ×× | ✓ | ✓✓✓ | ×× |
| Value Capture | ✓ | × | ✓ | ✓ | ✓ |
| Industry capacity and capability | ✓✓✓ | ✓✓ | ✓✓ | ✓✓ | ✓✓ |
| Risk management | ✓✓✓ | ×× | ✓ | ✓✓✓ | ✓ |
| **Un-weighted score** | | 2 | 9 | 15 | 7 |
| **Weighted score** (considering importance) | | 7 | 21 | 35 | 19 |
| **RANKING** (1 = highest preference) | | **4** | **2** | **1** | **3** |

The Delivery Model Assessment Framework and assessment against the Procurement Objectives identifies that the Alliance model is the preferred delivery model. This model is assessed to most effectively support the delivery of the project whilst managing risks that are complex in nature. The Alliance model provides a mechanism to collaboratively work through key scope and design issues during the tendering process and throughout delivery to support an innovative arrangement that

reflects the complexities and unknowns regarding the solution for the Project and required flexibility respond to disruption and changes in occupations planning.

Given the key characteristics of the level crossing removal projects and packages, the Alliance model is anticipated to most effectively support the achievement of the procurement objectives, and in particular the highly ranked objectives of value for money, flexibility and risk management. In particular it will manage:

- Complex delivery and construction methodologies in highly complex brown field operating environments, therefore management of key risks therefore being fundamental to achieving desired outcomes.
- A construction timeframe that reflects a desire to complete projects as soon as possibly practical to limit disruption. This means that project delivery requires complex sequencing of the program of works and time constraints that can have significant flow on issues to the program.
- Dependence at each site on a number of long lead-time, sequential occupations of the operating rail environment, with the role of MTM being critical to facilitate the development and delivery of packages. A series of interrelated works, approvals and other dependencies need to be planned to ensure that the overall construction delivery timetable can be met.
- Reliance on limited windows within which construction can take place, which exacerbates the importance of a delivery model that assures appropriate timing and is readily able to deal with any adjustments to project scheduling.
- Developing and/or facilitating Integrated Development Opportunities (IDOs) at the time of design and delivery of the level crossing removal or delivering sufficient enabling works to facilitate IDOs at a later date, whilst working with LXRA to achieve stakeholder input and planning and approval requirements.
- Multiple stakeholders combined with the above timing constraints and brownfield environments, raises the importance of developing a delivery model that can efficiently adapt scope and operations where unplanned or unexpected issues arise.
- An environment where flexibility is required to ensure other projects on the network outside level crossing removals, can be efficiently delivered.

In **February 2019** the Victorian Cabinet endorsed the MTIA-LXRP Portfolio Procurement Strategy Update (PPSU). A key recommendation of the PPSU was that additional level crossing removals projects across the network will be delivered by LXRP Program Alliances.

The PPSU outlines that LXRP's Program Alliances has a number of further benefits including:

- A systematic approach to the Victorian government's management and delivery of a multibillion dollar network upgrade and efficiency project that can be leveraged and improved on for the duration of the program
- Ability to leverage resources across all levels of project delivery, which has proven particularly important in the constrained labour market
- Realisation of cost and time efficiencies through use of standardised designs, leveraging continuous improvement and streamlined review and approval processes
- Timely mobilisation of teams, with the Accredited Rail Operator (MTM) and a mix of Tier 1 and Tier 2 contractors, under established contractual arrangements
- Flexibility to effectively coordinate and manage Track occupations and driver training requirements across the network and therefore minimise disruption across the transport system
- A culture shift where sharing of lessons learnt and efficiencies occurs across LXRP Program Alliances. For example, LXRP Program Alliances have formed a joint design group for the development of standardised design

- Flexibility to deliver additional or varied scope either as a result of unknown conditions in relation to the existing network or to support the timely delivery of enabling works for other projects in the rail portfolio
- Ability to leverage a competitively established commercial framework for the procurement of additional works, realising the benefits of competitive locked in commercial terms such as corporate overhead and profit
- Reduced procurement costs and time across LXRP and industry (when compared to traditional procurement processes), particularly important in a resource constrained market
- Achievement of Victorian government policies for sustainable employment, positively impacting social inclusion
- Robust application of the Value for Money (VfM) assessment.

The PPSU also details the Allocation Framework to determine the preferred LXRP Program Alliance to deliver the works that are to be delivered by MTIA-LXRP.

The Allocation Framework builds on MTIA-LXRP's initial corridor approach and sets out the factors to be considered in selecting the LXRP Program Alliance:

- **Construction technique**: Allocation of works should consider where LXRP Program Alliances are more suited to undertaking works based on a certain construction technique (e.g. Road over Rail) to leverage economies of scale and cost efficiencies which come through undertaking multiple similar projects. There is also the potential to apply continuous improvement learnings which will further improve efficiency.
- **Capability:** Allocation of works to consider the LXRP Program Alliances' past performance in developing and delivering works across the network. This includes considerations to where the LXRP Program Alliances have established a competitive advantage in undertaking complex works, for example, in certain geographical locations through establishing deep relationships with key stakeholders and an understanding of site specific risks (e.g. utilities).
- **Proximity:** Allocating sites to LXRP Program Alliances based on other works the LXRP Program Alliances are currently undertaking or planning to undertake in a similar geographic area (including parallel lines) in order to drive cost efficiencies, economies of scale, minimise disruption and effectively manage occupation schedules (e.g. "piggy back" on one occupation to deliver works occurring along the corridor).
- **Capacity:** Allocation of works should consider the capacity of existing LXRP Program Alliances to deliver the works required to provide opportunities for economies of scale and optimise industry capacity and capability to provide a continuous pipeline of work to ensure that one or two LXRP Program Alliances are not overloaded at the expense of other LXRP Program Alliances (noting the other factors above).

### 6.3.4 Additional Works Package development process

MTIA-LXRP has an established process for AWPs, that allows the award of additional works to be streamlined while maintaining the rigour and due diligence of a standard procurement process including a value for money assessment of the proposal (see paragraph 6.3.5 below).

Once an AWP has been allocated to an LXRP Program Alliance, the AWP Development Process allows rapid mobilisation of the design and development of the package. Subject to the MTIA-LXRP Program Alliance successfully meeting design and development milestones, the alliance is then requested to proceed with a Target Outturn Cost ("TOC")/AWP Proposal.

### 6.3.5 AWP value for money assessment

In July 2016 the Victorian Cabinet approved the MTIA-LXRP approach for approval of Works Package Proposals (AWP Proposal Approach) and MTIA-LXRP has been following this approach to achieve value for money outcomes for AWPs.

The approach includes MTIA-LXRP's assessment and evaluation of an AWP Proposal from a Program Alliance and includes:

- Engagement of an independent estimator to closely examine the TOC submitted by the MTIA-LXRP Program Alliance including assessment against benchmark rates to determine whether the price represents value for money to the State;
- The development of MTIA-LXRP's own price estimate ("LXRP Owner Benchmark") utilising the in-house cost control team based on data and cost ranges obtained from LXRP's cost dataset in accordance with the Benchmarking and Continuous Improvement Framework. The LXRP Program Alliance is incentivised under the commercial framework (via an increase to the performance pool) to submit a TOC that below the LXRP's Owners Benchmark.
- Assessment of the LXRP Program Alliance's performance through LXRP's performance monitoring and reporting activities (this includes the Track Record Test, a point in time assessment regarding how the alliance is performing against key performance criteria;
- Evidence from the LXRP Program Alliance to demonstrate price competition in procurement of materials and sub-contract works where open-book pricing is subject to independent review;
- Assessment of non-price elements in accordance with the VfM Statement[32] including proposed approach and delivery program, continuous improvement, risk management, team potential and stakeholder management; and
- Victorian Department of Treasury and Finance (DTF) support during the evaluation of AWP Proposals and as a member of the Executive Review Team.

If the proposal is assessed as Value for Money, the AWP is incorporated into the relevant Program Alliance Agreement.

### 6.3.6 Next steps

Upon delivery funding of the Glenferrie Road Level Crossing Removal, the next steps will occur for procurement:

- The assessment using the Allocation Framework will be undertaken by MTIA-LXRP, considering the criteria listed above, and the current resources/ capacity of the Program Alliances at the time the assessment is made;
- A TOC / AWP proposal will be prepared by the allocated LXRP Program Alliance;
- A Value for Money Assessment will be prepared against the AWP proposal, following the steps listed above;
- Following these steps, approval to commence construction will then be sought. This includes a recommendation to accept the AWP Proposal to the Victorian Government, and a commensurate Project Proposal Report to the Australian Government for release of construction/ delivery funding.

[32] Value for Money Statements are included in the Program Alliance Agreements

# 7 Planning and Environment

## 7.1 Summary

This chapter outlines land use considerations, planning and environmental approval requirements, and relevant aboriginal cultural heritage considerations.

In summary, the project solution will result in some localised impacts. The extent of these impacts has been informed by site investigations and due-diligence assessments. The likely impacts are considered to be within the scale expected for a project of this nature. Impacts will be managed noting recommendations of due-diligence assessments already undertaken and further impact assessments would be undertaken should the project solution proceed.

## 7.2 Land use considerations

Table 30 outlines land use considerations and potential impacts that will arise from implementation of the project solution.

