Environment
Effects Statement

Technical Report A
Traffic and transport

North East Link Environment Effects Statement

Technical report A – Traffic and transport impact assessment

Prepared for North East Link Project

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Executive summary

This technical report is an attachment to the North East Link Environment Effects Statement (EES). It has been used to inform the EES required for the project, and defines the environmental performance requirements (EPRs) necessary to meet the EES objectives.

Overview

North East Link ('the project') is a proposed new freeway-standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway, and include works along the Eastern Freeway from near Hoddle Street to Springvale Road.

The Major Transport Infrastructure Authority (MTIA) is the proponent for North East Link. The MTIA is an administrative office within the Victorian Department of Transport with responsibility for overseeing major transport projects.

North East Link Project (NELP) is an organisation within MTIA that is responsible for developing and delivering North East Link. NELP is responsible for developing the reference project and coordinating development of the technical reports, engaging and informing stakeholders and the wider community, obtaining key planning and environmental approvals and coordinating procurement for construction and operation.

On 2 February 2018, the Minister for Planning declared North East Link to be 'public works' under Section 3(1) of the Environment Effects Act 1978, which was published in the Victorian Government Gazette on 6 February 2018 (No. S 38 Tuesday 6 February 2018). This declaration triggered the requirement for the preparation of an EES to inform the Minister's assessment of the project and the subsequent determinations of other decision-makers.

The EES was developed in consultation with the community and stakeholders and in parallel with the reference project development. The reference project has been assessed in this EES. The EES allows stakeholders to understand the likely environmental impacts of North East Link and how they are proposed to be managed.

Smedley Technical & Strategic (SmedTech) was commissioned to undertake a traffic and transport impact assessment for the purposes of the EES.

Traffic and transport context

The scoping requirements for the EES released by the Minister for Planning set out the specific environmental matters to be investigated and documented in the project's EES, and have informed the scope of the EES technical studies. The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project.

The following evaluation objective is relevant to the traffic and transport assessment:

> *To increase transport capacity and improve connectivity to and from the north east of Melbourne, and, in particular, increase freight movement via the freeway network instead of local and arterial roads, while adequately managing the effects of the project on the broader and local road, public transport, cycling and pedestrian transport networks.*

The key assets, values and uses potentially impacted by the project and the assessment of the impacts are summarised below.

Methodology

The impact assessment methodology comprised:

- Defining the project scope, including the extent of key construction and operation phase activities
- Establishing the legislative and policy context of the project
- Defining the project study area for the impact assessment
- Preparing an existing conditions assessment to set a base line for current transport network performance across the study area
- Performing an initial risk assessment
- Undertaking 'no project' and 'with project' impact assessments for the forecast year of 2036, underpinned by strategic, spreadsheet and microsimulation modelling
- Finalising EPRs required to mitigate project impacts and identify residual risk factors.

Existing conditions and 'no project' assessment

An assessment of the existing conditions and 2036 'no project' scenario found:

- Melbourne's north-east relies on a relatively sparse arterial road network, which lacks the grid-based resilience found in the eastern and inner suburbs. Trips are heavily reliant on a limited number of arterial roads, such as Rosanna Road and Fitzsimons Lane for north-south movements and Bell Street for east-west movements.
- The Yarra River cuts diagonally through the study area and its presence is a barrier to north-south movements throughout Melbourne's north-east. There are only five river crossings in the study area to facilitate demand for local, medium and longer cross-city trips. As a result, the north-eastern arterial road network is generally congested in peak periods, with poor travel time reliability and network resilience.
- Truck demand through the north-east is primarily facilitated via the Greensborough Road – Rosanna Road – Bulleen Road corridor, as well as Fitzsimons Lane. This is despite the primarily residential land uses along both corridors and extensive truck curfews operating throughout the region.
- Doncaster Area Rapid Transit (DART) bus services experience lengthy delays due to congestion and a high number of merges and diverges required along the Eastern Freeway. DART buses operate at full capacity during peak periods, with extensive over-crowding of services and long queues at the Doncaster Park and Ride facility.
- As private vehicle travel dominates throughout the north-east, congested roadways often form barriers for pedestrian and cyclist movements. Roadways often operate at high volumes with a large proportion of heavy vehicles, as well as high sign-posted speeds.
- Total population across metropolitan Melbourne is forecast to increase by 38 per cent from 2016 to 2036.
- Transport modelling for the 2036 'no project' scenario estimated that cars would remain the dominant mode of transport. Private vehicle mode share across metropolitan Melbourne is forecast to reduce from 78 per cent today to 73 per cent in 2036, while public transport would increase from 9 to 14 per cent.

- Vehicle kilometres travelled along arterial and local roads in the north-east are forecast to grow faster than on freeways. This would likely place further pressure on the north-eastern arterial road network.

‘With project’ impact assessment

An assessment of the 2036 ‘with project’ scenario found:

- A significant redistribution of medium and longer cross-city trips away from local and arterial roads as a result of the project. These trips are forecast to alternatively use the freeway network and North East Link. The largest reductions are anticipated on the parallel routes of Rosanna Road (a reduction of approximately 12,000 vehicles per day) and Greensborough Road (a reduction of approximately 19,000 vehicles per day).
- Public and active transport mode shares are anticipated to largely remain static once North East Link is open. This is intuitive given the project includes upgrades across roads, public transport and walking and cycling infrastructure. Public transport trips in the north-east are predicted to decrease by less than 1 per cent in the ‘with project’ scenario.
- Traffic volumes along the five existing Yarra River crossings are anticipated to reduce by 16 per cent across the day.
- As a result, travel times across the north-east are forecast to improve. North East Link users are forecast to save up to 35 minutes between the M80 Ring Road and the Eastern Freeway.
- Traffic is anticipated to increase on the neighbouring freeways of the M80 Ring Road and the Eastern Freeway. These increases would be accommodated with additional traffic lanes.
- Traffic volumes are also predicted to increase along some arterial roads south of the Eastern Freeway and near the Greensborough Bypass/Grimshaw Street interchanges, however the increases are primarily anticipated to occur outside peak periods. No net increase in traffic is anticipated for roads in the CBD once North East Link is open.
- Truck volumes are generally forecast to decrease across the north-eastern arterial road network. Large decreases are predicted along Greensborough Road (-7,400 trucks per day), Bulleen Road (-2,400), Manningham Road (-3,000) and Rosanna Road (-2,800).
- The Doncaster Busway would improve travel times for DART users by up to 30 per cent along the Eastern Freeway.
- A program of new and upgraded off-road shared use paths would improve accessibility for pedestrians and cyclists and minimise interactions with general traffic.

Construction impact assessment

An assessment of the construction impacts has been performed for two scenarios: locating the tunnel boring machine (TBM) launch site on Manningham Road (southern launch site) or on Lower Plenty Road (northern launch site). The assessment found:

- The peak month of construction activity for the southern launch option is January 2023, when it is predicted that construction works would generate approximately 3,500 truck trips per day. The northern launch option would peak in November 2022 with 3,700 truck trips per day.

- The haulage routes for materials would depend on the location of the worksite:
  – Worksites on the Eastern Freeway east of Doncaster Road are predicted to haul south to Dandenong via EastLink
  – Worksites on the Eastern Freeway west of Doncaster Road, along Bulleen Road and Manningham Road are predicted to haul north, and use Bulleen Road or Chandler Highway to access Bell Street
  – From Bell Street, three potential haulage routes to the M80 Ring Road are available: Sydney Road, High Street or Plenty Road
  – Worksites north of Lower Plenty Road are predicted to haul north, and travel along Greensborough Road to access the M80 Ring Road.
- The site generating the highest peak daily truck trips is the section from Kempston Street to the northern portal, if the southern TBM launch option was selected. This is predicted to generate 1,730 trips per day during the peak month of construction activity.
- This site would also operate within the existing curfew zone. If curfews were maintained, the forecast hourly truck volumes are predicted to be up to 220. If trucks were permitted to operate during the curfew period, the forecast hourly truck volumes are predicted to be 100. Greensborough Road would be able to accommodate this additional volume of trucks outside peak periods.
- Other key areas generating truck movements include the southern TBM launch site at Manningham Road. If this option was selected, it is estimated that 960 daily truck movements would be generated at its peak; 80 truck movements per hour.
- The northern TBM launch site is within the existing north-east curfew zone. If curfews were maintained, the forecast hourly truck volumes are predicted to be 120 during the peak month of construction activity. If trucks were permitted to operate during the curfew period, the forecast hourly truck volumes are predicted to be 70. Greensborough Road would be able to accommodate this additional volume of trucks outside peak periods.
- The northern TBM launch site would likely overlap with the Kempston Street to the northern portal worksite. Combined, the two sites would generate up to 240 truck trips per hour during the peak month of construction activity if curfews were maintained.
- A number of short-term road closures would be required to allow for construction activities. These would typically occur overnight or over a weekend.
- Longer-term closures would require the construction of side tracks to divert traffic around the worksites and maintain traffic flow. This may result in some small redistribution of traffic away from the worksites that may need to be managed.
- All construction activities would require the production of Transport Management Plans. These plans must identify how safe and efficient passage through or around construction sites would be provided, including details on proposed traffic control. The plans must demonstrate how impacts would be minimised and traffic flow maintained on the surrounding road network. They must identify and mitigate construction impacts on all transport network users, including pedestrians, cyclists, public transport and general traffic. These plans must meet the relevant standards, guidelines and requirements of the responsible authorities before works commence.

Structure of the EES

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Technical reports

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Attachments

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II. Urban design strategy
III. Risk report
IV. Stakeholder consultation report
V. Draft Planning Scheme Amendment
VI. Works Approval Application

EES Map Book

Glossary and abbreviations

Glossary of terms

Term	Definition
A-Double	A heavy vehicle consisting of a prime mover towing two semi-trailers linked by a converted dolly between the two trailers.
Annual Average Daily Traffic (AADT)	The average daily traffic volumes across an entire year, inclusive of public and school holidays.
Average Weekday Daily Traffic (AWDT)	The average daily traffic volumes on a normal weekday, excluding public and school holidays.
Automatic Traffic Count (ATC)	A device that counts, classifies and measures the speed of traffic on a road. These often include pneumatic road tubes laid across the road.
B-Double	A heavy vehicle consisting of a prime mover towing two semi-trailers. The first trailer is attached to the prime mover and the second is mounted on the rear of the first semi-trailer by a fifth wheel coupling.
B-Triple	A heavy vehicle consisting of a prime mover towing three semi-trailers. The first trailer is attached to the prime mover and the second and third are mounted on the rear of the trailers in front of them.
Catchment	A catchment is the area from which a city, institution or other piece of infrastructure attracts demand for use of its services.
Collector-distributor	A collector-distributor is a component of a freeway, usually an outer carriageway, which facilitates entry and exit movements for on and off-ramps.
Community facilities	Refers to recreational, social or educational spaces (for example schools, sports ovals or local halls) available for use by the local community.
Counter-peak	Describes travel that occurs in the opposite direction to peak flow, ie outbound in the AM peak or inbound in the PM peak.
Crash hotspots	Describes areas with a higher occurrence of crashes (by any mode).
Flow breakdown	A condition that can occur on freeways and motorways when demand exceeds capacity (at a bottleneck or due to an incident) and free flowing conditions cannot be maintained. A flow breakdown results in significant decreases in speed and capacity to below the geometric capacity of the facility.
Free flow speed	The speed at which vehicles travel in the absence of traffic congestion.
Gating	The effect whereby congestion bottlenecks hold back traffic from accessing other parts of the road network, meaning they experience relatively lower levels of overall congestion.
Greater Melbourne/metropolitan Melbourne	The Greater Melbourne/metropolitan Melbourne area is defined by the Australian Bureau of Statistics' Greater Capital City Statistical Area for Greater Melbourne.
Heavy Commercial Vehicle	This is defined by the Austroads vehicle classification system, where a Heavy Commercial Vehicle is defined as Austroads classification 4 to 12.