**Table 31 – Land use considerations and potential impacts**

| Consideration | Potential impacts |
|---|---|
| **Land acquisition** | • No compulsory acquisition of land is required for the project solution. |
| **Voluntary Purchase Scheme (VPS)** | • Preliminary assessment indicates no properties will be eligible for the voluntary purchase scheme (VPS), due to roads providing a buffer between the rail corridor and residential properties on both Warra Street and Talbot Crescent.<br>• Based on amenity impacts from the station (light spill, operational noise etc), it is estimated nine properties in Warra Street could apply for VPS, based on compelling reasons.<br>• The potential for properties to seek inclusion in the VPS for compelling reasons would need to be assessed when further details regarding the design of the new station and the platforms are known. |
| **Temporary land use impacts** | • Temporary occupation of land outside the rail corridor boundary for construction purposes will be required. Whilst the details of these sites are still to be finalised, it is likely a combination of public and private land will be required.<br>• Discussions are in progress with Stonnington City Council for use of several reserves for site compounds, laydown and other temporary construction-related activities, including but not yet limited to Sir Zelman Cowen Park.<br>• Use of the access road within land owned privately by Kooyong Lawn Tennis Club will also be necessary given the immediate proximity to works zone.<br>• Powers to temporarily occupy land for construction purposes may be facilitated by the Major Transport Project Facilitation Act (MTPFA), if required, through the issue of a temporary occupation notice.<br>• Any land temporarily occupied will be required to be reinstated to pre-existing conditions unless otherwise agreed to with the landowner. Temporary occupation of land will not result in permanent loss of public open space. |
| **Permanent land use impacts** | • There may be a requirement to alter the rail corridor boundary in some locations to ensure all permanent rail infrastructure constructed as part of the project is located within rail corridor land. Alterations to the rail corridor boundary will be limited to land owned by of state government agencies and/or Stonnington City Council.<br>• The location and footprint of the new station will require access to, and permanent construction on, some parts of land currently leased to the Kooyong Lawn Tennis Club from MTM for the purposes of car parking and vehicle access. This is unl kely to impact upon the Kooyong Lawn Tennis Club's operations as impacted areas will be largely limited to landscaped areas.<br>• Permanent stormwater drainage infrastructure may be required through Sir Zelman Cowen Reserve, between Ta bot Crescent and Gardiners Creek. |
| **Historic heritage impacts** | • The rail corridor and l kely project works areas are adjacent to precincts of local heritage significance under the Stonnington Planning Scheme. Further historic heritage advice will be required during detailed design to ensure impacts are minimised. |

| Consideration | Potential impacts |
|---|---|
| | • The project will require the relocation and repurposing of the Kooyong Railway Signal Box and Switch House, which are of local heritage significance under the Stonnington Planning Scheme. Further historic heritage advice will be required to inform relocation options. Other major transport infrastructure projects have successfully relocated heritage buildings.<br>• The project is not l kely to impact any places listed on the Victorian Heritage Register (these being places of State or regional heritage significance).<br>• The project may impact archaeological sites. Consents to damage archaeological sites would contain conditions to ensure such sites were researched and recorded prior to being impacted. |
| **Aboriginal cultural heritage impacts** | • Refer to Section 7.3. |
| **Native vegetation removal impacts** | • The project may require removal of up to 4.727 ha of native vegetation, the majority of which is located in the rail corridor between Glenferrie Road and Heyington Station. It is likely a proportion of this vegetation will be retained and protected during construction. The extent of vegetation removed would be offset in accordance with the Victorian Department of Environment, Land, Water and Planning guidelines.<br>• The removal of native vegetation is unlikely to impact threatened species or threatened ecological communities as defined under Commonwealth or Victorian legislation. |
| **Residential amenity impacts** | • The project is l kely to result in localised amenity impacts to properties on the southern side of Warra Street, for example by light spill or operational noise, as these properties face the rail corridor. These impacts will be minimised through detailed design.<br>• Vegetation removal is likely to result in localised amenity impacts on residential properties near the rail corridor.<br>• Residential properties in the broader area are likely to experience improved amenity through reduced noise from the operation of the level crossing, reduced local congestion, improved safety, improved local connections and improved transport infrastructure. |

## 7.3 Planning and environment approvals

Table 31 sets out the planning and environment approvals that will be required for the project solution.

**Table 32 – Planning and environmental approvals for Glenferrie Road level crossing removal**

| Item | Approval required and timeframe | Preliminary assessment |
|---|---|---|
| **Victorian Planning and Environment Act 1987** | **Yes - 26-week process** | To allow the use and development of the land for the Project, planning approval will be required under Clause 52.03 of the Stonnington Planning Scheme. This will require the Project to be declared by the Premier as a project to which the Major Transport Projects Facilitation Act 2009 applies. |
| **Victorian Heritage Act 2017** | **Victorian Heritage Register approval – unlikely** | **Victorian Heritage Register – permit approval**<br>A historical heritage due-diligence assessment has been completed.<br>It is not likely the Project will trigger any approvals under this Act. The Kooyong Railway Signal Box and Switch House, which are protected by a local Heritage Overlay under the Stonnington Planning Scheme, have been assessed by a heritage consultant as being unlikely to meet the criteria for inclusion on the Victorian Heritage Register (VHR). No other places listed on the VHR, or which potentially meet the criteria for inclusion on the VHR, will be impacted by the project. |
| | **Victorian Heritage Inventory approval – likely** | **Victorian Heritage Inventory - consent to damage an archaeological site**<br>A historical heritage due-diligence assessment has been completed. The assessment concludes there is likely to be unrecorded archaeological sites within the project footprint. These archaeological |

| Item | Approval required and timeframe | Preliminary assessment |
|---|---|---|
| | | sites are likely to be footings or other remnants of previously demolished structures and buildings.<br>A consent under the Heritage Act is required to disturb or destroy such archaeological sites.<br>If the project proceeds, further specialist investigations will be carried out to confirm whether any archaeological sites will be impacted. If impacts are anticipated, a consent under the Heritage Act will be sought, which is a four week process. Such consents, if required, are able to be obtained without impacting on the project program and are routinely required for major transport infrastructure projects. |
| **Victorian Aboriginal Heritage Act 2006** | **Yes - approx. 32 week process** | The project footprint is within 200m of a waterway (Gardiners Creek and Yarra River) and is therefore defined as an area of aboriginal cultural heritage sensitivity under the Aboriginal Heritage Act 2006. The project would constitute a high impact activity under the Aboriginal Heritage Act 2006 and as such a Cultural Heritage Management Plan (CHMP) will be required. An aboriginal cultural heritage due diligence assessment has been completed, which confirms a CHMP is required.<br>A CHMP is usually required for major transport infrastructure projects. The CHMP will be prepared by an accredited aboriginal heritage adviser and evaluated by Aboriginal Victoria in consultation with the relevant Traditional Owner (TO) groups.<br>On the basis of the findings of the aboriginal cultural due-diligence assessment, it is unlikely the project will result in harm to any unrecorded aboriginal heritage places. One previously recorded aboriginal heritage place may be impacted by the project, however this is likely to be minimised or avoided. |
| **Victorian Environment Effects Act 1978** | **Unlikely** | The Project is not anticipated to trigger any referral criteria in the Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978. A flora and fauna (ecology) due-diligence assessment has been completed. This assessment confirms no ecology-related referral criteria are likely to be triggered. Based on other similar projects, it is not likely the project will trigger any other referral criteria. As such, the Project is unlikely to require referral under the Act. |
| **Victorian Environment Protection Act 1970** | **No** | The Project does not constitute a Scheduled Premises under Section 19A of the Act but the Project will need to comply with State Environment Protection Policies and Waste Management Policies.<br>Standard EPA environmental management measures for construction apply. Management and disposal of contaminated waste will require arrangements with the EPA. |
| **Australian Environment Protection and Biodiversity Conservation Act 1999** | **No** | Based on the historic heritage and flora and fauna (ecology) due-diligence assessments, the project will not have a significant impact on Matters of National Environmental Significance and does not require referral under the Act. |
| **Victorian Flora and Fauna Guarantee Act 1988** | **No** | Based on the flora and fauna (ecology) due-diligence assessment, the project will not require approval under the Act. |
| **Victorian Major Transport Projects Facilitation Act 2009 (MTPF Act)** | **Yes - approx. 30 weeks** | The project is likely to meet the criteria to enable declaration as a major project under Section 10(1)(b) of the MTPF Act. The MTPF Act is advantageous for delivery of the project, as it provides a range of powers relating to land assembly, land management, road management, temporary occupation of land and utilities.<br>The project delivery provisions of the MTPF Act will become available to the project proponent once the project has been declared and a Project |

| Item | Approval required and timeframe | Preliminary assessment |
|---|---|---|
| | | Area has been designated by the Minister for Planning under section 95 of the MTPF Act. |
| **Victorian Wildlife Act 1975** | **Unlikely** | Approval is required under the Act to handle wildlife which may be found during project delivery. Approvals under this Act are able to be obtained as required. |

## 7.4 Cultural heritage considerations

A Cultural Heritage Management Plan (CHMP) is required for the project because it is a high-impact activity within an area of aboriginal cultural heritage sensitivity as defined by the Aboriginal Heritage Act 2006.

The purpose of a CHMP is to manage impacts on aboriginal heritage and, where appropriate, permit harm to aboriginal heritage. In addition to confirming a CHMP is required for the project, the aboriginal heritage due-diligence assessment undertook research on the environmental, historical and archaeological context of the surrounding area. The assessment also reviewed known areas of aboriginal heritage sensitivity and previously recorded aboriginal heritage places in the surrounding area.

The aboriginal heritage due-diligence assessment concludes there has been a significant ground disturbance in the surrounding area as a result of urban development, land clearing, changes to watercourses and infrastructure construction. The likely project footprint, being the rail corridor and nearby road reserves, were assessed to have either no or low potential for previously unrecorded aboriginal heritage.

The aboriginal heritage due-diligence noted one previously recorded aboriginal heritage place located in Sir Zelman Cowen Park, approximately 200 metres north-east of the level crossing adjacent to Gardiners Creek. This heritage place is an extensive artefact scatter however has been previously assessed to be in poor condition. Sir Zelman Cowen Park has been heavily disturbed, however previous assessments have estimated between 20 and 40 per cent of the aboriginal place may remain. This aboriginal heritage place may be impacted by temporary occupation of Sir Zelman Cowen Park. The CHMP would provide a process to manage any impacts. However, given any project impacts would be limited to temporary use of Sir Zelman Cowen Park, it is expected any impacts to the aboriginal heritage place are able to be minimised or completely avoided.

# 8 Project Schedule

## 8.1 Project schedule summary

The delivery phase of Glenferrie Road level crossing removal has been planned assuming a 2021-22 Federal Budget announcement for full funding of the project. Key milestones are:

- Project Award: **Late 2021**
- Start Construction: **Early 2022**
- Works Completion: **Early 2024**

A summary of the key stages and associated activities is outlined in Table 32 (see Appendix E for a detailed project schedule).

**Table 33 – Key stages and associated activities (Assuming full funding in 2021-22 Federal budget)**

| Stage | Activities | Timing |
|---|---|---|
| **Site establishment and enabling works** | • Construction of site compound and site staff carpark<br>• Vegetation removal works<br>• Delineating fencing installation<br>• Construction of project haul roads<br>• Early utility relocation and protection works | Q1 2022 – Q2 2022 |
| **Offline works** | • Rail systems enabling works<br>• Offline piling works<br>• Track drainage<br>• Pump station installation<br>• Utility relocation<br>• Service bridge installations across Glenferrie Road | Q2 2022 – Q2 2023 |
| **Main occupation** ***Subject to review & availability of network occupation schedules*** | • Removal and relocation of signalling hut to north east of level crossing<br>• Removal of remaining track, ballast and overhead lines<br>• Online piling<br>• Excavation and shotcreting<br>• Road bridge construction<br>• Tank slab construction<br>• Track drainage works<br>• Station construction<br>• New track and rail systems | Q2 2023 – Q3 2023 |
| **Works Completions** | • Concourse canopy<br>• Service installations<br>• Architectural panel and finishing works<br>• Fencing and cladding installations<br>• Paving and outdoor furniture<br>• Lift completion and commissioning<br>• Defect rectification<br>• Station opening<br>• Landscaping<br>• Reconstruction of local roads<br>• Construction of commuter carpark<br>• Construction of shared user path | Q4 2023 – Q1 2024 |

## 8.2 Key milestones

Table 33 provides a high-level summary of the key milestone dates for the Glenferrie Road level crossing removal project.

**Table 34 – Project key milestones (Assuming full funding in 2021-22 Federal budget)**

| Key milestones | Timing |
|---|---|
| Project Award | Late 2021 |
| Planning and environmental approvals | Early 2022 |
| Construction commencement | Early 2022 |
| Major occupations (Glen Waverley Line)<br>***Subject to review & availability of network occupation schedules*** | Mid 2022 – 4 days<br>Late 2022 – 7 days<br>Mid 2023 – 35 days (main occupation)<br>Late 2023 – 2 days occupation |
| Tram occupation (Yarra Trams Route 16) | Mid 2022 – 2 days<br>Late 2022 – 1 day<br>Early 2023 – 7 weeks |
| Kooyong Station closure | Early 2023 – 12 weeks |
| Glenferrie Road Closure | During construction – 3 weeks<br>Mid 2023 – 4 weeks |
| Works Completion | Early 2024 |

# 9 Project Budget

## 9.1 Capital costs

Details of the Capital funding request is outlined below:

**Table 35 – Capital costs (core and additional project scope)**

| Capital Funding Element | $ million | | | | | |
|---|---|---|---|---|---|---|
| | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 2024-25 | 5 year total/ TEI |
| **Glenferrie Road Level Crossing Removal** | | | | | | |
| Total Estimated Investment | **8.0** | 75.4 | 165.2 | 131.2 | | **380.0** |
| Less Funds from Other sources | | | | | | 0.0 |
| Less Existing funding: business case & early dvpt | 8.0 | | | | | -8.0 |
| **Net Impact Capital: Australian Govt** | **0.0** | **75.4** | **165.2** | **131.2** | **0.0** | **372.0** |
| **Value Creation Option:** Pedestrian Underpass Enhancement | | | | | | |
| Total Estimated Investment | | | | 3.5 | | 3.5 |
| Less Funds from other sources | | | | | | 0 |
| Less Existing Funding | | | | | | 0 |
| **Net Impact Capital: Australian Govt** | **0.0** | **0.0** | **0.0** | **3.5** | **0.0** | **3.5** |
| **TOTAL Net Impact Capital: Australian Govt** | **0.0** | **75.4** | **165.2** | **134.5** | **0.0** | **375.5** |

Details of the Total Estimated investment cost are included below. Full details of the cost estimate are included in the Supplementary cost estimate report

**Table 36 – Headline project cost summary: Glenferrie Road Level Crossing Removal**

| Element | Estimate | Table reference |
|---|---|---|
| **Glenferrie Road Level Crossing Removal** | | |
| **Base cost estimate** | **$294m** | Table 37 |
| Base risk allocation | $52m | Table 37 *P50 esc- Base Cost Estimate* |
| Project cost estimate | $349m | Table 37 *P50 esc* |
| Contingency | $30m | Table 37 *P90 esc. - P50 esc.* |
| **Total Estimated Investment** | **$380m** | Table 37 *P90 esc.* |
| **Value Creation and Capture Options** | | |
| **Value Creation option** Pedestrian Underpass Enhancements | **$3.5m** | |

**Table 37 – Glenferrie Road Project cost estimate**

| Item | Amount ($m) |
|---|---|
| Direct Construction Cost | 147 |
| Design | 16 |
| Contractor Project Mgt/ Overheads | 59 |
| **TOTAL CONSTRUCTION COST** excl. risk, escalation & contractor margin | **223** |
| Contractor margin | 22 |
| **TOTAL CONSTRUCTION COST** excl. risk & escalation (Base Construction Estimate) | **245** |
| Project Development & Delivery Management | 19 |
| Package / Program Administration | 17 |
| Business Case & Early Development | 8 |
| Land Acquisition | 0 |
| Minor Works | 5 |
| **TOTAL PROJECT COST excl. risk** | **294** |
| P50 risk | 36 |
| **P50 Total (Excl escalation)** | **330** |
| P90 risk | 30 |
| **P90 Total (Excl escalation)** | **360** |
| **P50 Escalated** | **349** |
| **TOTAL ESTIMATED INVESTMENT (TEI) P90 escalated** | **380** |

## 9.2 Funding Details

Existing funding for this project is for the Business Case and early development costs, of $8 million.

**Table 38 –Output funding**

| Description of funding provided | 2021-22 | 2022-23 | 2023-24 | 2024-25 | 2025-26 |
|---|---|---|---|---|---|
| | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Table 39 – Existing funding**

| Description of funding provided | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 2024-28 |
|---|---|---|---|---|---|
| Glenferrie BC and Early Development | 8.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Table 40 – Existing revenue estimates for this initiative**

| Existing revenue financial impact | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 5 year Total | Ongoing |
|---|---|---|---|---|---|---|---|
| Existing revenue in the forward estimate | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Table 41 – New revenue**

| New revenue financial impact | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 5 year Total | Ongoing |
|---|---|---|---|---|---|---|---|
| New revenue initiatives | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Impact on existing revenue increase/(decrease) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Net revenue impact** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** |

## 9.3 State Staffing Impacts

The project is not expected to change long-term Victorian public sector staffing numbers.

**Table 42 - Staffing impacts (VPS staff and contractors)**

| Functional category | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | Ongoing |
|---|---|---|---|---|---|---|
| New Victorian Public Service (VPS) staff | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Existing VPS staff | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| New non-VPS staff | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Existing non-VPS staff | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total staff** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |

## 9.4 Operational costs

Preliminary operational expenditure estimates have been determined through consultation with the rail operator (MTM, the tram operator (Yarra Trams) and DOT.

MTM costs have been based on level crossing removals at similar sites. Further work is required in the next phase of the project to refine this estimate focussing on site specific elements, including identifying potential additional savings by not having to manually operate the tram square or maintain associated train control infrastructure.

**Table 43 - Summary of operational costs**

| Item | Glenferrie Road: Preliminary Operational Cost Estimate per annum |
|---|---|
| **MTM Operational costs** | |
| MTM Infrastructure | $312,453 |
| MTM Operational Control Systems | $119,837 |
| MTM Staff | |
| **MTM operational costs Total** | **$432,290** |
| **Yarra Trams Operational Costs** | |
| Tram square maintenance costs (onroad infrastructure) | -$232,848 (Savings) |
| New shelters: Power supply, signage, Passenger information display | $17,050 |
| **Yarra Trams operational costs Total** | **-$215,797 p.a. (Savings)** |

| | |
|---|---|
| **VicRoads/ DOT bridge maintenance Total** | **$5,000 p.a.** |
| **TOTAL OPERATIONAL COSTS** | **$221,493 p.a.** |

**Table 44 – Ongoing operational costs**

| **Ongoing operational costs of new assets** | | | |
|---|---|---|---|
| Does the submission include <u>all</u> ongoing costs associated with maintaining and operationalising the capital component of this submission? | ☐ Yes – these are included in the output funding tables | ☐ No | ☒ Partial |
| If 'no' or 'partial', please specify any ongoing components not included with:<br>• a high-level estimate of funding requirements; and<br>• timing | Refinement and confirmation of operational costs is required as part of the next phase of this project | | |

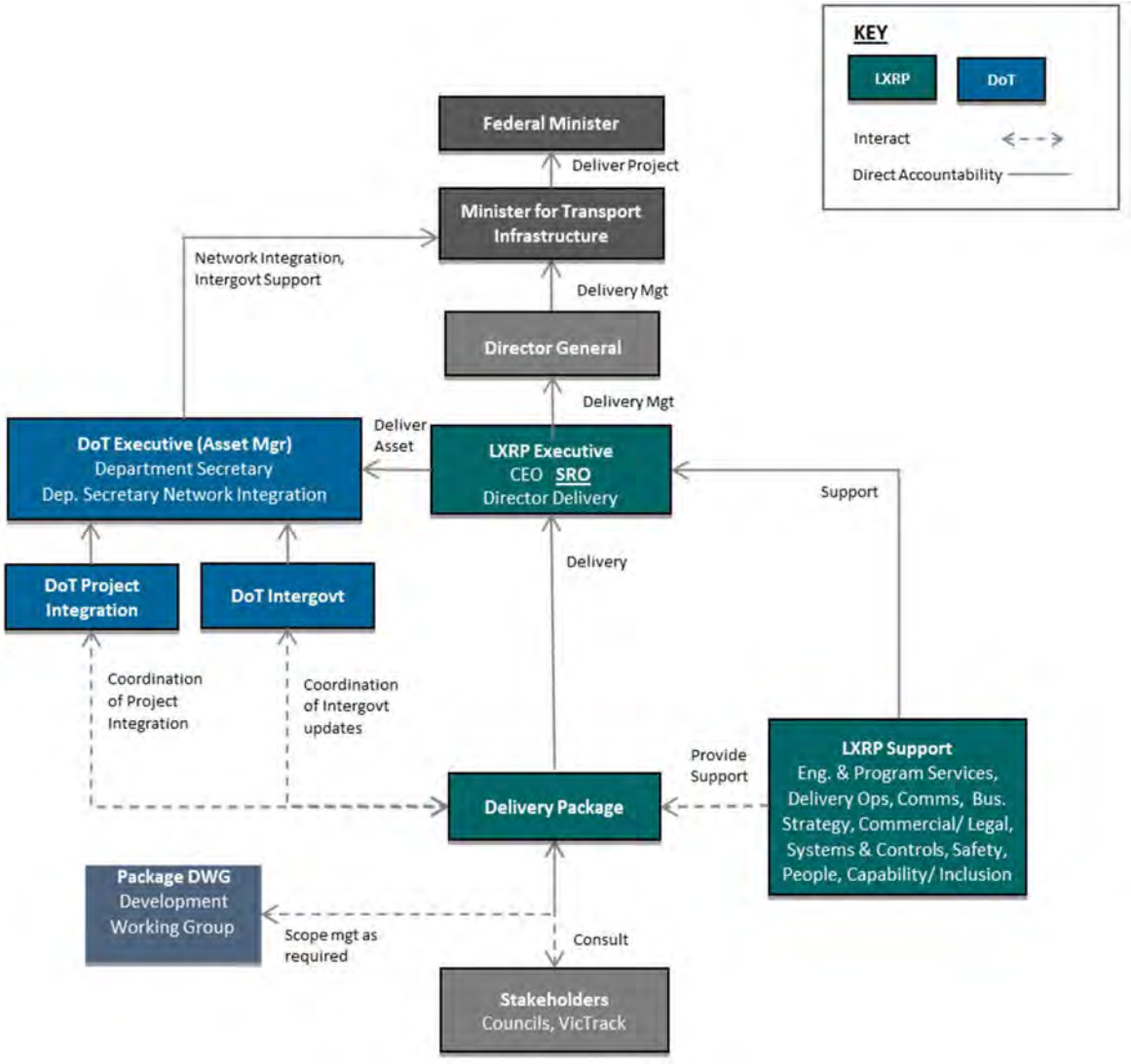
# 10 Management

## 10.1 Governance framework

As this project will be funded by the Commonwealth Government it will be delivered in accordance with the National Partnership Agreement (NPA) and Notes on Administration (NoA). MTIA-LXRP, in consultation with the Victorian Department of Transport, will comply with the NPA and NoA for this project.