Term	Definition
Higher Mass Limits (HML) network	VicRoads gazetted network for Class 2 and 3 heavy vehicles operating above their prescribed general maximum weights. Some vehicles are permitted to operate above these limits along roads gazetted for Higher Mass Limits.
HPFV	High productivity freight vehicle. These are truck and trailer combinations that exceed nominal mass and dimension limits and require permits from the National Heavy Vehicle Regulator.
Level of Service (LoS)	A qualitative measure (from A to F) for ranking operating conditions, based on factors such as traffic density and delays. A Level of Service A represents free-flowing conditions where individual users are virtually unaffected by the presence of others. A Level of Service F represents flow breakdown with demand exceeding capacity and low comfort and convenience. A road in constant traffic jam is considered Level of Service F.
Light Commercial Vehicle	This is defined by the Austroads vehicle classification system, where a Light Commercial Vehicle is defined as Austroads classification 3.
Mainline	A mainline is a component of a freeway, typically between entry and exit ramps.
Major Transport Infrastructure Authority (MTIA)	The Major Transport Infrastructure Authority (MTIA) is the proponent for the North East Link project. The MTIA is an administrative office within the Victorian Department of Transport with responsibility for overseeing major transport projects.
Metropolitan Activity Centre (MAC)	Identified as part of Plan Melbourne, MACs are designated hubs which often comprise of a concentration of employment, services, education and transport links.
Mid-block volume	The volume of traffic passing a specified point between two traffic intersections (for an arterial road) or between two interchanges (for a freeway). Mid-block volumes are typically taken at a point far removed from intersections/interchanges to distinctly assess the throughput demand.
National Employment and Innovation Cluster (NEIC)	Another key concept of Plan Melbourne, NEICs are a series of knowledge-intensive employment hubs of national significance and scale.
North East Link Project (NELP)	North East Link Project (NELP) is an organisation within MTIA that is responsible for developing and delivering North East Link. NELP was formerly known as the North East Link Authority prior to 1 January 2019. NELP is responsible for developing the reference project and coordinating development of the technical reports, engaging and informing stakeholders and the wider community, obtaining key planning and environmental approvals and coordinating procurement for construction and operation.
Over-dimensional (OD) vehicles/routes	OD vehicles are defined as vehicle combinations that exceed five metres high or wide, 30 metres long or 100 tonnes gross mass. OD routes are the permitted roads which OD vehicles may use without a permit.
Oversize/overmass (OSOM) vehicles	Vehicle combinations that operate up to five metres high or wide, 30 metres long and 100 tonnes gross mass.
Passenger Car Unit (PCU)	A Passenger Car Unit is a vehicle unit used for expressing highway capacity. Cars are defined as 1 PCU and typically heavy vehicles are defined as 2.5 PCUs.
Placarded load	A placarded load is a quantity of dangerous goods being transported that requires placards to be displayed on the vehicle or unit carrying the load.

Term	Definition
Plan Melbourne	The Victorian Government's metropolitan planning strategy for Melbourne, spanning 2017 to 2050.
Ramp-metering	A traffic control system that regulates the flow of vehicles onto a freeway or motorway system from its entry ramps.
Reference project	The North East Link project design which has been considered as part of this assessment.
SCATS data	SCATS data refers to traffic volumes extracted from SCATS (Sydney Co-ordinated Adaptive Traffic System). Traffic volumes are derived from detector loops in the pavement of each lane at the approaches to intersections where SCATS is used.
Screenline	A screenline is a theoretical line which intersects a series of road links, for the purposes of analysing traffic volumes and behaviour. The Yarra River screenline consists of the traffic volumes at each bridge from Chandler Highway to the Warrandyte Bridge, and is used to analyse demand for river crossing movements.
Sensitive receptors	A place, location or point at which exposure to particular effects (such as noise, vibration, traffic, visual or airborne pollutants) is measured.
Shared use path	Combined walking and cycling paths.
Shockwave	The transition zone between free flowing and breakdown conditions that can propagate backwards from an area of flow breakdown.
Through traffic	Traffic with an origin and destination outside a given local area.
Transport for Victoria (TfV) Transport Modelling Reference Case	A document published by Transport for Victoria which sets out the forecasting assumptions which are adopted within the transport models, however they do not necessarily represent Victorian Government policy or commitment to achieving these outcomes. These assumptions inform the 2026 and 2036 traffic volume forecasts which have been used in this and other assessments.
Truck	Light and heavy commercial vehicles are referred to as 'trucks'. This is based on the Austroads vehicle classification system, where a truck is defined as Austroads classification 3 to 12.
T2 lanes	T2 lanes are priority freeway lanes which operate along certain designated sections during peak hours. Only vehicles with two or more occupants are permitted to use these lanes.
Victorian Department of Transport	The Victorian Department of Transport is responsible for delivering the government's transport infrastructure agenda. It was formed on 1 January 2019 when the former Victorian Department of Economic Development, Jobs, Transport and Resources transitioned into the Department of Transport and the Department of Jobs, Precincts and Regions.
VIF	Victoria in Future – Victorian Government population and household projections
VLC Zenith Model	The strategic transport model of Melbourne developed by Veitch Lister Consulting.

List of abbreviations

Term	Definition
AADT	Annual Average Daily Traffic
AWDT	Average Weekday Daily Traffic
ANZSIC	Australian New Zealand Standard Industry Classification
ATC	Automatic Traffic Count
AWDT	Average Weekday Daily Traffic
BITRE	Bureau of Infrastructure, Transport and Regional Economics
CCTV	Closed-circuit television
CTW	CityLink-Tulla Widening
DDA	Disability Discrimination Act
DELWP	Department of Environment, Land, Water and Planning
EES	Environment Effects Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act
EPR	Environmental Performance Requirements
HCV	Heavy Commercial Vehicles
HML	Higher Mass Limits
HPFV	High Productivity Freight Vehicle
LCV	Light Commercial Vehicles
LGA	Local Government Area
LUMS	Lane Use Management System
MAC	Metropolitan Activity Centre
NEIC	National Employment and Innovation Cluster
NELP	North East Link Project
OD routes	Over-dimensional routes
OD vehicles	Over-dimensional vehicles
OSOM vehicles	Oversize/overmass vehicles
PCU	Passenger Car Unit
PTV	Public Transport Victoria

Term	Definition
SCATS	Sydney Co-ordinated Adaptive Traffic Signals
TBM	Tunnel Boring Machine
TfV	Transport for Victoria
TMP	Transport Management Plan
VIF	Victoria in Future
VISSIM	Microsimulation traffic modelling program
VISTA	Victorian Integrated Survey of Travel and Activity
VKT	Vehicle Kilometres Travelled
VMS	Variable Message Signs

1 Introduction

1.1 Purpose of this report

North East Link ('the project') is a proposed new freeway-standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway, and include works along the Eastern Freeway from near Hoddle Street to Springvale Road.

The Major Transport Infrastructure Authority (MTIA) is the proponent for North East Link. The MTIA is an administrative office within the Victorian Department of Transport with responsibility for overseeing major transport projects.

North East Link Project (NELP) is an organisation within MTIA that is responsible for developing and delivering North East Link. NELP is responsible for developing the reference project and coordinating development of the technical reports, engaging and informing stakeholders and the wider community, obtaining key planning and environmental approvals and coordinating procurement for construction and operation.

On 2 February 2018, the Minister declared the works proposed for North East Link as 'public works' and issued a decision confirming that an Environment Effects Statement (EES) is required for the project due to the potential for significant environmental effects.

Similarly, the project was referred to the Australian Government's Department of the Environment and Energy on 17 January 2018. On 13 April 2018 the project was declared a 'controlled action', requiring assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* ('EPBC Act').

Separate to this EES, a Public Environment Report (PER) is required to be prepared to satisfy the EPBC Act requirements, and assess the impacts of the project on Commonwealth land and matters of national environmental significance (MNES).

The purpose of this report is to assess the potential traffic and transport impacts associated with North East Link and to define the Environmental Performance Requirements (EPRs) necessary to meet the EES objectives.

1.2 Why understanding traffic and transport is important

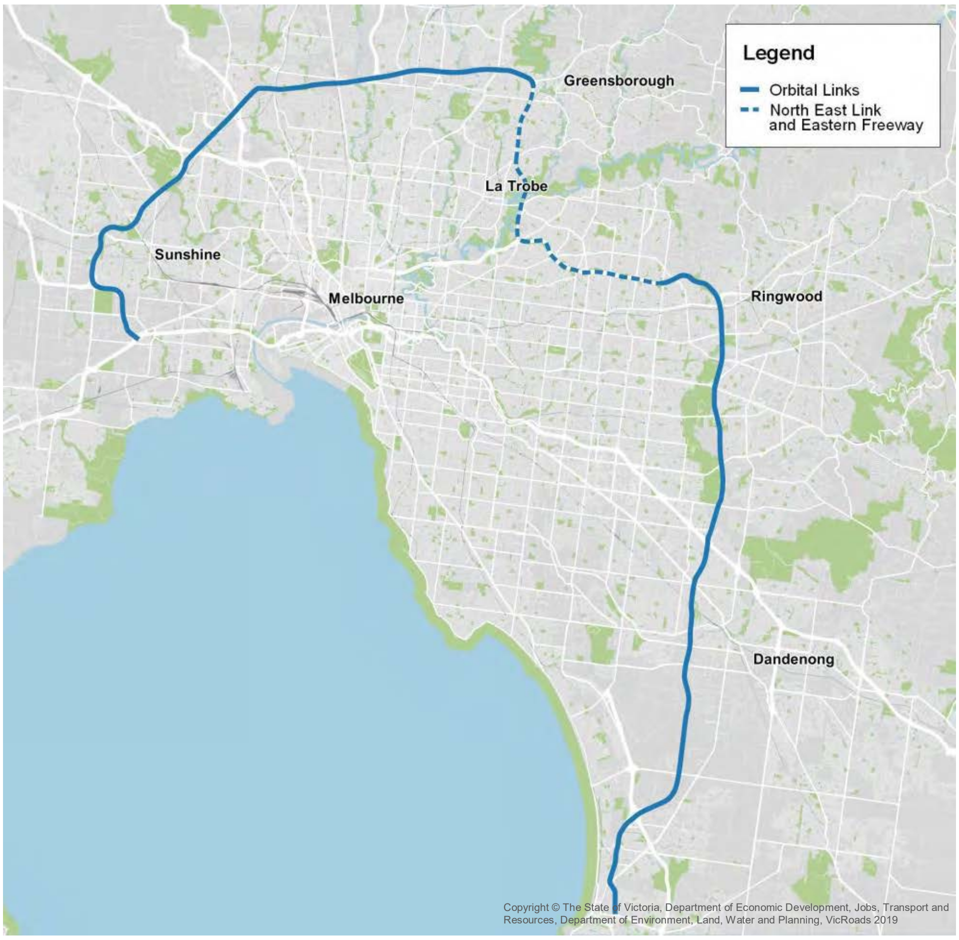
North East Link would be a significant addition to Melbourne's freeway network, connecting the M80 Ring Road to the Eastern Freeway near Bulleen Road. The project would complete the 'missing link' in Melbourne's orbital freeway network as shown in blue in Figure 1-1, spanning Altona in Melbourne's west to Frankston in the south-east. The strategic connectivity and enhanced accessibility the project offers has the potential to redistribute traffic and change travel patterns across Melbourne.

The existing conditions assessment found that peak period traffic congestion in the north-east is worse than metropolitan Melbourne on average. Its arterial road network currently experiences significant delays in peak periods, poor travel time reliability and low resilience in the event of incidents. The lack of an efficient and robust transport network in the north-east hinders the movement of both people and goods across Melbourne.

It is therefore important to quantify the traffic and transport effects of North East Link to understand its impacts and benefits. This includes quantifying impacts across the full spectrum of road users, including cars, trucks, buses, on-road trams, pedestrians and cyclists.

The construction of North East Link would also involve activities that generate traffic and divert vehicles to alternative routes. The management of construction traffic and general diversion routes is important in minimising impacts during the project’s construction.

Figure 1-1 – Melbourne’s orbital freeway network



1.3 EES scoping requirements

1.3.1 EES evaluation objectives

The scoping requirements for the EES, issued by the Minister for Planning, set out the specific environmental matters to be investigated and documented in the project’s EES, which informs the scope of the EES technical studies. The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project.

Evaluation objective 4.2 is relevant to the traffic and transport assessment:

> *To increase transport capacity and improve connectivity to and from the north east of Melbourne, and, in particular, increase freight movement via the freeway network instead of local and arterial roads, while adequately managing the effects of the project on the broader and local road, public transport, cycling and pedestrian transport networks.*

The design and mitigation measures from evaluation objective 4.9 is also relevant to the traffic and transport assessment:

> *Identify options for treating, reusing or disposing of excavation spoil with reference to the waste hierarchy and relevant best practice principles, including for both contaminated and clean materials, and identify the routes and destinations for spoil material to be transported away from the project worksites.*

Evaluation objective 4.11 is also relevant to the traffic and transport assessment:

> *To demonstrate that the project will contribute to the need for an effective, integrated and climate change resilient transport system that provides a wide range of travel choices for all Victorians.*

1.3.2 EES scoping requirements

The aspects from the scoping requirements relevant to the traffic and transport evaluation objective are shown in Table 1-1, as well as the location where these items have been addressed in this report.