A governance structure specific to the delivery of the project solution for the Glenferrie Road level crossing removal has been developed and is shown in Figure 26. This outlines the governance relationship between key departments and agencies in the Victorian Government, and the proposed relationships with the State Minister's Office (MTI), the Federal Department (Department of Infrastructure and Regional Development) and Infrastructure Australia (IA).

**Figure 26 – Governance structure for delivery of project solution**



## 10.2 Stakeholder engagement and communications plan

LXRP has an overarching Communication and Stakeholder Engagement Strategy, which takes a phased approach to engagement. It sets out the basis for consultation and engagement activities that support the development, construction and commissioning stages of level crossing removal projects.

A Communications and Stakeholder Engagement Plan specific to the Glenferrie Road level crossing removal project will be finalised upon project award. This will include the interface with the Commonwealth Government who is funding the project.

The Plan will guide interactions with government, the community and stakeholder groups in relation to the Glenferrie Road level crossing removal project during the development, design, procurement and delivery stages. Implementation of the Plan will help to raise stakeholder and community awareness, facilitate appropriate opportunities for stakeholder participation on project negotiables, and manage expectations on design outcomes and construction impacts. The key stakeholders and their interests that have been identified, and the proposed engagement approaches, are set out in Table 48.

**Table 45 – Key stakeholder interest analysis**

| Stakeholder | Interest | Proposed approach |
|---|---|---|
| **City of Stonnington** | • Minimising temporary construction/amenity impacts to community and local businesses<br>• Disruption of rail services on the Glen Waverley line<br>• Development and urban design of Kooyong station precinct and adjacent Easy Access tram stop<br>• Potential integrated development opportunity east of Glenferrie Road within existing station precinct<br>• Traffic management during construction<br>• Design and maintenance of new assets<br>• Temporary occupation of council land for construction<br>• Potential temporary surface impacts to Sir Zelman Cowen Park from drainage upgrade (Avenel Road to Gardiners Creek)<br>• Potential change to Warra Street/ Glenferrie Road intersection configuration<br>• Vegetation removal<br>• Potential land transfers to accommodate permanent station infrastructure | • Operational briefings<br>• Meetings<br>• Communications material<br>• Workshops<br>• Email |
| **Aboriginal Victoria** | • Review and approval of CHMP and project adherence to conditions | • Briefings<br>• Meetings |
| **Heritage Victoria** | • Relocation of the existing heritage signal hut and building within the Kooyong station precinct | • Briefings<br>• Meetings |
| **Melbourne Water** | • Potential impact on assets (water distribution main and stormwater drain)<br>• Drainage design | • Briefings<br>• Meetings |
| **Yarra Valley Water** | • Water and sewer asset protection and relocations | • Briefings<br>• Meetings |
| **Multinet Gas** | • Potential impact on local assets and service delivery | • Briefings<br>• Meetings |
| **Energy Companies – Citypower / United Energy** | • Protection and relocation of existing power assets<br>• Potential temporary customer outages during relocations | • Briefings<br>• Meetings |
| **Telecommunications – Telstra / NBN / UEComm** | • Protection and relocation of telecommunications assets | • Briefings<br>• Meetings |

| Stakeholder | Interest | Proposed approach |
|---|---|---|
| **VicTrack** | • Kooyong station development<br>• Potential temporary and permanent impacts to VicTrack leases with St Kevin's College and Kooyong Lawn Tennis Club | • Briefings<br>• Meetings |
| **Public Transport Victoria** | • Bus operations during construction<br>• Rail occupations and rail replacement bussing<br>• Any changes to the bus interchange | • Briefings<br>• Meetings |
| **Department of Transport (Roads)** | • Traffic management during construction<br>• Design of Stop 65 Easy Access tram stop<br>• Consideration of potential speed limit change related to relocated pedestrian crossing | • Briefings |
| **Yarra Trams** | • Design of Stop 65 Easy Access tram stop<br>• Disruption to Route 16 Tram users<br>• New substation development and integration with project infrastructure | • Briefings<br>• Meetings |
| **Australian Government Department of Infrastructure, Transport, Regional Development and Communications** | • Provision of funding for the business case into the Glenferrie Road level crossing<br>• Governance of the project, given Commonwealth Funding | • Briefings |
| **Disability groups or advocates** | • DDA arrangements for temporary bussing and station access during construction, and permanent Glenferrie station design | • Briefings<br>• Meetings |
| **Kooyong Lawn Tennis Club (KLTC)** | • Temporary and permanent occupation of land for construction (incl. VicTrack land leased to KLTC) and potential impacts to club operations<br>• Visual impact of new station precinct works in the rail corridor from KLTC<br>• Re-grading of Glenferrie Road impacting existing fence<br>• Temporary access changes and traffic management | • Briefings<br>• 1:1 meetings |
| **St Kevin's College** | • Temporary impacts to Moonga Road underpass access into the school<br>• Potential construction / land impacts from CSR works | • Briefings<br>• 1:1 meetings |
| **Vision Australia** | • Potential site compound and laydown area adjacent to facilities<br>• DDA features of station design and pedestrian connections to their facility<br>• Temporary access changes and traffic management | • Briefings<br>• 1:1 meetings |
| **Kooyong Neighbourhood Activity Centre traders** | • Amenity impacts from construction<br>• Potential loss of car park spaces to accommodate relocated pedestrian crossing<br>• Station and precinct design<br>• Trader support during construction<br>• Property damage<br>• Potential access changes to Warra Street | • Communications materials incl. letter, works alerts and newsletters<br>• Door knocks<br>• 1:1 meetings<br>• Email |

| Stakeholder | Interest | Proposed approach |
|---|---|---|
| **Private landowners adjacent to level crossing** | • Visual and noise amenity impacts from permanent design solution<br>• Mitigation measures for construction noise, vibration, air quality and light spill<br>• Property damage<br>• Temporary access changes and traffic management<br>• Vegetation removal | • Communications materials incl. letter, works alerts and newsletters<br>• Door knocks<br>• 1:1 meetings<br>• Email |
| **Glen Waverley line passengers** | • Disruption to rail services - travel time impacts, journey availability, punctuality and reliability<br>• Temporary station and car park closures, and temporary offset car park operation<br>• Ease and safety of temporary bussing and interchange operations | • Communications material, including advertising and signage<br>• Station pop ups<br>• Surprise and delight activities |
| **Route 16 tram passengers** | • Disruption to Yarra Tram services | • Communications material, including advertising and signage<br>• Station pop ups<br>• Surprise and delight activities (TBC] |
| **Glenferrie Road users** | • Disruption from temporary road or lane closures impacting route and journey times<br>• Knowing what is happening in advance so they can plan ahead<br>• Ease of detour routes<br>• Benefits of level crossing removal to travel times | • Advertising<br>• VMS |
| **Emergency Services – Hawthorn Fire Brigade (FSV station), VicPol and Ambulance Victoria** | • Access to site<br>• Temporary alterations to local traffic arrangements | • Briefings<br>• Meetings |
| **St Kevin's College** | • Station closure<br>• Temporary altered local traffic arrangements<br>• Opportunity to engage students in the project and promote rail/construction/engineering careers<br>• Temporary impacts to Moonga Road underpass access into the school<br>• Potential construction / land impacts from CSR works | • Presentations<br>• Site tours<br>• Educational opportunities<br>• Educational content<br>• Briefings<br>• 1:1 meetings |
| **Scotch College** | • Station closure<br>• Temporary altered local traffic arrangements<br>• Opportunity to engage students in the project and promote rail/construction/engineering careers | • Presentations<br>• Site tours<br>• Educational opportunities<br>• Educational content<br>• |

| Stakeholder | Interest | Proposed approach |
|---|---|---|
| **Local community groups:**<br>• **Kooyong Underground**<br>• **Vision Australia**<br>• **Hearing Australia**<br>• **Rotary Club of Glenferrie** | • Local construction impacts<br>• Opportunities to engage with the project on for community interest | • Communications material<br>• Email |
| **Local park / sports grounds users** | • Local construction impacts and traffic disruptions affecting access to grounds | • VMS<br>• Signage |
| **Bicycle User Groups:**<br>• **Hawthorn Cycling Club**<br>• **Boroondara Users Group** | • Safety, ease and length of any detours<br>• Connections to SUPs and cycling trails (e.g. Gardiners Creek) | • Signage<br>• Email |
| **Local media – Stonnington Leader, The Age, Herald Sun, TV and Radio** | • Local story angles | • Media releases/responses<br>• Media photo opportunities/events |

## 10.3 Delivery management strategy

The Major Transport Infrastructure Authority: Level Crossing Removal Project (MTIA-LXRP), was established by the Victorian Government to oversee one of the largest rail infrastructure projects in Victoria's history: removal of 75 level crossings by 2025, as well as other rail network upgrades such as new train stations, track duplication and train stabling yards.

Program Alliances have been established to deliver the projects, each with its own systems and procedures. At a program-wide level, MTIA-LXRP has also established a wide range of functions and processes to support each project. These have been progressively built upon continuous learnings over a number of years, which have resulted in a high degree of delivery efficiency across the whole program. The functions and processes include:

- **Business Strategy:** Strategic support, including governance, business planning and research. This includes special initiatives on data management across project delivery.
- **Commercial and Legal:** Includes support for an Alliance Development Framework, which outlines the preparation of Alliance Work Package Proposals.
- **Engineering and Program Services:** Oversight of the design, plans and processes to successfully deliver on the objectives of the projects. This includes engineering management, value engineering, planning, land, environment, urban design, sustainability, and property development.
- **Industry, Capability and Inclusion:** A focus on development of the skills and capability of the rail industry, to meet labour needs for rail infrastructure projects. This includes creating a diverse and inclusive workforce to maximise social benefit.
- **Knowledge Sharing:** Portals including Extranet and EHub, allow for sharing of information and lessons learnt across the projects.
- **Network Disruptions:** A special focus on integrated management of disruptions across the rail and road networks, during construction a large scale of concurrent infrastructure projects.
- **Project Controls:** A focus across the project on consistent scoping, staging constructability, scheduling, cost, risk, utilities and quality.

- **Safety:** Provides a program-wide focus on a high safety & health performance. This includes: a behavioural (LeadSafe) program, knowledge sharing, initiatives, and issue resolution.
- **Strategic Communications:** Management of program-wide stakeholder relations activities, and consistent customer interfaces.

## 10.4 Change management

No change management strategies are required for LXRP and other agencies to effectively deliver the Glenferrie Road level crossing removal project, nor is any form of staff restructuring anticipated. In the event that further level crossing removal projects are funded (i.e. Tooronga Road) the delivery program will be reviewed based on timing commitments made by government.

Upon completion of the level crossing removal, most of the assets will be operated and maintained by the rail and tram operators. The transition to the operational stage will involve training drivers and staff on the new rail station and track layouts, plus incorporation of new assets into the relevant rail systems. These training and completion costs have been reviewed by MTM and Yarra Trams and are included in the cost estimate for this project

## 10.5 Performance measures and benefits realisation

A set of KPIs that have been developed for the project as outlined in Chapter 2, also reflected on the Investment Logic Map and Benefits Management Plan included in Appendix B.

There are key uncertainties with the benefits baselining and reporting, due to the lasting impacts of COVID-19 pandemic on travel behaviour and mode share.

This will require re-baselining of key performance indicates, within six months of construction commencement.

## 10.6 Risk management

The project will be subject to LXRP's risk management approach, which is based upon the principles of AS/NZS ISO 31000:2009 (Risk Management Principles and Guidelines) and the Victorian Government Risk Management Framework.

A risk and opportunity register has been developed during the development of the project. This provides an overview of the key risks across a range of categories that cover relevant activities throughout design, development, construction, delivery and closure activities. The criticality of each risk has been graded, along with actions and responsibilities.

Risks relating to the project solution have been identified and described in Chapter 3. A project schedule risk assessment has been developed and described in Chapter 8. Key project risks (those rated significant or high) that have been identified through the development of the project are shown in Table 50.

**Table 46 – Key project risks**

| Key risk | Risk category | Criticality | Management |
|---|---|---|---|
| Signalling arrangement design yet to be finalised, scope may extend from Burnley to Darling | Design | Significant | Engage with Accredited Rail Operator to ensure signalling works are consistent with its Safety Management System |
| Final stakeholder approval for tram stop upgrade design | Design | Significant | Ongoing work with Yarra Trams and Victorian Department of Transport to finalise tram stop arrangement |
| Talbot Crescent underpass may require rework, with DDA compliant design | Design | High | New underpass being considered as VCC opportunity. |
| Flooding of trench due to low-lying topography | Design | Significant | Understand potential flooding impacts on new rail trench. |
| Rail alignment tie-in at Moonga Road bridge to avoid any further works | Design | High | Undertake assessment of different permanent rail alignments to ensure no capital works are required. |
| Interface of Yarra Trams substation proposed for intersection of Glenferrie Road | Technical stakeholder | High | Engagement with Yarra Trams to ensure alignment of design solutions |
| Road truncation advocated by residents of Warra Street and Talbot Crescent | Design | Significant | Determine council and DOT interest in truncation of local roads. |

## 10.7 Exit strategy

The procurement process and preconstruction activity can be terminated prior to entering into binding commitments for implementation of the project solution without significant cost imposts. This is possible until such time as contracts are awarded.

## 10.8 Readiness and next steps

To progress to the next stage of the project, the following steps will be undertaken:

- Refine and finalise project solution design, including further engagement with key stakeholders and the community on the design solution.
- Obtain required consents and approvals.
- Commence procurement.
- Commence construction.
- Refine the Operational Cost estimate to focus on site specific elements, including identifying potential additional savings by not having to manually operate the tram square or maintain associated train control infrastructure.
- Subject to Australian Government advice, update the Business Case to include the Tooronga Road level crossing removal and commence further development activities for the Tooronga Road site.
- Development planning for removal of the Madden Grove level crossing removal, including feasibility assessment, to be considered in the context of the project schedule of the Glenferrie Road (and potential Tooronga Road) level crossing removals to avoid prolonged disruption to the Glen Waverley Line.

# Appendix A: Checklist and Sign-off

**Victorian Department of Treasury and Finance checklist**

| **Initiative title:** | **Glenferrie Road Level Crossing Removal** | **Yes** |
|---|---|---|
| **Department:** | **Department of Transport** | |
| Was DTF/DPC consulted during the preparation of the business case and/or costings agreed? | | ☒ |
| Has a Business case cover sheet been completed to accompany this business case? | | ☐ |
| Has the SRO signed an attestation statement for this business case? | | ☒ |
| Is the project High Value High Risk (HVHR) (i.e. has a PPM been completed)? | | ☒ |
| If the project is HVHR, has a Gateway review for gates 1/2 been undertaken? | | ☒ |
| If applicable, have the relevant value creation and capture documents been completed and included? | | ☒ |
| Have the following documents been submitted to DTF?: | | |
| • Project Profile Model (PPM) | | ☒ |
| • Investment Logic Map (ILM) | | ☒ |
| • Benefits management plan | | ☒ |
| • Procurement strategy | | ☒ |
| • Risk register | | ☒ |
| • Detailed project schedule | | ☒ |
| • Detailed cost plan | | ☒ |
| • Red rated Gateway recommendations in the Recommendations Action Plan (RAP) | | ☒ |

**Business Case finalised: January 2021 (Version 1)**

**Submission to Commonwealth: June 2021 (Version 2)**

| | | |
|---|---|---|
| **Prepared by:** | Richard Myles<br>Deputy Director, Program Investments<br>Level Crossing Removal Project | **Date:** 24 June 2021 |
| **Approved by:** | Kevin Devlin<br>Chief Executive Officer<br>Level Crossing Removal Project | **Date:** |
| **Deputy Secretary:** | Will Tieppo<br>Deputy Secretary Network Integration<br>Department of Transport | **Date:** |

**Senior Responsible Officer attestation**

The undersigned attests this business case has been prepared:

- with consideration of the applicable sections of the *Project Development and Construction Management Act 1984 (Vic)* (refer section 7.2.1) and the *Investment Management and High Value and High Risk Guidelines* (both available on the DTF website). ☒
- that the business case will achieve the full intended service outcome. ☒

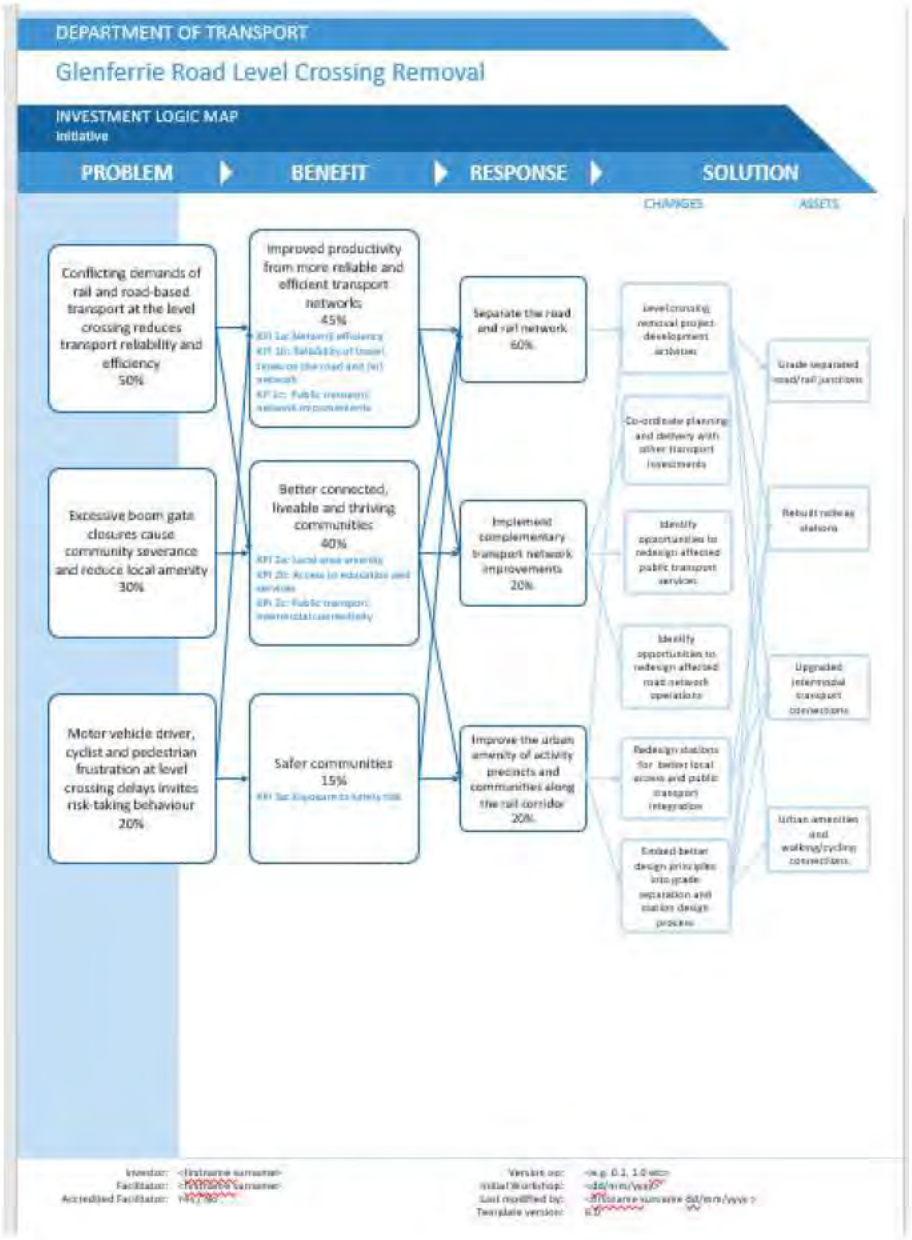
**Signature:**

| | | |
|---|---|---|
| **Name of Senior Responsible Officer:** | Kevin Devlin | Will Tieppo |
| **Title:** | Chief Executive Officer<br>Level Crossing Removal Project | Deputy Secretary Network Integration<br>Department of Transport |
| **Date:** | | |

**Infrastructure Australia checklist**

| **Business Case Checklist (see IAAF page numbers for more detail)** | | | |
|---|---|---|---|
| **Item** | **Y/N** | **Item** | **Y/N** |
| Information is finalised | Y | Timeline of when costs and benefits realised (p.59) | Y |
| Information is not out of date | Y | Full cost-benefit analysis model provided (p.36, 59) | Y |
| Submission made for Stage 4 assessment | Y | Underlying demand forecasts with assumptions (p.57) | Y |
| State/territory support or approval provided (p.54) | Y | Land use plan provided (p.57) | Y |
| Project description provided (p.54) | Y | Integrated planning (e.g. land use and transport) | Y |
| Alignment with strategic objectives (p.56) | Y | Risk analysis provided (p.61, 74, 116) | Y |
| Defines base and project cases (p.21, 55) | Y | Deliverability information included (p.61, 74) | Y |
| Options analysis provided (p.25) | Y | Post Completion Review plan included (p.36, 74) | Y |
| At least two options in the business case (p.28) | Y | Funding and financing considered (p. 61) | Y |
| Project concept or scheme design provided (p.53) | Y | **Non-mandatory:** | |
| Project cost report provided (p.57) | Y | On IPL as Initiative (p.18) | N |
| Quantification of costs and benefits detailed (p. 59) | Y | Project cost report peer review (p.57) | Y |
| Inputs/assumptions for costs and benefits (p.59) | Y | Transport modelling peer review (p.56) | Y |
| Breakdown of cost-benefit analysis results (p.59) | Y | Economic appraisal peer review (p.60) | Y |