Table 1-1 – Scoping requirements relevant to traffic and transport

Aspect	Scoping requirement	Section addressed
Key issues	Contribution to an integrated and sustainable transport system, including active transport.	Section 9.2 Section 9.6 Section 9.7
	Transport connectivity and capacity across the northeast of Melbourne, including network resilience and redundancy.	Section 9.2.5
	Changes to local and arterial traffic distribution in the northeast of Melbourne.	Section 9.2
	Effects of the redistribution of freight and heavy vehicle traffic including placarded and over-dimensional vehicles in the northeast of Melbourne and implications for residents, residential areas and businesses during construction and operation.	Section 9.5
	Disruption to pedestrian movements, bicycle connectivity, public transport, motor vehicle and freight traffic during construction.	Section 10
	Connectivity of pedestrian and cycling networks across the northeast of Melbourne and opportunities for future linkages.	Section 9.7
	Predicting future travel behaviour and transport trends over time.	Section 8.2 Section 9.2

Aspect	Scoping requirement	Section addressed
Priorities for characterising the existing environment	Describe both the regional and local transport network context for the project.	Section 6.1 Section 6.2
	Describe relevant policies, strategies and plans for transport in the vicinity of the project.	Section 3
	Establish comprehensive baseline data on freight, private motor vehicle, public transport, pedestrian and bicycle movements in areas affected by the project.	Section 6.2 Section 6.4 Section 6.5 Section 6.6
	Describe the elements of the road-based transport system including road, public transport, freight, cycling and pedestrian transport networks that might be affected by the project, during the construction and operational phases of the project.	Section 6.1 Section 6.2 Section 6.4 Section 6.5 Section 6.6
	Undertake predictive modelling of regional and local transport network traffic flows in the absence of the project.	Section 8.2 Section 8.3
Design and mitigation measures	Describe the proposed approach to managing transport network conditions during the project's construction such as any staging proposed to maintain transport system function and the proposed nature and duration of diversions including for pedestrian and cycle links.	Section 10.5
	Describe the potential routing of spoil transport from tunnelling works and other construction-related transport movements to minimise traffic and amenity impacts.	Section 10.2
	Describe any potential public transport priority treatments, such as signal priority and tram/bus lanes, to enhance public transport access and uptake and minimise any adverse impacts on traffic and other public transport users' journeys including travel to stops and stations during construction.	Section 9.2.4 Section 9.6.1 Section 10
	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network, including any proposed solutions to accommodate placarded and over-dimensional vehicles.	Section 9.1 Section 9.2.6 Section 9.5.2 Section 9.5.3
	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing pedestrian and bicycle network, including any proposed solutions to enhance pedestrian and bicycle access in the vicinity of the project.	Section 9.7.1
	Describe traffic calming or other management tools that could be used to modify travel behaviour on the project and local roads such as managed motorway systems, intelligent transport systems, tolls, clearways, truck curfews and bans.	Section 9.1.5 Section 9.1.6

Aspect	Scoping requirement	Section addressed
	Identify options for treating, reusing or disposing of excavation spoil with reference to the waste hierarchy and relevant best practice principles, including for both contaminated and clean materials, and identify the routes and destinations for spoil material to be transported away from the project work sites.	Section 10.2
Assessment of likely effects	Characterise the extent, duration and types of disruptions during the construction phase.	Section 10.5
	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.	Section 9.2 Section 9.3
	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to: • Predicted travel time and vehicle movement outcomes, including performance at the project's interchanges and key intersections adjacent to the proposed alignment • Redistribution of traffic, including trucks and placarded vehicles, on the regional and local road network • Effects of traffic management measures on local and arterial roads • Traffic safety, given the predicted transport network traffic flows following implementation of the project • Local access of the community to residential areas, schools, retail centres, activity centres, community facilities and open spaces • Effects on tram, bus and train movements and access to stops and stations • Accessibility and safety for pedestrians at road junctions and community facilities • Connectivity, accessibility, function, experience and safety for cyclists and pedestrians including use of existing and new shared use paths, bridges and on-road bike paths • The overall geographic distribution and magnitude of changes to travel times and accessibility for road users • Consistency with transport and urban plans (eg VicRoads Movement and Place Framework, Victorian Cycling Strategy (2018–2028), Plan Melbourne (2017–2050)) • Interactions, including possible cumulative impacts with other relevant projects, for example, the M80 and the Outer Metropolitan Ring Road/E6 developments.	Section 3 Section 9.2 Section 9.4 Section 9.5 Section 9.6 Section 9.7
	Undertake sensitivity analysis to test assumptions and inputs of transport model, if required.	Section 11
Approach to manage performance	Describe the environmental performance requirements to set transport network outcomes that the project must achieve.	Section 12

1.3.3 Linkages to other reports

This report informs the technical assessments as listed in Table 1-2.

Table 1-2 – Linkages to other technical reports

Specialist report	Relevant to this impact assessment
Technical report B – Air quality	This assessment provides forecast traffic volumes in the project study area which inform the air quality assessment.
Technical report C – Noise	This assessment provides forecast traffic volumes in the project study area which inform the noise assessment.
Technical report I – Social	This assessment provides forecast traffic volumes in the project study area which inform the social assessment.
Technical report J – Human health	This assessment provides forecast traffic volumes in the project study area which inform the human health assessment.

2 Project description

2.1 Overview

The North East Link alignment and its key elements as assessed in the Environment Effects Statement (EES) include:

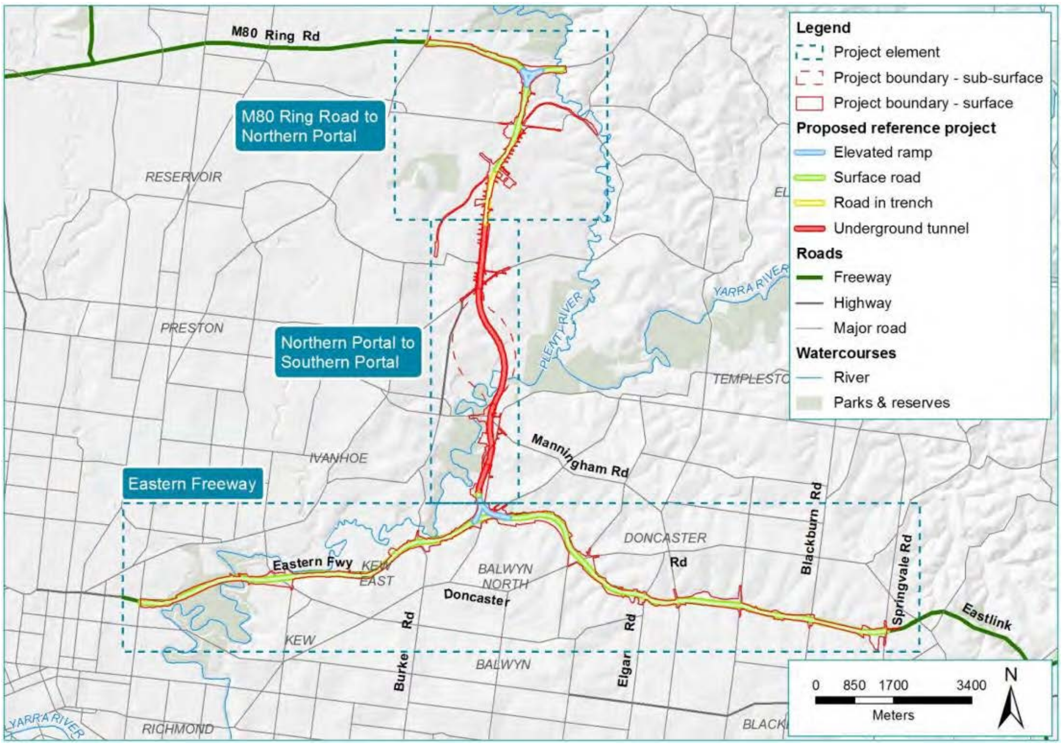
- **M80 Ring Road to the northern portal** – from the M80 Ring Road at Plenty Road, and the Greensborough Bypass at Plenty River Drive, North East Link will extend to the northern portal near Blamey Road utilising a mixture of above, below and at surface road sections. This includes new road interchanges at the M80 Ring Road and Grimshaw Street.
- **Northern portal to southern portal** – from the northern portal the road will transition into twin tunnels that connect to Lower Plenty Road via a new interchange, before travelling under residential areas, Banyule Flats and the Yarra River to a new interchange at Manningham Road. The tunnels will then continue to the southern portal located south of the Veneto Club.
- **Eastern Freeway** – from around Hoddle Street in the west through to Springvale Road in the east, modifications to the Eastern Freeway include widening to accommodate future traffic volumes and new dedicated bus lanes for the Doncaster Busway. There will also be a new interchange at Bulleen Road to connect North East Link to the Eastern Freeway.

These elements are illustrated in Figure 2-1.

The project will also improve existing bus services from Doncaster Road to Hoddle Street through the Doncaster Busway, as well as pedestrian connections and the bicycle network with connected shared use paths from the M80 Ring Road to the Eastern Freeway.

For a detailed description of the project, refer to EES Chapter 8 – Project description.

Figure 2-1 – Overview of North East Link



2.2 Construction

Key construction activities for North East Link would include:

- General earthworks including topsoil removal, clearing and grubbing vegetation
- Relocation, adjustment or installation of new utility services
- Construction of retaining walls and diaphragm walls including piling
- Ground treatment to stabilise soils
- Tunnel portal and dive shaft construction
- Storage and removal of spoil
- Construction of cross passages, ventilation structures and access shafts
- Installation of drainage and water quality treatment facilities
- Installation of a managed motorway system
- Tunnel construction using TBMs, mining and cut and cover techniques
- Installation of noise barriers
- Restoration of surface areas.

2.3 Operation

Following construction of North East Link, key operation and maintenance phase activities would include:

- Operation and maintenance of new road infrastructure
- Operation and maintenance of the managed motorway system
- Operation of the North East Link motorway control centre
- Operation and maintenance of the tunnel ventilation system
- Operation and maintenance of water treatment facilities
- Operation and maintenance of the motorway power supply (substations)
- Maintenance of landscaping and Water Sensitive Urban Design (WSUD) features.

3 Legislation, policy and guidelines

This section provides an overview of the key legislation, policy and guidelines that forms the framework that guides the development of North East Link.

Some of these documents, particularly legislation, outline procedures and processes that require compliance. Other documents, particularly policy and guidelines, include quantifiable objectives which the project can be aligned with.

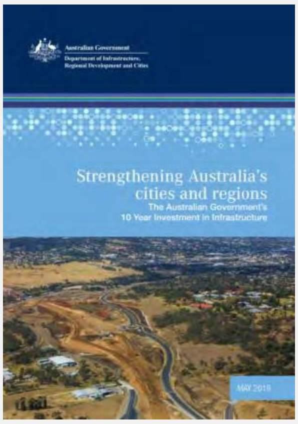
3.1 Commonwealth legislation

There are no Commonwealth legislation or policies specifically relevant to the traffic and transport aspects for North East Link.

3.2 Federal policy

An overview of Australian Government policies relevant to North East Link is presented in Table 3-1.

Table 3-1 – Relevant Australian Government policies

Document title	Summary
Strengthening Australia's cities and regions – the Australian Government's 10 Year Investment in Infrastructure 	*Strengthening Australia's cities and regions* (May 2018) outlines the Australian Government's 10 Year Infrastructure Investment Pipeline as set out in its 2018–19 Budget. The document presents a list of major transport infrastructure funding commitments across metropolitan and regional areas in Australia. **Relevance to North East Link** The document specifically references North East Link as a federal funding commitment. It identifies the completion of Melbourne's orbital freeway network, congestion relief and freight efficiency improvements as the project's key benefits.

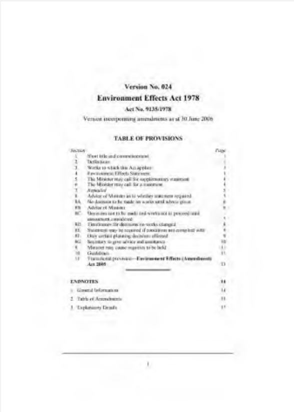
3.3 State legislation

Victorian legislation details how the state's road assets (and other infrastructure) are to be designed, managed and operated. Relevant legislation and their strategic alignment with North East Link are summarised in Table 3-2.

Table 3-2 – Relevant state legislation

<table>
<tr><th>Document title</th><th>Summary</th></tr>
<tr><td>

Environment Effects Act 1978



Version No. 024
Environment Effects Act 1978
Act No. 9135/1978
Version incorporating amendments as at 30 June 2006

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</td><td>

The *Environment Effects Act 1978* provides for the assessment of actions that are capable of having significant environmental effects.

The Act triggers a substantial assessment process to be followed as per the applicable Ministerial direction.

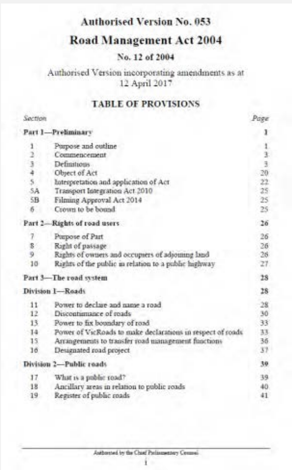
An assessment under the Environment Effects Act informs decisions on the key project approvals required under other legislation.

Relevance to North East Link

As the Victorian Minister for Planning has declared North East Link as 'public works' which are capable of having a significant impact on the environment under section 3 of the Environment Effects Act, an EES is being prepared.

</td></tr>
<tr><td>

Road Management Act VIC 2004



Authorised Version No. 053
Road Management Act 2004
No. 12 of 2004
Authorised Version incorporating amendments as at 12 April 2017

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The *Road Management Act 2004* provides a detailed outline of laws relating to road management in Victoria. These laws assist individuals proposing, or conducting, any works on roads within Victoria. The 2004 update also includes amendments to certain Acts previously established.

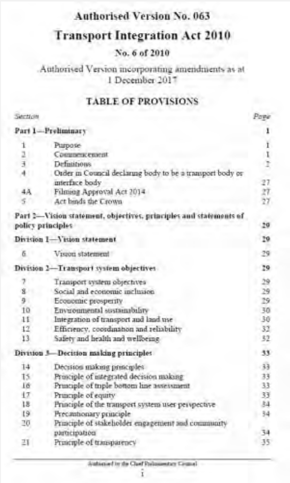
The Road Management (General) Regulations 2016 and the Road Management (Works and Infrastructure) Regulations 2015 are made pursuant to the Road Management Act. These regulations apply to all roads (as defined under the Road Management Act.