# Appendix B: Investment Logic Map and Benefit Management Plan



DEPARTMENT OF TRANSPORT

# Glenferrie Road Level Crossing Removal

## BENEFIT MANAGEMENT PLAN

Part 1: Benefit Map


NOTE: updated baseline data to be collected within six months of project commencement and allowance for seasonal variation to be made.

| RESPONSIBILITY FOR DELIVERING THE BENEFITS | | |
|---|---|---|
| Name: Kevin Devlin | Position: CEO Level Crossings Removal Project | 18/01/2021 |

Investor: Level Crossings Removal Project (on behalf of the Commonwealth Government
Facilitator: David Cochrane
Yes

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6.0

# Glenferrie Road Level Crossing Removal

## Benefit 1: Improved productivity from more reliable and efficient transport networks

| | | |
|---|---|---|
| **KPI 1a:** | **Network efficiency** | |
| **Measure 1:** | **Average vehicle travel time (in minutes) between Glenferrie Rd/Toorak Rd and Glenferrie Rd/Callantina Rd intersections during mid-week AM peak period** | |
| | **Baseline** | 7.5 minutes northbound / 6 mins southbound **(updated baseline data to be collected within six months of construction commencement)** |
| | **Target** | Travel time reduced by 20% or more |
| | **Interim target** | Improved travel time |
| | **Source** | Travel time surveys (baseline collected in February 2018) |
| **Measure 2:** | **Vehicle traffic volume across the level crossing during mid-week AM peak period (both directions)** | |
| | **Baseline** | 1,250 (updated baseline data to be collected within six months of project commencement) |
| | **Target** | Traffic volume passing Kooyong Station along Glenferrie Road increased by 10% following removal of level crossing |
| | **Interim target** | Increased traffic volume |
| | **Source** | Vehicle counts (current baseline takes average of 2018 base case microsimulation model). |
| **Reporting** | **Forum** | Gateway Review |
| | **Start date** | After Works Completion |
| | **Frequency** | One-off |
| | **End date** | Two years after level crossing removal |
| **Responsibility for reporting** | **Name** | Kevin Devlin |
| | **Position** | CEO |
| | **Organisation** | Level Crossing Removal Project |

| | | |
|---|---|---|
| **KPI 1b:** | **Reliability of travel times on the road and rail network** | |
| **Measure 1:** | **Variability of northbound vehicle travel time (difference between 85th and 15th percentiles, in minutes) between Glenferrie Rd/Toorak Rd and Glenferrie Rd/Riversdale Rd intersections during mid-week AM peak period. Percentiles are calculated over each 2-hour AM peak period measuring the variation day to day (for a minimum period of 14 days) for trips which leave at the same time (say within 10 minutes).** | |
| | **Baseline** | 4 minutes northbound / 2.5 mins southbound **updated baseline data to be collected within six months of construction commencement** |
| | **Target** | Travel time variability reduced by 50% or more in both directions |
| | **Interim target** | Improvement to the reliability of travel time |
| | **Source** | Travel time surveys (current baseline takes average of 2018 base case microsimulation model) |
| **Reporting** | **Forum** | Gateway Review |
| | **Start date** | After Works Completion |
| | **Frequency** | One-off |
| | **End date** | Two years after level crossing removal |
| **Responsibility for reporting** | **Name** | Kevin Devlin |
| | **Position** | CEO |
| | **Organisation** | Level Crossing Removal Project |

| | | |
|---|---|---|
| **KPI 1c:** | **Public transport network improvements** | |
| **Measure 1:** | **Average vehicle travel time (in minutes) between Glenferrie Rd/Toorak Rd and Glenferrie Rd/Callantina Rd intersections during mid-week AM peak period** | |
| | **Baseline** | 7.5 minutes northbound / 6 mins southbound **(updated baseline data to be collected within six months of construction commencement)** |
| | **Target** | Travel time reduced by 20% or more |
| | **Interim target** | Improved travel time |
| | **Source** | Travel time surveys (baseline collected in February 2018) |
| **Reporting** | **Forum** | Gateway Review |
| | **Start date** | After Works Completion |
| | **Frequency** | Annually (One-off) |
| | **End date** | Two years after level crossing removal |
| **Responsibility for reporting** | **Name** | Kevin Devlin |
| | **Position** | CEO |
| | **Organisation** | Level Crossing Removal Project |

## Benefit 2: Better connected, liveable and thriving communities

| | | |
|---|---|---|
| **KPI 2a:** | **Local area amenity** | |
| **Measure 1:** | **Increased in daily station patronage** | |
| | Baseline | 2600 (Total Daily Entries and Exits) |
| | Target | 20% increase |
| | Interim target | 10% increase |
| | Source | Myki Data |
| Reporting | Forum | Gateway Review |
| | Start date | After Works Completion |
| | Frequency | One-off |
| | End date | Two years after level crossing removal |
| Responsibility for reporting | Name | Kevin Devlin |
| | Position | CEO |
| | Organisation | Level Crossing Removal Project |

| | | |
|---|---|---|
| **KPI 2b:** | **Access to education and services** | |
| **Measure 1:** | **Average vehicle travel time (in minutes) between Glenferrie Rd/Toorak Rd and Glenferrie Rd / Callantina Rd intersections during mid-week AM peak period** | |
| | Baseline | 7.5 minutes northbound / 6 mins southbound **(updated baseline data to be collected within six months of construction commencement)** |
| | Target | Travel time reduced by 20% or more |
| | Interim target | Improved travel time (baseline collected in February 2018) |
| Reporting | Forum | Gateway Review |
| | Start date | After Works Completion |
| | Frequency | One-off |
| | End date | Two years after level crossing removal |
| Responsibility for reporting | Name | Kevin Devlin |
| | Position | CEO |
| | Organisation | Level Crossing Removal Project |

| KPI 2c: | Public transport intermodal connectivity | |
|---|---|---|
| Measure 1: | Average time of interchange between trams and trains (tram stop to station platform) for key transfers (northbound tram stop to down platform, southbound tram stop to up platform) | |
| | Baseline | Interchange Level of Service C (Baseline sourced from the DOT Kooyong Station Network Planning Requirements, 17 August 2020) |
| | Target | Interchange Level of Service B (Target sourced from the DOT Kooyong Station Network Planning Requirements, 17 August 2020) |
| | Interim target | Reduced distance between tram stops and station platforms |
| | Source | Interchange survey |
| Reporting | Forum | Gateway Review |
| | Start date | After Works Completion |
| | Frequency | One-off |
| | End date | Two years after level crossing removal |
| Responsibility for reporting | Name | Kevin Devlin |
| | Position | CEO |
| | Organisation | Level Crossing Removal Project |

## Benefit 3: Safer communities

| KPI 3a: | Exposure to safety risk | |
|---|---|---|
| Measure 1: | ALCAM risk score at the level crossing (road and pedestrian crossings) | |
| | Baseline | Existing level crossing risk scores |
| | Target | ALCAM risk score of zero |
| | Interim target | ALCAM risk score of zero at project completion |
| | Source | VicTrack ALCAM |
| Reporting | Forum | n/a |
| | Start date | n/a |
| | Frequency | n/a |
| | End date | n/a |
| Responsibility for reporting | Name | Kevin Devlin |
| | Position | CEO |
| | Organisation | Level Crossing Removal Project |

Uncertainty

Lasting impacts of COVID-19 pandemic on travel behaviour and mode share.
Shifts in work practices, with increased work from home and flexible arrangements being adopted.
**This will require re-baselining of key performance indicates, within six months of construction commencement)**

Interdependencies

Planned level crossing removals in current program
Potential level crossing removals at Tooronga Road and Madden Road
Surrounding land use changes or new development
Planned changes to existing tram network

| Responsibility for delivering the benefits | |
|---|---|
| Kevin Devlin | CEO |

# Appendix C: Detailed Scope Summary

| Area | Item | Key scope |
|---|---|---|
| Rail | **Track and civil** | • Two new ballasted tracks, concrete sleeper and formation, located within a rail cutting approximately 800 metres long between Moonga Road and existing pedestrian underpass which connects Norford Grove and Talbot Crescent.<br>• Vertical geometry limited to 2.5% grade.<br>• Horizontal geometry retains existing 65km/h on the Up end and 80km/h on the Down end of Kooyong station.<br>• Maintenance walkways are provided on both sides of the new rail trench. |
| | **Power** | • Five new HV location cases connecting to existing signal power route.<br>• Traction power upgrades. |
| | **Signalling** | • Six new signals (uncontrolled home signals) with ladder and landing arrangement.<br>• Two new co-actor signals due to potential signal sighting issues.<br>• Design headway 180 seconds for stoppers on the Up and Down line, dwell time 30 seconds.<br>• Design speed of 65km/h and 80km/h on the Up and Down end of Kooyong station respectively.<br>• Remove existing relay interlocking and replace with MTM type approved computer based interlocking (CBI) from Heyington Station to match into the recently completed signalling works for the Toorak Road level crossing removal. |
| | **Train control** | • Area covered under new computer based interlocking (CBI) will be indicated on visual display unit (VDU) at Metrol.<br>• Mechanical lever frame at Kooyong signalling hut will be removed.<br>• Five new double width location cases for computer based interlocking (CBI) and track circuits.<br>• Five new double width location cases for high voltage equipment.<br>• Five new single width location cases for remote terminal units (RTU). |
| Station and surrounds | **Station** | • New local station on east side of Glenferrie Road, with walkway underneath new Super T road bridge connecting to 160m long platforms on west side of Glenferrie Road.<br>• Vertical transport (VT) comprises lift and stair and main station entry east side of Glenferrie Road. Ramp connections to platform are provided at west side of Glenferrie Road. Additional access point to the western end of the Up platform provided from Warra Street. |
| | **Station Parking Facilities** | • No net loss of commuter carparking (retain 69 car parks), with carparking to be reconstructed in current location on east side of Glenferrie Road. |
| Structures | **Major Structures** | • Retaining structures are predominantly solider piles with shotcrete infill, with batters on Up and Down end of new trench.<br>• Approximately 200 metres of 400 millimetres thick reinforced concrete base slab for ‘tanking’ where construction is below anticipated design groundwater levels.<br>• Glenferrie Road and station concourse is suspended using combination of 1200 Super T and plank structures. |
| | **Pedestrian structures / other** | • Existing pedestrian underpass connecting Ta bot Crescent and Norford Grove is not impacted by planned works. |
| Roadways and paths | **Roadways** | • Road scope is to regrade Glenferrie Road to remove the level crossing and facilitate Easy Access tram stop at the new Kooyong Station entry. |

| Area | Item | Key scope |
|---|---|---|
| | **Road-based public transport** | • Existing Yarra Trams Route 16 tram Stop 65 will be upgraded to an Easy Access stop, to retain two traffic lanes each way on Glenferrie Road, with one lane shared with trams per existing functionality (exact location to be confirmed).<br>• Existing tram Stop 66 (located between Kooyong Lawn Tennis Club and Vision Australia) will be removed to optimise tram movements. |
| | **Traffic signals, lighting and road systems** | • Pedestrian operated signals will be relocated south of Monaro Road. Existing street lighting is expected to remain relatively unchanged outside of the station precinct. Other changes to intersection control, if required would be subject to traffic modelling and future stakeholder engagement. |
| | **Paths** | • An existing pedestrian crossing (to Vision Australia) in Ta bot Crescent will be retained and potentially realigned.<br>• New pedestrian and cycling connection to be provided along Ta bot Crescent connecting the station precinct to the existing pedestrian underpass on Talbot Crescent, Sir Zelman Cowen Park and Gardiners Creek Trail.<br>• Formalisation of a pedestrian path connection on Warra Street (between Moonga Road and Power Street) and pedestrian crossing at Up end platform entry. |
| **Land use** | **Urban design** | • Two station entrances (one either side of Glenferrie Road) and additional entrance on Warra Street at western end of Up platform.<br>• Main station facilities at eastern entrance, including repurposing of existing heritage signalling hut.<br>• Station forecourts addressing Glenferrie Road and new Easy Access tram stops for improved intermodal transfer.<br>• New active transport connection along northern side of corridor at Talbot Crescent to link station to Sir Zelman Cowen Park and associated shared user path (SUP) network.<br>• Upgrading of existing informal pedestrian track on north side of Warra Street to connect to St Kevin's College, Kooyong Lawn Tennis Club and Moonga Road<br>• Retention of existing pedestrian link from Norford Grove to Kooyong station through upgraded station carpark<br>• Interface tree planting and landscaping to balance of corridor interface |
| | **Integrated development** | • A preliminary assessment of mixed commercial and residential integrated development opportunities has been assessed in this Business Case.<br>• Should the Australian Government wish to pursue this IDO, it is recommended that further development would be required to resolve details, costs, revenues and risks, with a separate funding submission to proceed with any enabling works and implementation of the proposal |
| | **Compulsory land acquisition** | • There is no requirement for private land acquisition to facilitate the design solution. |
| **Utility services** | **Utility services** | Major utility relocations include:<br>• 400lm bypass diversion of the existing 225mm sewer<br>• 850lm bypass diversion upgrade of low pressure to high pressure gas via Toorak Road and localised 150mm sewer<br>• High voltage / low voltage relocations at Avenel Road.<br>There are various utilities that will be relocated via the future Glenferrie Road bridge, including:<br>• 23 bank of 100mm Telstra and NBN conduits<br>• HV / LV conduits for Citipower<br>• UEcomm 50mm feed |

| Area | Item | Key scope |
|---|---|---|
| | | • 150mm Water<br>• 150mm Gas (offline provision)<br>• Traffic Signal reticulation<br>• Tram service conduits<br>• 525mm drainage crossing at Glenferrie Road to be renewed to new bridge levels<br>• Diversion of minor drainage in Glenferrie Road to Moonga Road via Warra Street, combined with new main drainage and flood storage connection<br>• Reconstruction and augmentation of existing main drain from Avenel Road to Gardiners Creek. |
| Car parking | **Commuter parking** | Existing 69 commuter carparks in Kooyong station to be retained or replaced. Two DDA spaces will be provided along with two staff carparks. |
| | **Other parking (including on street)** | • New kiss and ride parking is proposed to be distributed between Monaro Road and Warra Street.<br>• 1P 9-5 Mon-Sat and 9-12 Sat in Glenferrie Road south of Warra Street to be maintained other than removal of approximately five spaces to facilitate tram stop upgrade at station entry.<br>• 4P 9-5 Mon-Fri in Talbot Crescent in the vicinity of the station to be retained.<br>• 2P 9-5 Mon-Fri and 9-12 Sat in Monaro Road to be retained other than conversion of three bays at station entry to on-street kiss and ride.<br>• Informal (illegal) parking currently occurring on Warra Street along the rail corridor will no longer be possible. |

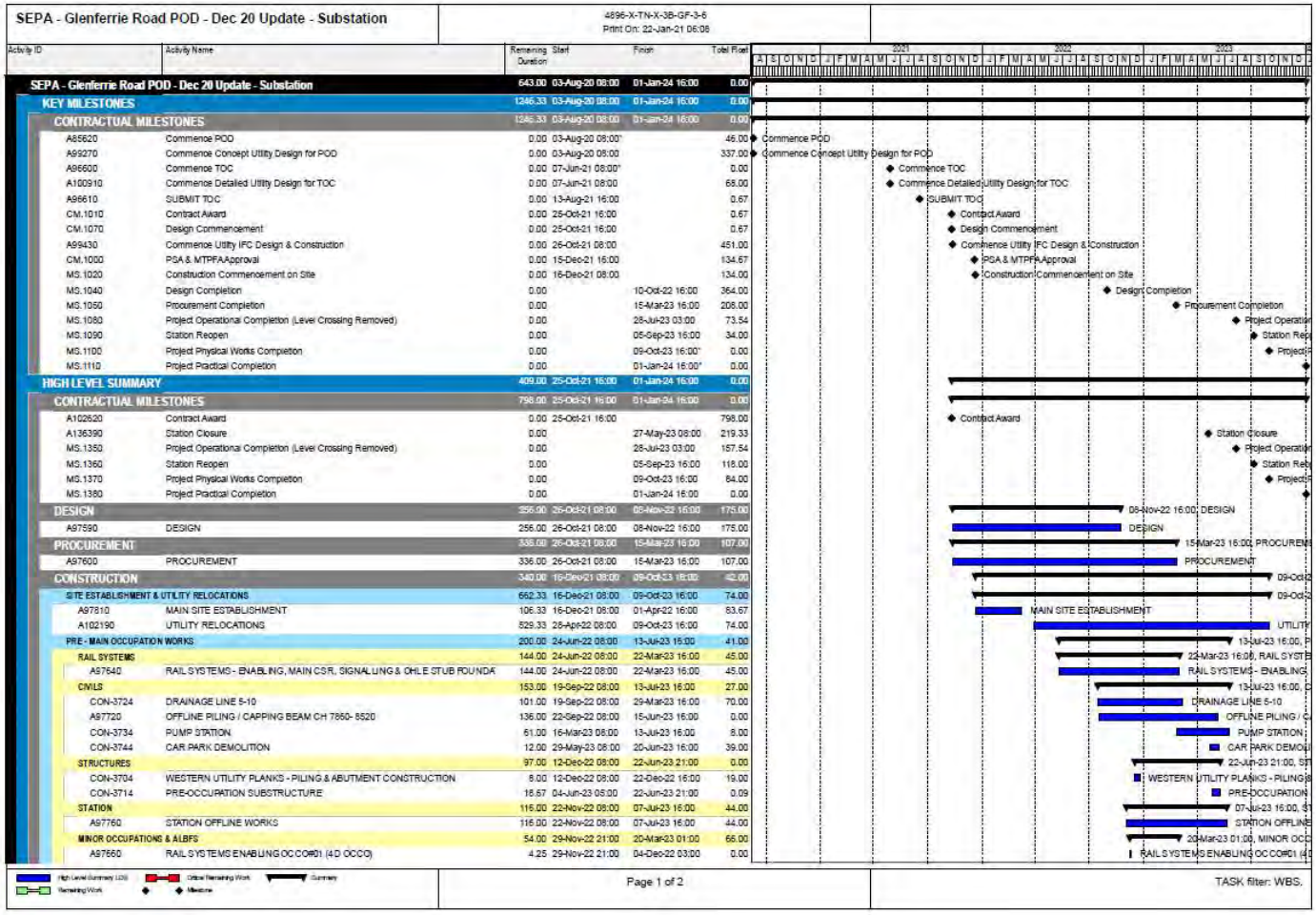
# Appendix D: Project Development and Due Diligence (PDDD)