Under these Acts there are a number of codes of practice that must be met.

Relevance to North East Link

North East Link will be required to comply with the statutory framework for the management of the road network as outlined in the Road Management Act. Procedures will be implemented for the project's construction and operation so that requirements of the road authority are met.

</td></tr>
</table>

<table>
<tr><th>Document title</th><th>Summary</th></tr>
<tr><td>
Transport Integration Act 2010

Authorised Version No. 063
Transport Integration Act 2010
No. 6 of 2010
Authorised Version incorporating amendments as at 1 December 2017
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20 Principle of stakeholder engagement and community participation 34
21 Principle of transparency 35
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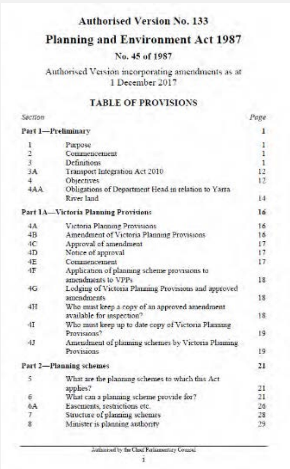
</td><td>
The Transport Integration Act 2010 establishes a framework for the delivery of an integrated and sustainable transport system in Victoria.
The Transport Integration Act sets out the key policies and objectives that guide the development of the Victorian transport system. It provides a framework to ensure the elements of Victoria’s transport are considered as a unified system and that transport and land use planning are integrated.
The Transport Integration Act lists transport system objectives under the following categories:
• Social and economic inclusion
• Economic prosperity
• Environmental sustainability
• Integration of transport and land use
• Efficiency, coordination and reliability
• Safety and health and wellbeing.
Relevance to North East Link
The North East Link scope integrates all modes of transport, and includes upgrades to road, public transport and shared use path infrastructure. A team of VicRoads staff are additionally embedded within NELP to assist with the integration of North East Link and the balance of the road network. Interactions between North East Link and other transport projects is additionally discussed in Section 9.2.6.
</td></tr>
<tr><td>
Planning and Environment Act 1987

Authorised Version No. 133
Planning and Environment Act 1987
No. 45 of 1987
Authorised Version incorporating amendments as at 1 December 2017
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6 What can a planning scheme provide for? 21
6A Easements, restrictions etc. 26
7 Structure of planning schemes 28
8 Minister is planning authority 29
Authorised by the Chief Parliamentary Counsel
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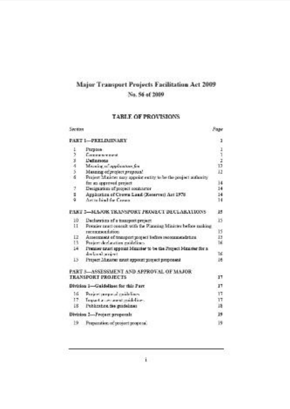
</td><td>
The Planning and Environment Act 1987 details a framework for planning the use, development and protection of land in Victoria that meets the present and long-term interests of all Victorians.
The Planning and Environment Act sets out the structure and administration of planning in Victoria and authorises the preparation, approval and adoption of planning schemes and planning scheme amendments by planning authorities.
The Act includes seven key objectives for planning in Victoria:
• To provide for the fair, orderly, economic and sustainable use, and development of land
• To provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity
• To secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria
• To conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value
• To protect public utilities and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community
• To facilitate development in accordance with the objectives above
• To balance the present and future interests of all Victorians
Relevance to North East Link
The seven objectives above are supported by the objectives and guiding principles for North East Link.
The project will affect land in the municipalities of Banyule, Boroondara, Manningham, Nillumbik, Whitehorse and Yarra.
An amendment will be required to each of these planning schemes under Victoria’s Planning and Environment Act to facilitate the construction of North East Link.
</td></tr>
</table>

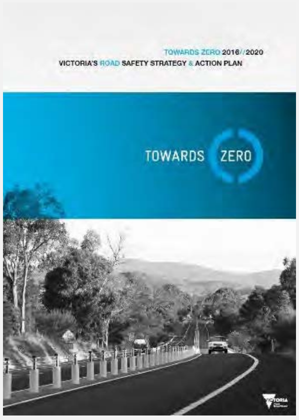
Document title	Summary
Major Transport Projects Facilitation Act 2009  Major Transport Projects Facilitation Act 2009 No. 56 of 2009 TABLE OF PROVISIONS	The purpose of the *Major Transport Projects Facilitation Act 2009* is to facilitate the development of major transport projects, with the aim to create a 'one stop shop' for assessment, approvals and delivery of major transport projects in Victoria. **Relevance to North East Link** North East Link was declared by the Premier under section 10 of the Major Transport Projects Facilitation Act. The Act applies to North East Link with the exception of Part 3 (Assessment and approval of major transport projects) and Part 8 (Assessment committees). This means that if North East Link was granted the principal environmental and planning approvals, North East Link Project (NELP) would be able to use the project delivery and utilities interface provisions in Parts 6 and 7 of the Act to deliver the project.

3.4 State policy

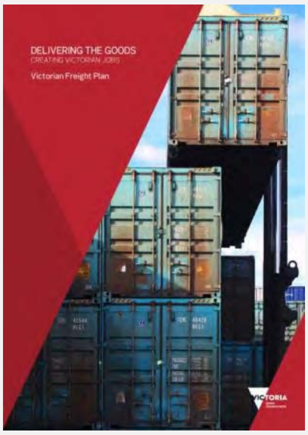
Victorian Government policies detail the principles and strategies to guide the decision-making process in regard to Victorian road assets (and other infrastructure). The policies and their strategic alignment with North East Link are summarised in Table 3-3.

Table 3-3 – Relevant state policies

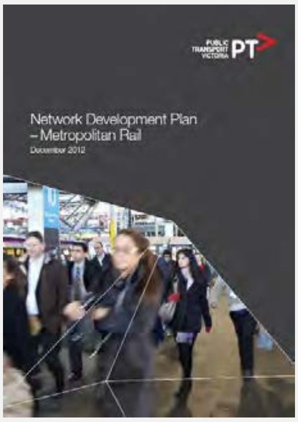
Document title	Summary
State Planning Policy Framework (SPPF)  	The State Planning Policy Framework (SPPF) provides a framework to ensure the objectives of planning in Victoria are implemented through appropriate land use and development planning policies and practices, in accordance with Section 4 of the *Planning and Environment Act 1987*. The SPPF is common in content across all Victorian planning schemes. These high-level policy directives help guide responsible authorities regarding matters of state significance that must be considered when administering the planning scheme in their respective municipalities. **Relevance to North East Link** State policy directives provide a guiding framework to inform the planning of North East Link so the project integrates well with its urban setting and contributes to the fair, orderly, economic and sustainable use and development of the areas it passes through. The framework states that *'New transport routes and adjoining land uses should be located and designed to minimise disruption of residential communities and their amenity'.* This is supported by the objectives and guiding principles for North East Link. The SPFF also emphasises the need to integrate transport and land use planning outcomes. This has been considered for North East Link via the Transport for Victoria Movement and Place framework, which allocates road hierarchy according to its strategic purpose and surrounding land uses. This is discussed in further detail in Section 6.1.2.

Document title	Summary
Towards Zero (2016–2020) Victoria's Road Safety Strategy and Action Plan 	The Towards Zero 2016/2020 Victoria's Road Safety Strategy and Action Plan outlines how the Victorian Government aims to achieve its goal of reducing the road toll to 200 or less by 2020. To achieve this, the Towards Zero campaign has utilised the Safe System Approach when considering all elements of a safe road system. The Safe System Approach outlines four key areas to target; Safer Roads, Safer Speeds, Safer Vehicles and Safer Road Users. The safer roads target area is relevant to North East Link. Key actions set in Towards Zero include: • Improvements to road and roadside infrastructure • Innovated safety treatments and upgrades such as raised platform treatments at signalised intersections, to create safer travel speeds and manage traffic, pedestrians and cyclists more safely when passing through them • A major investment to redirect thousands of trucks away from local streets • An increase in separate bike paths and lanes on principal and priority bicycle networks and routes to help protect cyclists from traffic. **Relevance to North East Link** The Victorian Government subsequently announced that all major transport projects must incorporate safe system principles. North East Link would include safe system principles in the design process, which will be refined during the tendering phase. The project is anticipated to significantly reduce truck volumes along arterial and local roads in Melbourne's north-east, as discussed in Section 9.5. It also includes a series of new shared use paths, which would reduce interactions between cyclists and general traffic. This is discussed further in Section 9.7.
Plan Melbourne (2017–2050) 	Plan Melbourne (2017–2050) is the key planning strategy for metropolitan Melbourne and sets out the Victorian Government's vision for Melbourne's growth to 2050. Plan Melbourne sets outs principles, outcomes, directions and policies. **Relevance to North East Link** North East Link is a key deliverable set out in Plan Melbourne. The plan's third outcome states: '*Melbourne has an integrated transport system that connects people to jobs and services and goods to market*'. North East Link is specifically mentioned in Plan Melbourne as a means to help achieve this outcome. Policies of Plan Melbourne that do not directly identify North East Link still relate to the project include: • Policy 3.1.5: Improve the efficiency of the motorway network • Policy 3.4.1: Support sufficient gateway capacity with efficient landside access • Policy 3.1.3: Improve arterial road connections across Melbourne for all road users • Policy 3.1.5: Improve the efficiency of the motorway network • Policy 3.1.6: Support cycling for commuting • Policy 3.2.1: Improve roads in growth areas and outer suburbs • Policy 3.3.2: Create a network of cycling links for local trips • Policy 3.4.3: Avoid negative impacts of freight movements on urban amenity.

Document title	Summary
Victorian Infrastructure Plan 	The Victorian Infrastructure Plan (2017) outlines the Victorian Government's long-term commitments and directions across the following nine sectors: • Transport • Culture, sport and community • Digital connectivity • Education and training • Energy • Environment • Health and human services • Justice and emergency services • Water. The Victorian Infrastructure Plan sets out four priorities relating to transport: • Making the most of existing assets: by upgrading existing infrastructure and rolling stock, as well as expanding maintenance programs • Building for the future: through the provision of new transport infrastructure • Connecting regional Victoria: through the provision of new and upgraded transport infrastructure across regional Victoria • Developing smarter transport solutions: by funding initiatives for intelligent transport systems and data analytics. **Relevance to North East Link** The Victorian Infrastructure Plan directly references North East Link by outlining the commitment to planning and pre-construction works for the project. North East Link is listed as a means of reducing congestion in Melbourne's north-east, and improving freight efficiency by removing trucks from arterial and local roads.

Document title	Summary
Victorian Freight Plan  	The Victorian Freight Plan (2018) outlines the Victorian Government's short, medium and long-term priorities to improve the efficiency and productivity of freight movements, and better connect businesses in and outside of Victoria. The Victorian Freight Plan sets four key objectives: • Reducing the cost of doing business • Improving the efficiency of moving freight while minimising adverse impacts • Better connecting Victorian businesses with their local, interstate and export markets • Providing sufficient future capacity. To achieve these objectives, the plan sets out five priorities for the next five years: • Manage existing and proposed freight corridors and places in conjunction with urban form changes • Reduce the impact of congestion on supply chain costs and communities • Better use of our rail freight assets • Plan for Victoria's future port capacity • Stay ahead of the technology curve. **Relevance to North East Link** The Victorian Freight Plan specifically discusses North East Link as an action to expand the state's High Productivity Freight Vehicle (HPFV) network. North East Link also responds to the plan's overarching objectives relating to reducing the impact of congestion on freight capacity and efficiency.
Victorian Cycling Strategy (2018–2028)  	The Victorian Government's Victorian Cycling Strategy 2018–2028 aims to encourage more people to cycle as a means of transport. The strategy guides planning and investment in cycling over the next decade. To increase the number, frequency and diversity of people cycling for transport purposes in Victoria, the strategy outlines two primary goals: • Goal 1: Investing in a safer, lower-stress, better-connected network, prioritising strategic cycling corridors. • Goal 2: Making cycling a more inclusive experience These goals overarch a series of initiatives and objectives and provide overall guidance for the strategy. **Relevance to North East Link** While the Victorian Cycling Strategy does not specifically reference North East Link it does discuss how more cycling will contribute to reducing Victoria's transport issues. This includes a reduced reliance on private vehicles and the benefits of integrating cycling infrastructure with other transport infrastructure projects. Objectives of Victorian Cycling Strategy that relate to the objectives of North East Link are: • Provide a lower-stress cycling experience • Incorporate new cycling infrastructure in major transport projects • Improve outcomes for cyclists in planning. North East Link will deliver considerable cycling infrastructure upgrades in the form of new, continuous and separated shared use paths along the Eastern Freeway and Greensborough Road corridors. This is discussed further in Section 9.7.