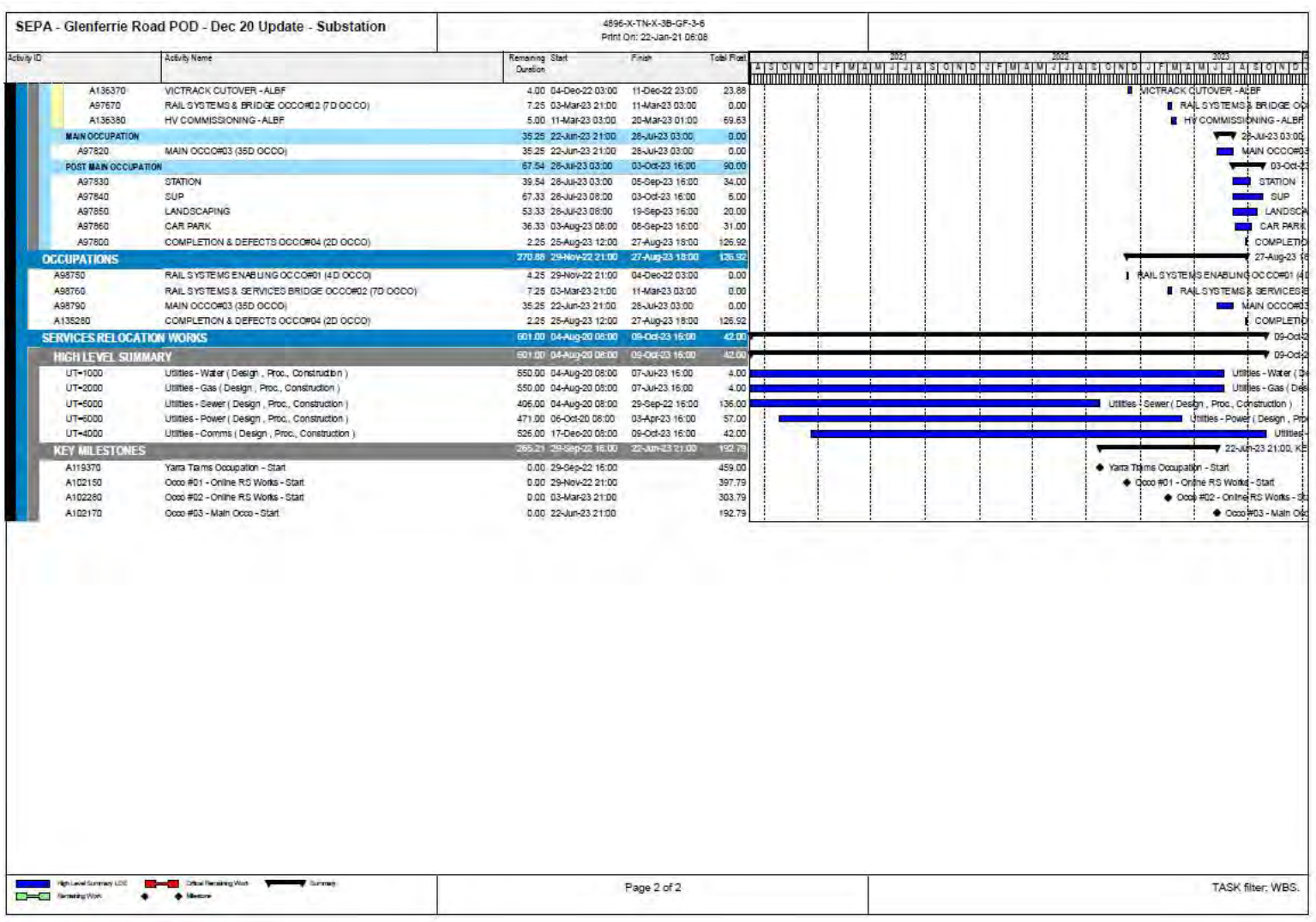
| Interface | Status | Comments |
|---|---|---|
| **A1. Project Scope & Design** | | |
| Client Requirements Document | **Preliminary** | The CRD is currently being developed by DoT in conjunction with this Business Case |
| Operational, Functional & System Requirements | **Preliminary** | Preliminary Operator Requirements have been received |
| Development Brief | **Completed** | |
| Principal Requirements/ Specifications | **Not started** | To be prepared if project is funded |
| Concept Design & Report | **Completed** | Prepared as part of Preferred Option Development phase |
| Digital Engineering | **N/A** | Not required for this project |
| Urban Design | **Completed** | Prepared under MTIA-LXRP Urban Design Framework |
| Scope Outline | **Completed** | |
| Reference Design | **Not started** | To be prepared if project is funded |
| Site Constraints Plan | **Completed** | Considered as part of Concept Design |
| **A2. Planning & Approvals** | | |
| Demand Modelling | **Completed** | |
| Economic Appraisal | **Completed** | |
| Client & Operator Agreements | **Completed** | Scope approvals have followed the DoT project governance process |
| Planning Approval Strategy | **Completed** | |
| Land Availability / Acquisition/ Assessments | **Completed** | Land acquisition not required |
| Legislation assessment | **Completed** | |
| Obtain all Approvals | **Not started** | To commence once project is funded |
| Initiative Summary | **Completed** | |
| Options Report | **Completed** | |
| **A3. Project Management Outline** | | |
| Risk & Opportunities Register | **Completed** | |
| Cost Estimates | **Completed** | |
| Schedule | **Preliminary** | |
| Benefit Plan | **Completed** | |
| Project Assurance Plan | **Not started** | Developed by DTF and OPV |
| Governance Plans | **Completed** | |
| Interfaces & Interdependencies | **Completed** | |

| Interface | Status | Comments |
|---|---|---|
| Resource Management Plan | Not started | To be prepared under existing MTIA-LXRP processes if project is funded |
| Stakeholder Identification | Completed | |
| Asset handover/ commissioning | | New asset handover plans will be prepared under existing MTIA-LXRP processes if project is funded |
| **A4. Investigations** | | |
| Air Quality | N/A | Not required for this project |
| Existing Asset Assessments | Completed | |
| Constructability | Completed | |
| Contamination | Completed | |
| Cultural Heritage | Completed | |
| Disruptions/ Occupation | Completed | |
| Flora/ Fauna/ Ecology | Completed | |
| Geotechnical | Completed | |
| Hydrology & Hydrogeology | Completed | |
| Survey | Completed | |
| Land Use | Completed | |
| Urban Design/ Landscape/ Visual | Completed | |
| Utilities | Completed | |
| Noise & Vibration | Completed | |
| Water Quality | Completed | |
| **A5. Procurement & Delivery** | | |
| EOI/ RFT Strategy | N/A | Procurement will follow MTIA-LXRP PPSU process |
| Tender Documents/ Evaluation Plan | N/A | Procurement will follow MTIA-LXRP PPSU process |
| Construction/ staging strategy | Preliminary | |
| Traffic Management | Preliminary | |
| **A6. Management Plans** | | |
| All Project Management Plans | Not started | All Project Management Plans to be prepared under existing MTIA-LXRP processes if project is funded |

# Appendix E: Project Schedule

A more detailed version is included as a supplementary document.





SEPA - Glenferrie Road POD - Dec 20 Update - Substation

4896-X-TN-X-3B-GF-3-6
Print On: 22-Jan-21 06:08

| Activity ID | Activity Name | Remaining Duration | Start | Finish | Total Float |
|---|---|---|---|---|---|
| A136370 | VICTRACK CUTOVER - ALBF | 4.00 | 04-Dec-22 03:00 | 11-Dec-22 23:00 | 23.88 |
| A97670 | RAIL SYSTEMS & BRIDGE OCCO#02 (7D OCCO) | 7.25 | 03-Mar-23 21:00 | 11-Mar-23 03:00 | 0.00 |
| A136380 | HV COMMISSIONING - ALBF | 5.00 | 11-Mar-23 03:00 | 20-Mar-23 01:00 | 69.63 |
| MAIN OCCUPATION | | 35.25 | 22-Jun-23 21:00 | 28-Jul-23 03:00 | 0.00 |
| A97820 | MAIN OCCO#03 (35D OCCO) | 35.25 | 22-Jun-23 21:00 | 28-Jul-23 03:00 | 0.00 |
| POST MAIN OCCUPATION | | 67.54 | 28-Jul-23 03:00 | 03-Oct-23 16:00 | 90.00 |
| A97830 | STATION | 39.54 | 28-Jul-23 03:00 | 05-Sep-23 16:00 | 34.00 |
| A97840 | SUP | 67.33 | 28-Jul-23 08:00 | 03-Oct-23 16:00 | 5.00 |
| A97850 | LANDSCAPING | 53.33 | 28-Jul-23 08:00 | 19-Sep-23 16:00 | 20.00 |
| A97860 | CAR PARK | 36.33 | 03-Aug-23 08:00 | 06-Sep-23 16:00 | 31.00 |
| A97800 | COMPLETION & DEFECTS OCCO#04 (2D OCCO) | 2.25 | 25-Aug-23 12:00 | 27-Aug-23 18:00 | 126.92 |
| OCCUPATIONS | | 270.86 | 29-Nov-22 21:00 | 27-Aug-23 18:00 | 126.92 |
| A98750 | RAIL SYSTEMS ENABLING OCCO#01 (4D OCCO) | 4.25 | 29-Nov-22 21:00 | 04-Dec-22 03:00 | 0.00 |
| A98760 | RAIL SYSTEMS & SERVICES BRIDGE OCCO#02 (7D OCCO) | 7.25 | 03-Mar-23 21:00 | 11-Mar-23 03:00 | 0.00 |
| A98790 | MAIN OCCO#03 (35D OCCO) | 35.25 | 22-Jun-23 21:00 | 28-Jul-23 03:00 | 0.00 |
| A135280 | COMPLETION & DEFECTS OCCO#04 (2D OCCO) | 2.25 | 25-Aug-23 12:00 | 27-Aug-23 18:00 | 126.92 |
| SERVICES RELOCATION WORKS | | 601.00 | 04-Aug-20 08:00 | 09-Oct-23 16:00 | 42.00 |
| HIGH LEVEL SUMMARY | | 601.00 | 04-Aug-20 08:00 | 09-Oct-23 16:00 | 42.00 |
| UT-1000 | Utilities - Water ( Design , Proc., Construction ) | 550.00 | 04-Aug-20 08:00 | 07-Jul-23 16:00 | 4.00 |
| UT-2000 | Utilities - Gas ( Design , Proc., Construction ) | 550.00 | 04-Aug-20 08:00 | 07-Jul-23 16:00 | 4.00 |
| UT-5000 | Utilities - Sewer ( Design , Proc., Construction ) | 406.00 | 04-Aug-20 08:00 | 29-Sep-22 16:00 | 136.00 |
| UT-6000 | Utilities - Power ( Design , Proc., Construction ) | 471.00 | 06-Oct-20 08:00 | 03-Apr-23 16:00 | 57.00 |
| UT-4000 | Utilities - Comms ( Design , Proc., Construction ) | 526.00 | 17-Dec-20 08:00 | 09-Oct-23 16:00 | 42.00 |
| KEY MILESTONES | | 265.21 | 29-Sep-22 16:00 | 22-Jun-23 21:00 | 192.79 |
| A119370 | Yarra Trams Occupation - Start | 0.00 | 29-Sep-22 16:00 | | 459.00 |
| A102150 | Occo #01 - Online RS Works - Start | 0.00 | 29-Nov-22 21:00 | | 397.79 |
| A102280 | Occo #02 - Online RS Works - Start | 0.00 | 03-Mar-23 21:00 | | 303.79 |
| A102170 | Occo #03 - Main Occo - Start | 0.00 | 22-Jun-23 21:00 | | 192.79 |



Page 2 of 2

TASK filter: WBS.

# Appendix F: Supplementary Reports

| Report Title | Version | Date | Purpose & Contents |
|---|---|---|---|
| Economic Appraisal Report | | 02 Feb 21 | Subject to disclosure disclaimers |
| VITM Modelling Report | Final | 17 Dec 20 | Demand modelling |
| VISSIM Modelling Report | Final | 17 Dec 20 | Microsimulation modelling |
| Modelling and Economics Independent Review Report | Final | 09 Feb 21 | Peer review |
| Options Appraisal Report | V2.0 | 20 Aug 20 | Project Options assessment |
| Preferred Option Development Report | - | 29 Jan 21 | Possible design solution and scope |
| Urban Design Report | - | 12 Oct 20 | Urban Design response |
| Project Schedule | Final | 14 Dec 20 | Program |
| Risk and Opportunity Register | Final | 13 Jan 21 | Risk matrix |
| Construction Cost Estimate Report | Final | 18 Jan 21 | Detailed Cost Estimate |
| P50/P90 Estimate Report | Final | 20 Jan 21 | Risk adjusted estimate |
| Independent Estimator Report | | 04 Feb 21 | IE Review |
| Integrated Development Opportunity (IDO) Feasibility Assessment | | Aug 20 | Rapid Assessment of possible IDO sites |
| Stonnington Council, Written submission | | Dec 20 | Council's position |
| Value Creation & Capture Plan | Final | Jan 21 | Outline details on optional initiatives for further value creation and capture |