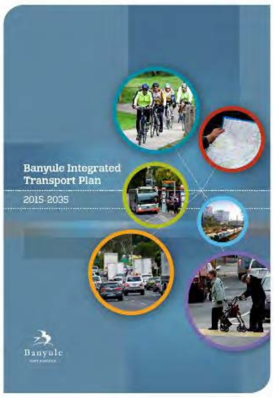
<table>
<tr><th>Document title</th><th>Summary</th></tr>
<tr><td>Cycling into the future (2013–2023)

</td><td>The Cycling into the future (2013–2023) strategy sets out a framework for the Victorian Government to support and encourage cycling as a means of travel, recreation and commuting.
To achieve this and to mitigate the barriers associated with cycling, the strategy aims to build better networks, knowledge, attitudes and processes to enable cycling to grow.
Cycling into the future sets six key directions:
Build evidence – build a stronger evidence base for the Victorian Government to make more informed decisions
Enhance governance and streamline processes – clarify accountability and improve co-ordination, planning and delivery
Reduce safety risks – reduce conflicts and risks to make cycling safer
Encourage cycling – help Victorians feel more confident about cycling and make cycling more attractive
Grow the cycling economy – support opportunities to grow and diversify Victoria's economy through cycling
Plan networks and prioritise investment– plan urban cycling networks to improve connectivity and better target investment in urban networks, regional trails and specialist cycle sport infrastructure.
Relevance to North East Link
Cycling into the future does not provide specific policy outcomes or measurable targets that can be compared with the objectives of North East Link.
However, the strategy does discuss the planning of both Melbourne's Principal Bicycle Network and the Metropolitan Trail Network and the benefits of integrating cycling infrastructure with other infrastructure projects. The cycling infrastructure component of North East Link will provide connections identified as strategic cycling corridors.</td></tr>
<tr><td>Network Development Plan – Metropolitan Rail (2012)

</td><td>The Network Development Plan – Metropolitan Rail (2012) was prepared by Public Transport Victoria (PTV) to provide advice on expansion of the existing network, the re-design of service timetables to maximise efficiency and the extension of the network into areas not currently serviced by metropolitan rail.
The plan utilises a staged approach to 'strengthen and secure' the future of Melbourne's rail network. The key objectives of the plan are to:
Overcome existing network constraints and provide a strong foundation for further expansion of capacity in the future
Introduce a metro-style train system for Melbourne
Extend the network into growth areas and existing areas without good access to rail services
Prepare for further growth and protect future options.
Relevance to North East Link
The Network Development Plan sets numerous key projects for the metropolitan rail system. Projects in the vicinity of North East Link are:
Hurstbridge rail line upgrade and Eltham stabling
Heidelberg to Rosanna duplication
Duplication from Greensborough to Eltham.
North East Link will include rebuilding the existing car parking facilities at Watsonia railway station on the Hurstbridge rail line and will also integrate with Transport for Victoria's station access planning process.</td></tr>
</table>

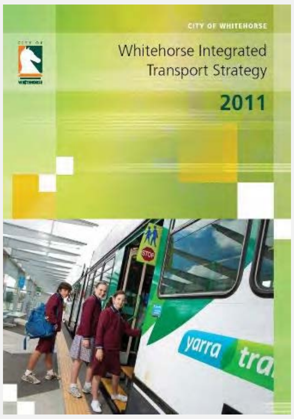
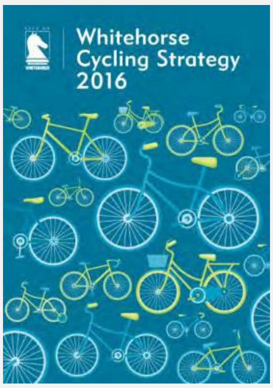
3.5 Local policy

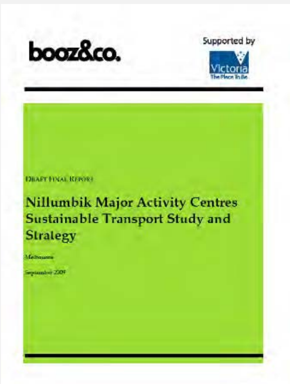
A number of Local Government Areas are near or within the North East Link project boundary. They all have policies and strategies relating to transport, many of which directly reference the project or are strategically aligned to the project's objectives. Relevant councils and their planning documents are summarised in Table 3-4.

Table 3-4 – Relevant local government policies

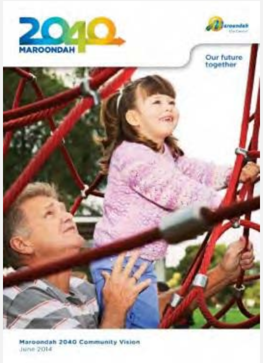
Document title	Summary
Banyule Integrated Transport Plan (2015–2035)  	The Banyule Integrated Transport Plan provides a long-term direction for the transport network in the City of Banyule. The plan has been adopted by Banyule City Council to guide strategic transport planning decisions across the municipality. The transport plan identifies six key themes that reflect the goals of the council: • Accessibility and Mobility • Land Use Development • Walking and Cycling • Public Transport • Streets and Public Spaces • Advocacy and Leadership. Each theme contains sub-objectives and actions to support delivery of the plan. **Relevance to North East Link** Of relevance to North East Link, the Banyule Integrated Transport Plan recognises the missing link between the M80 Ring Road and Eastern Freeway as well as the significant impact of freight movements on amenity and safety of the road network. Furthermore, the transport network across Banyule is described as '*under increasing pressure*' and is projected to worsen as the population in the City of Banyule and neighbouring areas grows. The transport plan describes North East Link as an '*essential orbital link'* which will help to achieve the council's strategic direction to improve safety and amenity. Action 51 of the plan outlines the desire of the council to advocate for North East Link. North East Link responds to a key action of Banyule City Council's transport plan in that it provides a link between the M80 Ring Road and EastLink.

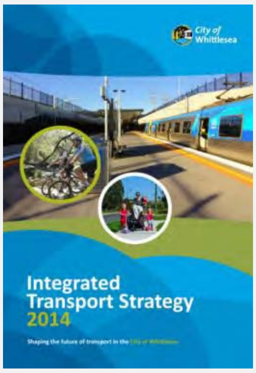
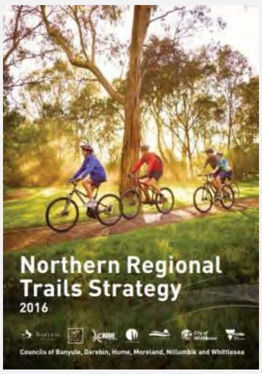
Document title	Summary
Greensborough Activity Centre Transport Masterplan (2017) 	The Greensborough Activity Centre Transport Masterplan sets out four key objectives to support transport and movement for the hub: • Improve public transport including a new integrated Greensborough Transport Interchange • Manage through traffic to facilitate pedestrian, cycling and public transport priority in the Greensborough Activity Centre • Improve pedestrian access within the Greensborough Activity Centre • Improve cycling access within the Greensborough Activity Centre. **Relevance to North East Link** The Transport Masterplan directly references North East Link as an opportunity to help achieve some of these objectives and to address the current transport challenges of the precinct. A summary of these opportunities include: • Managing through traffic on Grimshaw Street • Reviewing the function of arterial roads around Greensborough • Improvements to cycling infrastructure including completion of the missing walking and cycling path link along the Greensborough Road corridor. The project would reduce through-traffic along Grimshaw Street and the Greensborough town centre as discussed in Section 9.2.2. The walking and cycling scope, as outlined in Section 9.7, includes a significant program of works along the Greensborough Road corridor as well as a number of east-west crossings across the project.
Making Manningham Mobile (2010) 	Making Manningham Mobile is Manningham City Council's transport strategy. It aims to provide a sustainable, safe, equitable and efficient transport system within the City of Manningham to benefit local residents and business owners. The strategy informs residents of the council's transport outlook for the next 20 years and sets out opportunities to seek Australian and Victorian government investment in transport projects that benefit the municipality. The strategy sets actions and sub-actions targeted at fulfilling the council's four key objectives to provide a: • Strong community • Liveable Manningham • Convenient local services • Leading council. The transport strategy recognises key transport challenges for the municipality, including a heavy reliance on cars by residents. **Relevance to North East Link** The strategy outlines two actions which directly reference North East Link and demonstrate the council's interest to be involved in the project in the short, medium and long term: • Investigate the option of a proposal to link the M80 Ring Road and the Eastern Freeway • Support and liaise with the Victorian Government as required. North East Link responds to key actions of Making Manningham Mobile in that it provides a link between the M80 Ring Road and Eastern Freeway.

Document title	Summary
Whitehorse Integrated Transport Strategy (2011) 	The Whitehorse Integrated Transport Strategy provides a framework to achieve a sustainable, convenient, accessible and safe local transport network. Five key goals underpin the strategy and provide direction to ensure the community have access to a wide range of transport options: • Improve links between transport modes for the efficient and convenient movement of people and goods • Increase sustainable transport modes to minimise environmental impacts. • Increase sustainable transport modes that promote healthy lifestyles such as walking and cycling • Increase the safety of residents and commuters who travel in the municipality • Promote economic development and social connectedness in our community. The council has developed four strategic objectives with accompanying actions to help meet these goals. Whitehorse City Council recognises the high volume of commuter traffic that travels through its region. However, it recommends EastLink and Eastern Freeway for channelling regional traffic around the municipality. **Relevance to North East Link** North East Link indirectly responds to actions and objectives specified in the Whitehorse Integrated Transport Strategy. Although no action specifically lists North East Link, the project is predicted to help achieve several goals through: • Improvements in connectivity and travel times for cars and freight across Melbourne • Significant upgrades to off-road shared use paths across the north-east • Reductions in crashes across the north-east.
Whitehorse Cycling Strategy (2016) 	The Whitehorse Cycling Strategy outlines goals, guiding principles and targets to increase cycling across the City of Whitehorse. The strategy lists specific targets by 2026, including: • Increase the percentage of all journey-to-work trips made by bicycle from 0.7 per cent to 2 per cent • Increase the percentage of journey-to-work trips by bicycle, which start and end in the City of Whitehorse, from 1.1 per cent to 3 per cent • Increase the percentage of females cycling within the municipality from 14 per cent to 30 per cent • Increase the number of short distance bicycle trips (1 to 5 km) by 7.5 per cent • Reduce the number of cyclists killed or injured on roads by 15 per cent. **Relevance to North East Link** North East Link indirectly responds to the strategy's targets. It will include a broad program of new and upgraded shared use paths to encourage active travel. The shared use paths will be segregated and off-road, reducing interactions with traffic, leading to safer and less stressful journeys for pedestrians and cyclists.

Document title	Summary
Boroondara Integrated Transport Strategy (2006) 	The Boroondara Integrated Transport Strategy aims to combat the challenges of access and congestion by encouraging greater use of sustainable travel modes, improving traffic flows and tackling the conflict between different travel modes. The strategy provides Boroondara City Council strategic direction to address transport issues and improve accessibility and liveability across the municipality. The strategy outlines plans for future growth, development and travel patterns for the next 20 years. The plan has six key strategic objectives: • Facilitate improvements and better integrate all forms of public transport • Improve provision for cycling and walking, particularly in activity nodes, strip shopping centres and schools to improve access to public transport • Create more pedestrian-friendly street environments and high quality urban centres that are less car-dominated • Introduce measures to better manage traffic, public transport, cycling and walking on congested roads, particularly in urban centres • Promote safe and secure alternative forms of travel to the car • Introduce measures to better manage through traffic in the City of Boroondara. **Relevance to North East Link** North East Link indirectly responds to actions outlined in the strategy, specifically with the inclusion of the North East Bicycle Corridor and other off-road shared use path upgrades. The Doncaster Busway improves DART bus services travel times and reliability, meeting the objective of improvements to all forms of public transport.
Nillumbik Major Activity Centres Sustainable Transport Study and Strategy (2009) 	The Nillumbik Major Activity Centres Sustainable Transport Study and Strategy outlines Nillumbik Shire Council's objectives for implementing the actions in its structure plan. The strategy recommends further action to encourage sustainable transport and to assist in managing car parking demand over the next 25 years. The study focuses on the actions the council can make to improve local area traffic and car parking in the municipality. **Relevance to North East Link** The strategy aims to support the Diamond Creek and Eltham Major Activity Centre structure plans. While it does not specifically refer to North East Link, the project is predicted to reduce car and truck traffic through both precincts, which would improve amenity and accessibility for residents and visitors.

Document title	Summary
Yarra Council Plan (2017–2021)  	The Yarra Council Plan outlines a four-year plan of strategic directions and priorities. After engaging with local residents, businesses and community groups, Yarra City Council developed seven objectives for the plan, with accompanying key strategies, strategic indicators and initiatives to help the council fulfil its commitments. To combat this, it has stated it will continue to work on major improvements to walking and cycling infrastructure as well as improving traffic management. **Relevance to North East Link** While North East Link is not specifically mentioned in the Council Plan, the following initiatives relate to the outcomes of North East Link: • Work in partnership with VicRoads and influence traffic management and road safety on main roads • Develop and promote pedestrian and bicycle infrastructure that encourages alternative modes of transport, improves safety and connectedness. North East Link indirectly responds to the Council Plan initiatives listed above. The project is predicted to reduce crashes across the north-east by diverting a significant proportion of traffic from arterial and local roads. It will also include shared use path upgrades, such as the North East Bicycle Corridor, to improve amenity and comfort for walking and cycling trips.
Going Places, Darebin Transport Strategy (2007–2027) 	The Darebin Transport Strategy sets out Darebin City Council's 20-year plan for managing its transport issues. The plan sets eight key objectives, six policy areas and an implementation plan with a list of actions to help the council fulfil its policy commitments. The strategy focuses on improving public transport accessibility within the municipality, as well as removing barriers to walking and cycling. **Relevance to North East Link** While the strategy does not specifically mention North East Link, several of its policies relate to the project's outcomes: • Pedestrian needs and safety outcomes will be considered in all transport infrastructure upgrades and road works • Give pedestrians and cyclists greater priority over vehicles within activity centres and along local streets. North East Link is predicted to reduce crashes across the north-east by diverting a significant proportion of traffic from arterial and local roads. It will also include shared use path upgrades, such as the North East Bicycle Corridor, which would improve amenity and comfort for walking and cycling trips. This would allow planning authorities to repurpose road corridors, which are anticipated to have reduced traffic volumes, and give greater priority to pedestrians and cyclists. This is discussed in more detail in Section 6.1.2.

Document title	Summary
Maroondah 2040 	Maroondah 2040 sets the council's vision for the municipality for the next 22 years, integrating 18 months of community consultation. This feedback has been categories into a series of themes to shape the plan. Key directors and priority actions for transport issues are addressed in the theme 'A connected community'. The overall emphasis is on sustainable transport, particularly public and active transport improvements. Many of the directions support the 20-minute neighbourhood concept by encouraging the development of active streetscapes and improving local walkability. **Relevance to North East Link** North East Link is directly mentioned as a priority action in Maroondah 2040. Other directions relating to North East Link include: • Enhance and promote Maroondah's walking and cycling path network ensuring connections with the wider metropolitan Melbourne trail network • Advocate for and encourage the use of sustainable transport by enhancing local access to public transport, supporting behaviour change initiatives and enhancing the pedestrian and cycling network, including the provision of on-road bicycle lanes. The two directions relate to North East Link through its inclusion of shared use path upgrades. These upgrades will improve connectivity to Melbourne's existing trail and off-road path network, including those from Maroondah. This is discussed in further detail in Section 9.7.

Document title	Summary
City of Whittlesea Integrated Transport Strategy (2014)  	The Whittlesea City Council's Integrated Transport Strategy addresses the transport challenges faced by the municipality. The plan identifies six policy areas to focus the development of action and implementation plans: • Land Use and Transport • Walking • Cycling • Public Transport • Roads and Freight • Community Transport. Within the Roads and Freight policy area, there are five guiding principles and a series of action areas. They emphasise alleviating congestion and improving efficiency of existing roads via direct network upgrades and application of the VicRoads SmartRoads framework. **Relevance to North East Link** North East Link is not mentioned directly within the strategy, however a number of proposed actions have been considered in the project's design: • Action RF 2.1. Work with VicRoads to plan and implement SmartRoads to manage roads consistent with transport and land use priorities • Action RF 2.2. Manage local roads to improve amenity and safety for users and ensure consistency with SmartRoads principles • Action RF 4.1. Plan and manage freight access networks for efficient freight movement while minimising impacts on sensitive land uses. The Transport for Victoria Movement and Place category system replaced the VicRoads SmartRoads framework in 2014. The Movement and Place category system has been applied to the North East Link to repurpose roads anticipated to experience a significant reduction in overall traffic volumes. This is discussed in further detail in Section 6.1.2. Separately, one of the key outcomes of North East Link is the removal of trucks from residential streets in the north-east. The project is anticipated to reduce reliance on the Rosanna Road corridor as a truck route, as discussed in Section 9.5.4.
Northern Regional Trails Strategy (2016)  	The Northern Regional Trails Strategy is an initiative of six councils across Melbourne's north including Banyule, Darebin, Hume, Moreland, Nillumbik and Whittlesea. The strategy sets out a blueprint for northern Melbourne's off-road trails and paths, totalling more than 120 projects. **Relevance to North East Link** North East Link will directly fulfil the following proposed plans within the strategy: • Banyule Shared Trail (B1) • The North East Bicycle Corridor.

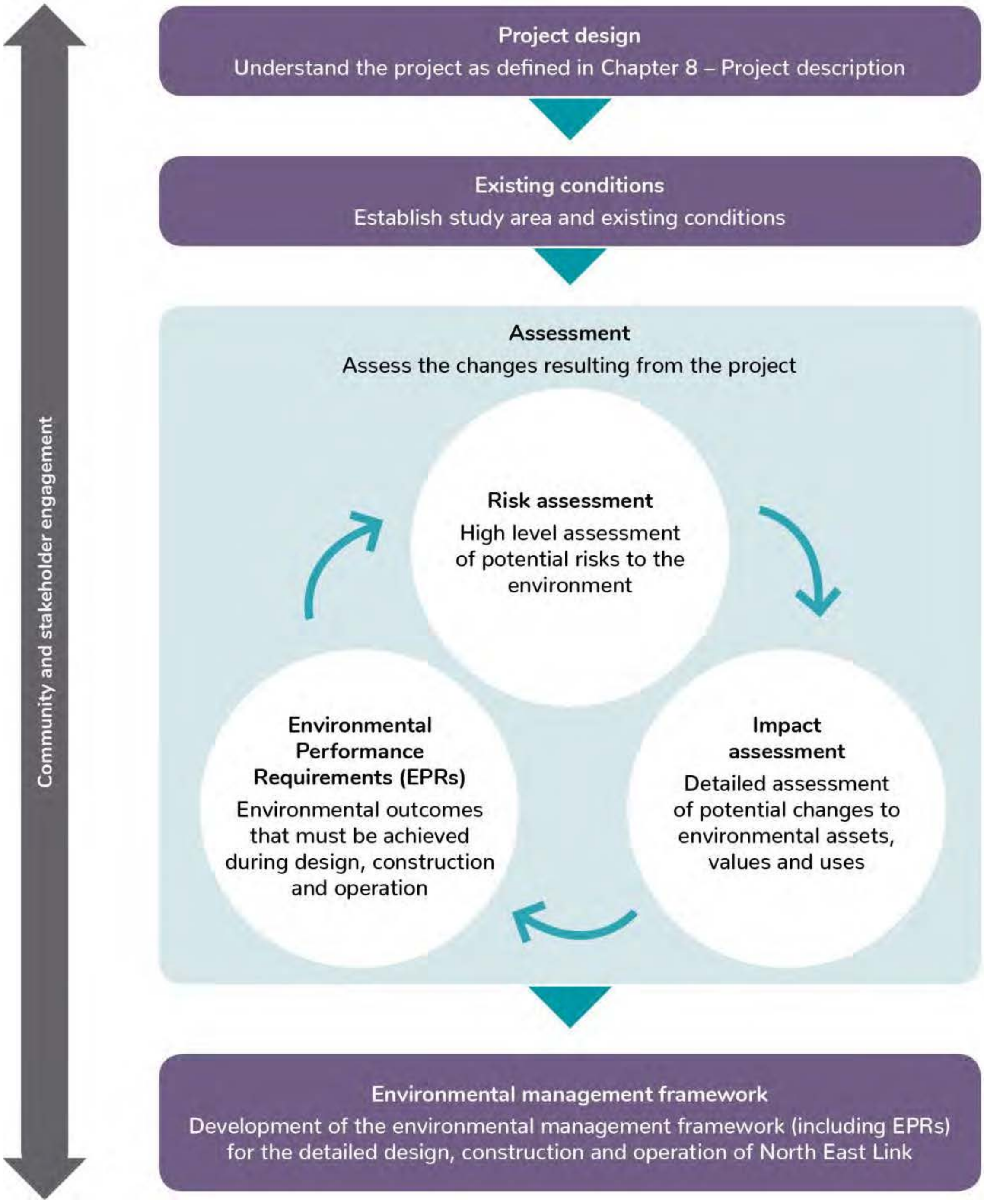
4 Methodology

4.1 Overview of methodology

This section describes the method that was used to assess the potential impacts of North East Link. A risk-based approach was applied to prioritise the key issues for assessment and inform measures to avoid, minimise and offset potential effects. This process is summarised in Figure 4-1.

The following sections outline the methodology for the traffic and transport impact assessment.

Figure 4-1 – Overview of assessment method



4.2 Study area

Transport modelling has been used to identify the traffic and transport impacts as a result of North East Link. The assessment has been conducted across three distinct areas:

- Metropolitan Melbourne
- A project-specific study area
- The project corridor.

Metropolitan Melbourne

Metropolitan Melbourne refers to the Greater Melbourne region defined by the Australian Bureau of Statistics' Greater Capital City Statistical Areas. The extent of the metropolitan Melbourne definition is shown in Figure 4-2.

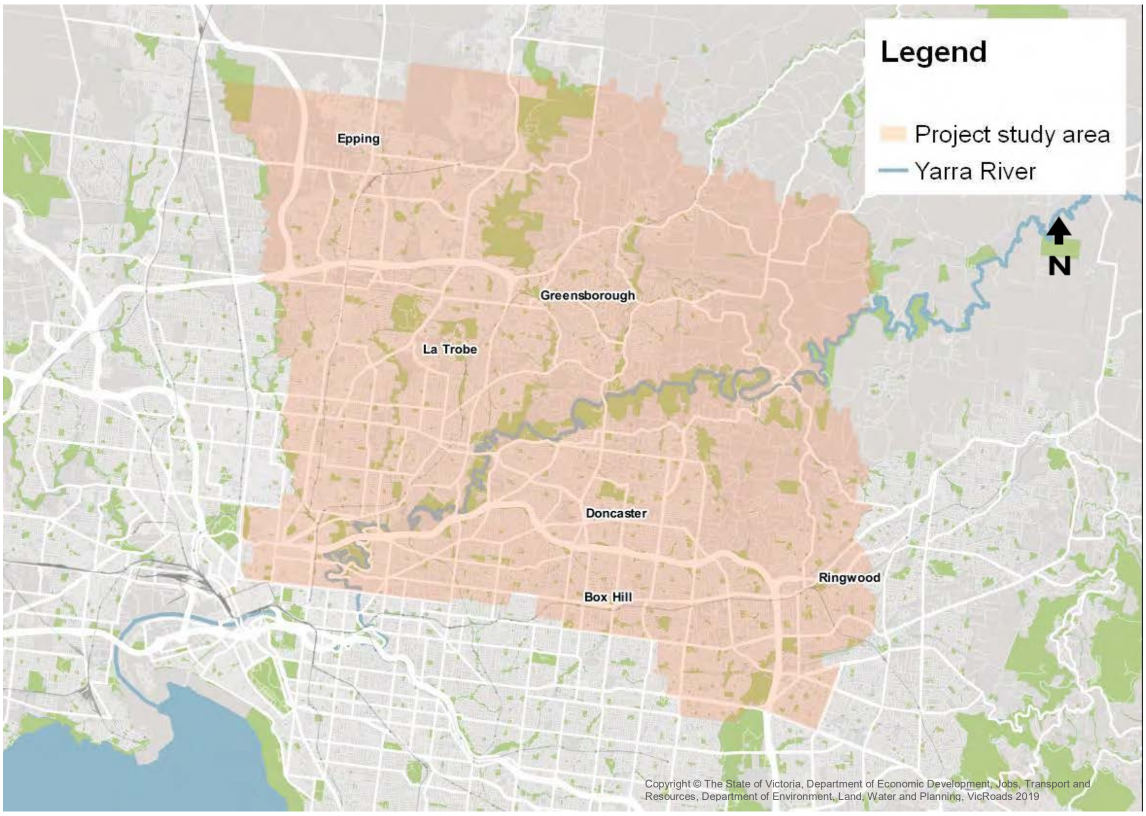
The metropolitan Melbourne area has been used within the existing conditions and impact assessment, often as a benchmark against the project study area. Impacts on metropolitan Melbourne are generally reported as network-wide statistics such as Vehicle Kilometres Travelled (VKTs) and average vehicle speeds.

Figure 4-2 – Overview of the metropolitan Melbourne area

Project study area

Strategic transport modelling has been used to inform the extent of the project study area.
Its boundaries have been determined through a review of forecast traffic impacts arising from North East Link. Traffic volume impacts outside the study area are minimal (less than 10 per cent) and are considered within the margin of error for transport models. The coverage of the adopted study area is presented in Figure 4-3.

Figure 4-3 – Project study area definition



The area broadly encompasses metropolitan Melbourne's north-eastern suburbs, spanning the Merri Creek in the west to Melbourne's metropolitan boundary in the east. The area also covers the Eastern Freeway in the south and M80 Ring Road in the north; the two key feeder routes of North East Link. Crucially, the study area covers the five Yarra River crossings to the east of Melbourne including Chandler Highway, Burke Road, Manningham Road, Fitzsimons Lane and the Warrandyte Bridge.

The study area spans the Local Government Areas (LGAs) of Banyule, Boroondara, Darebin, Manningham, Maroondah, Nillumbik, Whitehorse, Whittlesea and Yarra. It also includes the Metropolitan Activity Centres (MACs) of Box Hill, Epping and Ringwood as well as the proposed La Trobe National Employment and Innovation Cluster (NEIC).

The study area also spans a number of inner-city arterials, such as Hoddle Street, Queens Parade, and Alexandra Parade. While the anticipated traffic impact on these roads is anticipated to be negligible, they have been included within the study area boundary due to their strategic importance to central Melbourne.

It should be noted that local roads (residential access or lower-order collectors) were not able to be analysed as part of this assessment. This is discussed in further detail in Section 4.7.

Project corridor

The project corridor covers the roads that are a part of, or feed directly into North East Link. In summary these roads include:

- The Eastern Freeway, between Hoddle Street and Springvale Road
- The M80 Ring Road between Plenty Road and the Greensborough Bypass
- A series of existing signalised intersections along the Greensborough Bypass/Greensborough Road corridor
- North East Link itself, between the M80 Ring Road and Eastern Freeway.

4.3 Existing conditions

The existing conditions assessment has been used to set a base line assessment of the current transport conditions across the study area.

4.3.1 Study area

The existing conditions assessment focused on the project study area as presented in Figure 4-3. The metropolitan Melbourne area as presented in Figure 4-2 was also used for identifying the existing conditions.

4.3.2 Establishing existing conditions

An understanding of the existing conditions in the study area is required to establish a base against which to assess potential changes.

Existing data was obtained from a number of sources (including VicRoads, Transport for Victoria and local Councils) to provide a summary of current levels of congestion, travel time, freight movements, public transport coverage and walking/cycling connections.

Traffic information was largely derived from surveys of the north-eastern road network conducted in 2017 and 2018. This data was originally collected during the development of the Business Case for North East Link, however additional sites were surveyed once a preferred corridor was identified. This allowed the project team to concentrate the data collection to areas closer to the project corridor. All current and historical data analysed and their sources are presented in Table 4-1.

A strategic transport model for 2016 was also made available for network-wide assessments. These results are typically referred to as '2016 model' in Section 5.2 for clarity. Further information regarding the strategic transport model is provided in Section 4.5.1.

Table 4-1 – Traffic data referenced in this report

Source	Type of data	Data collection date
North East Link surveys	Traffic volume – Automatic Traffic Counts (ATC)	March 2017
North East Link surveys	Travel time surveys	April 2017
Northern Roads Upgrade project	Traffic volume – Automatic Traffic Counts (ATC)	May 2017
North East Link surveys	Traffic volume – Automatic Traffic Counts (ATC) Origin-destination surveys Intersection counts	June 2017
North East Link surveys	Traffic volume – Automatic Traffic Counts (ATC) Placarded vehicle surveys	September 2017
North East Link surveys	Origin-destination surveys	October 2017
North East Link surveys	Traffic volume – Automatic Traffic Counts (ATC) Intersection counts	November 2017
M80 Upgrade Project	Traffic volume – Automatic Traffic Counts (ATC)	February 2018
VicRoads	Traffic volume – Automatic Traffic Counts (ATC)	February 2018
North East Link surveys	Traffic volume – Automatic Traffic Counts (ATC) Pedestrian and cyclist counts	February 2018
North East Link surveys	Pedestrian and cyclist counts	November/December 2018
VicRoads SCATS data	Traffic volume – SCATS	2017–2018
VicRoads	Crash data	2012–2016

4.4 Risk assessment

An environmental risk assessment has been completed to identify environmental risks associated with construction and operation of North East Link. The risk-based approach is integral to the EES as required by section 3.1 of the Scoping Requirements and the *Ministerial guidelines for assessment of the environmental effects under the Environment Effects Act 1978*.

Specifically, the EES risk assessment aimed to:

- Systematically identify the interactions between project elements and activities and assets, values and uses
- Focus the impact assessment and enable differentiation of significant and high risks and impacts from lower risks and impacts
- Inform development of the reference project to avoid, mitigate and manage environmental impacts
- Inform development of EPRs that set the minimum outcomes necessary to avoid, mitigate or manage environmental impacts and reduce environmental risks during delivery of the project.

This section presents an overview of the EES risk assessment process. EES Attachment III Environmental risk report describes each step in the risk assessment process in more detail and contains a consolidated risk register.

This technical report describes the risks associated with the project on traffic and transport. Wherever risks relating to this study are referred to, the terminology 'risk TRXX' is used. Wherever EPRs relating to this study are referred to, the terminology 'EPR TX' is used. The risk assessment completed for this study is provided as Appendix C – Risk assessment.

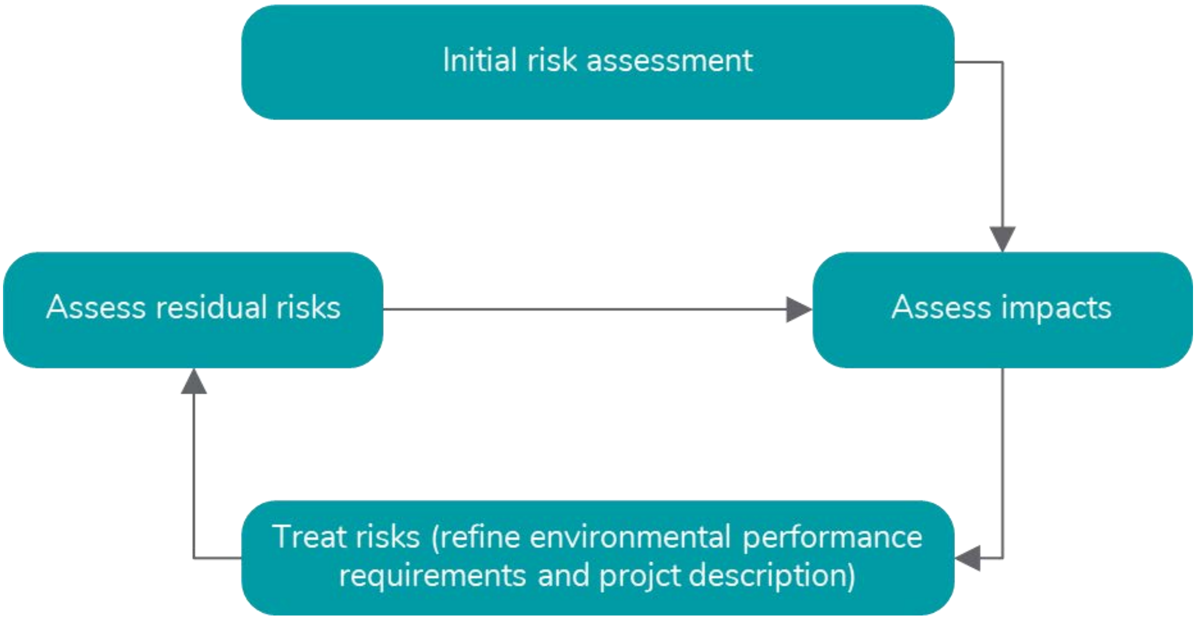
4.4.1 Risk assessment process

The risk assessment process adopted for North East Link is consistent with AS/NZS ISO 31000:2009 Risk Management Process. The following tasks were undertaken to identify, analyse and evaluate risks:

- Use existing conditions and identify applicable legislation and policy to establish the context for the risk assessment
- Develop likelihood and consequence criteria and a risk matrix
- Consider construction and operational activities in the context of existing conditions to determine risk pathways
- Identify standard controls and requirements (Environmental Performance Requirements (EPRs)) to mitigate identified risks
- Assign likelihood and consequence ratings for each risk to determine risk ratings considering design, proposed activities and standard EPRs.

While there are clear steps in the risk process, it does not follow a linear progression and requires multiple iterations of risk ratings, pathways and EPRs as the technical assessments progress. Demonstrating this evolution, a set of initial and residual risk ratings and EPRs are produced for all technical reports. Figure 4.4 shows this process.

Figure 4.4 – Risk analysis process



Rating risk

Risk ratings were assessed by considering the consequence and likelihood of an event occurring. In assessing the consequence, the extent, severity and duration of the risks were considered. These are discussed below.

Assigning the consequences of risks

'Consequence' refers to the maximum credible outcome of an event affecting an asset, value or use. Consequence criteria as presented in EES Chapter 4 – EES assessment framework, were developed for the North East Link EES to enable a consistent assessment of consequence across the range of potential environmental effects. Consequence criteria were assigned based on the maximum credible consequence of the risk pathway occurring. Where there was uncertainty or incomplete information, a conservative assessment was made on the basis of the maximum credible consequence.

Consequence criteria have been developed to consider the following characteristics:

- Extent of impact
- Severity of impact
- Duration of threat.

Severity has been assigned a greater weighting than extent and duration as this is considered the most important characteristic.

Each risk pathway was assigned a value for each of the three characteristics, which were added together to provide an overall consequence rating.

Further detail on the consequence criteria are provided in EES Chapter 4 – EES assessment framework.

Assigning the likelihood of risks

'Likelihood' refers to the chance of an event happening and the maximum credible consequence occurring from that event. The likelihood criteria are presented in Table 4-2.

Table 4-2 – Likelihood of an event occurring

Planned	The event is certain to occur
Almost certain	The event is almost certain to occur one or more times a year
Likely	The event is likely to occur several times within a five-year timeframe
Possible	The event may occur once within a five-year timeframe
Unlikely	The event may occur under unusual circumstances but is not expected (ie once within a 20-year timeframe)
Rare	The event is very unlikely to occur but may occur in exceptional circumstances (ie once within a 100-year timeframe)

Risk matrix and risk rating

Risk levels were assessed using the matrix presented in Table 4-3.

Table 4-3 – Risk matrix

Likelihood	Consequence				
	Negligible	Minor	Moderate	Major	Severe
Rare	Very low	Very low	Low	Medium	Medium
Unlikely	Very low	Low	Low	Medium	High
Possible	Low	Low	Medium	High	High
Likely	Low	Medium	Medium	High	Very high
Almost certain	Low	Medium	High	Very high	Very high
Planned	Planned (negligible consequence)	Planned (minor consequence)	Planned (moderate consequence)	Planned (major consequence)	Planned (severe consequence)

Planned events

North East Link would result in some planned events, being events with outcomes that are certain to occur (ie planned impacts such as land acquisition), as distinct from risk events where the chance of the event occurring and its consequence is uncertain. Although planned events are not risks, these were still documented in the risk register as part of Attachment III – Risk report for completeness and assigned a consequence level in order to enable issues requiring further assessment or treatment to be prioritised.

Risk evaluation and treatment

The risk assessment process was used as a screening tool to prioritise potential impacts and the subsequent level of assessment undertaken as part of the impact assessment. For example, an issue that was given a risk level of medium or above, or was identified as a planned event with a consequence of minor or above, would go through a more thorough impact assessment process than a low risk.

Where initial risk ratings were found to be 'medium' or higher, or were planned events with a consequence of 'minor' or higher, options for additional or modified EPRs or design changes were considered where practicable. It should be noted that the consequence ratings presented in the risk register are solely based on the consequence criteria presented in Attachment III – Risk report.

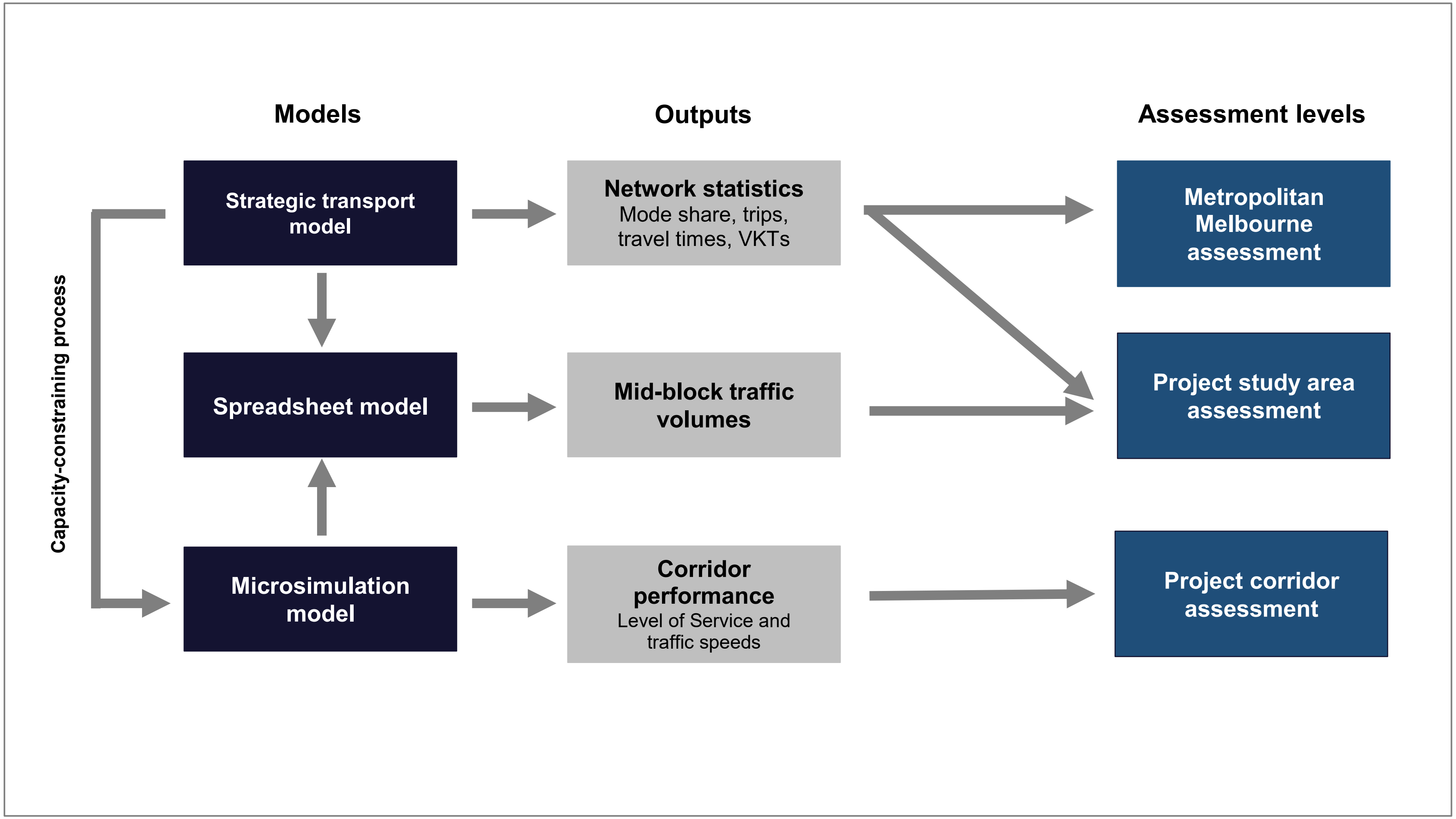
4.5 Impact assessment

This report focuses on two key scenarios in the forecast year of 2036 – a 'no project' scenario and a 'with project' scenario. This forecast year has been adopted to assess network performance approximately 10 years after the anticipated opening of North East Link.

The forecasts have been assessed at three separate levels: metropolitan Melbourne, project study area and the project corridor. Different models have been used across the assessment levels, as shown in Figure 4-5. The three models are:

- **A strategic transport model**, which is used as the basis for all assessments. The strategic model is directly used to forecast network-wide statistics such as total trips, mode share and vehicle kilometres travelled, which are used in the metropolitan Melbourne assessment. Outputs from the strategic model are subject to a capacity constraining process to develop mid-block traffic volumes and corridor performance metrics via a spreadsheet and microsimulation model respectively. The strategic model is discussed in further detail in Section 4.5.1.
- **A microsimulation model** which uses outputs from the strategic model to undertake a project corridor performance assessment. A capacity-constraining process is applied to the strategic model outputs to generate future traffic demand matrices. The resultant performance metrics are used in the project corridor assessment, and the resultant volumes are used by the spreadsheet model. The microsimulation model is discussed further in Section 4.5.2.
- **A spreadsheet model** which uses outputs from the strategic and microsimulation models to develop mid-block traffic volumes. The spreadsheet model applies a capacity constraining process to convert the 'partially-constrained' strategic model demand to fully capacity-constrained traffic volumes. Excess demand is shifted evenly to either side of the peak periods. The resultant volumes are used in the project study area assessment. The spreadsheet model is discussed further in Section 4.5.3.

Figure 4-5 – Overview of modelling processes and assessment levels



4.5.1 Strategic transport modelling

Strategic transport modelling by Veitch Lister Consulting (VLC) has been used for the metropolitan Melbourne and study area assessments. The VLC Zenith model has been used to estimate traffic volumes, public transport patronage and travel times across Melbourne for the following scenarios:

- 2016
- 2026 'no project'
- 2026 'with project'
- 2036 'no project'
- 2036 'with project'.

The 2016 model has been prepared for network-wide statistical assessment, and to assess growth trends to 2036. The 2026 models have been prepared to inform other specialist assessments where required. The traffic and transport impact assessment focuses on the 2036 forecasts. Note that strategic models are not the appropriate tools to forecast walking and cycling volumes on an individual link basis. Forecast changes to walking and cycling has alternatively been presented in mode share terms for the 'no project' and 'with project' scenarios.

Input assumptions which inform the 2026 and 2036 forecasts have been based on Transport for Victoria's (TfV's) Transport Modelling Reference Case. This document sets out transport modelling assumptions relating to future land use and demographics, road and public transport networks and road and public transport cost parameters (such as parking costs). Note that these assumptions do not necessarily represent Victorian Government policy or commitments.

Application of strategic modelling results

Strategic transport models such as the VLC Zenith model are typically used in the evaluation of transport infrastructure, as they can provide insight into project impacts on traffic volumes, public transport patronage, travel times and transport costs. However, all models are subject to limitations and uncertainties which should be considered in the analysis and application of modelled results.

A key limitation of strategic models is that resultant traffic volumes are only 'partially-constrained'. This means that forecast traffic volumes on a given road link may exceed its theoretical capacity in the instance of excessive demand, particularly in peak periods. In order to account for this limitation a spreadsheet model has been used in addition to the strategic model to convert the partially-constrained volumes into fully-constrained volumes for use in this, and other, assessments.
The spreadsheet model applies theoretical capacity limits to peak period strategic modelling results, shifting excess demand into the off peak periods. The spreadsheet model also rebases the strategic modelling results to observed traffic volumes, which accounts for variations in base year traffic validation. This is discussed in further detail in the following sections.

An out-of-model adjustment was separately applied to forecast travel times from the strategic model, to account for any variations in base year travel time validation. In summary, the 2036 'no project' case travel times for a given road segment were derived as follows:

1. Obtain an observed travel time survey
2. Extract the corresponding travel time from the 2016 VLC Zenith model

3. Extract the corresponding travel time from the 2036 ‘no project’ scenario as estimated by the VLC Zenith model

4. Calculate the percentage change in travel time between the 2016 and 2036 ‘no project’ VLC Zenith models.

5. Factor the observed travel time survey by the percentage change calculated in step four to derive an estimated 2036 ‘no project’ travel time.

After the estimated 2036 ‘no project’ case travel times have been derived, the 2036 ‘with project’ travel times can be estimated as follows:

1. Extract the travel time from the 2036 ‘no project’ scenario as estimated by the VLC Zenith model

2. Extract the travel time from the 2036 ‘with project’ scenario as estimated by the VLC Zenith model

3. Calculate the percentage change in travel time between the 2036 ‘no project’ and 2036 ‘with project’ VLC Zenith models

4. Apply the percentage change to the estimated 2036 ‘no project’ case travel time (as derived in the previous process).

Model structure and validation

The VLC Zenith model has been used for Victorian Government infrastructure projects including the Metro Tunnel, CityLink-Tulla Widening and West Gate Tunnel Project. The 2016 base year model has been calibrated and validated against existing traffic volumes collated by the project team, as outlined in Section 4.3.2. For further detail, refer to Appendix B – VLC transport modelling reports.
Key assumptions and parameters incorporated into the VLC Zenith model include:

- Toll diversion algorithms that can accommodate a range of tolling schemes (distance-based, toll point charging, toll caps and flagfalls), and algorithms for spreading toll user demand across multiple toll route options.
- Trip generation based on eight home-based and six non-home based journey purposes for travel by residents using zonal demographic and socio-economic profiles (such as household structure, person type and car availability) of each zone to produce forecasts.
- Trip attractions use disaggregate employment by the 14 ANZSIC industry categories, as well as households and enrolment types that predict home-based and non-home based attractions.
- Light and heavy commercial vehicle trips are estimated for every travel zone based on the socio-economic and employment profiles of each zone. The main drivers of demand are the number of people employed by industry category (the 14 ANZSIC industry categories) and the blue collar and white collar split of the employment. Once the commercial vehicle trip ends have been estimated a gravity model is used to distribute the vehicle trips between travel zones.
- The modelling includes light and heavy commercial vehicles which are referred to as ‘trucks’ in this assessment. This is based on the Austroads vehicle classification system, where a truck (or heavy vehicle) is Austroads classification 3 to 12.

- Daily traffic volumes have been developed into four time periods as follows:
  - AM peak: 7:00 am to 9:00 am
  - Inter-peak: 9:00 am to 4:00 pm
  - PM peak: 4:00 pm to 6:00 pm
  - Off-peak: 6:00 pm to 7:00 am.
- Calibration and validation of the VLC Zenith model using observed traffic and public transport datasets as well as the Victorian Integrated Survey of Travel and Activity (VISTA) from 2007 to 2010.

VicRoads provides guidelines for the validation of the VLC Zenith model in its draft report *Transport Modelling Guidelines–Volumes 2: Strategic Modelling* (26 April 2012). The results of the local area traffic validation exercise are shown in Table 4-4. In all cases, the model developed for North East Link achieves the VicRoads targets for traffic modelling validation.

Table 4-4 – Traffic validation against VicRoads validation guidelines

Statistics	VicRoads targets	AM	PM	Total
R-square	> 0.9	0.91	0.92	0.98
Gradient	0.9 to 1.1	0.99	0.99	0.99
% RMSE	< 30	26.7	23.8	13.7
All	As above	✓	✓	✓

Full documentation of the VLC Zenith model validation can be found in the VLC reports contained in Appendix B – VLC transport modelling reports:

Toll choice algorithm

Traffic demand along toll roads within the VLC Zenith model is governed by an embedded toll choice algorithm. Further detail surrounding the Zenith toll choice algorithm can be found VLC's website: <https://veitchlister.com.au/our-company/zenith>.

In summary, for each trip in the road network the algorithm:

1. Calculates the probability of the trip using a toll road. This is based on comparing travel times from the untolled route against travel times and toll prices of the tolled route
2. If the trip is tolled and where multiple tolled routes exit (such as CityLink, EastLink and North East Link) the algorithm assigns probabilities to each route by comparing their travel times and toll prices.

The algorithm is probabilistic and makes an allowance for some trips not using tolled routes even when they are attractive compared with untolled routes. This allowance accounts for travellers who do not own electronic tags (for example, tourists) or those who never use toll roads. These travellers are likely to avoid North East Link and have been included within the traffic volumes prepared for this assessment. Section 9.2.3 explores these impacts in more detail.

Induced demand

Induced demand is defined as additional traffic generated by infrastructure improvements or policy changes. The Victorian Auditor-General (Management of Major Road Projects 2011, Figure 2A) states there are six dimensions of induced demand that should be considered. A subsequent paper by the Victorian Auditor-General in 2013 (Managing Traffic Congestion) included confirmation that the Department of Transport had committed to incorporating induced demand in its evaluation of transport infrastructure.

The Victorian Government responded to the Auditor-General's findings by revising transport modelling guidance in 2016 (Guidelines for Transport Modelling and Economic Appraisal in Victoria, V3.03) which specified minimum requirements for addressing induced demand effects in strategic modelling. Minimum requirements of revised guidelines with respect to induced demand, as well as those that are captured within the North East Link strategic modelling are listed in Table 4-5. The North East Link strategic modelling meets the requirements of the guidelines with respect to induced demand.

Table 4-5 – Induced demand elements within the North East Link strategic modelling

Behavioural response	Definition	Required by Victorian Government guidelines	Incorporated into North East Link modelling
No change in behaviour	Fixed matrix, no change in journeys	Yes	Yes
Route change	Travellers have same origin and destination and make the same journeys but use the improved route	Yes	Yes
Mode change	Passengers switch mode because the improvement makes the new route more attractive	Yes	Yes
Destination change	Travellers decide to travel to more distant locations because the improvement makes the journey time acceptable (redistribution)	Yes	Yes
Time of travel change	Travellers decide to travel in the commuting peak period because the improvement reduces journey times to an acceptable level	No	Yes (via the spreadsheet model, see Section 4.5.3)
Trip frequency increase	Travellers are willing to make additional journeys because of the improvement	No	No
Generated or new (eg from different land use patterns)	People and businesses relocate to take advantage of the improvement and so make journeys that are new to the area	No	Yes (project-specific land use scenario, evaluated as a sensitivity test in Section 11)

Sensitivity testing

Sensitivity testing has been performed on the 2036 'with project' scenario to assess the impact of a range of input assumptions. The tests include:

- Low population and land use scenario (2031)
- High population and land use scenario (2041)
- +20 per cent tolls
- -20 per cent tolls
- E6 project
- North-east truck curfews (24 hours)
- Manningham Road interchange alternative design
- Project-specific land use.

The results of these sensitivity tests are provided in Section 11.

4.5.2 Microsimulation modelling

Detailed intersection modelling has been undertaken for the 2036 'no project' and 'with project' scenarios. The microsimulation package VISSIM has been used to assess the performance of both scenarios along North East Link corridor. The model simulates the behaviour of individual vehicles in a defined area and is used to assess the impact of changes to road network operations.

The 'no project' and 'with project' microsimulation models have been based on models that have been calibrated and validated to existing conditions. Two existing conditions models have been developed, one for the Eastern Freeway corridor and one for the M80 Ring Road/Greensborough Bypass corridor. A summary of the calibration and validation of these existing conditions models is provided in Table 4-6 and Table 4-7. These tables show that both of the existing conditions models meet guidelines with respect to calibration and validation requirements.

Table 4-6 – Traffic validation against validation guidelines – Eastern Freeway corridor

Statistics	Target	AM peak		PM peak		Meet requirement?
		1st hour	2nd hour	1st hour	2nd hour	
Arterial turn calibration	85%	99%	99%	100%	100%	✓
Ramp volume calibration	100%	100%	100%	100%	100%	✓
Eastbound travel time validation	+/- 15%	-6%	-4%	-4%	-6%	✓
Westbound travel time validation	+/- 15%	-6%	3%	-4%	-9%	✓

Table 4-7 – Traffic validation against validation guidelines – M80 Ring Road/Greensborough Bypass corridor

Statistics	Target	AM peak		PM peak		Meet requirement?
		1st hour	2nd hour	1st hour	2nd hour	
Arterial turn calibration	85%	99%	100%	100%	100%	✓
Ramp volume calibration	100%	100%	100%	100%	100%	✓
Eastbound travel time validation	+/- 15%	-1.5%		-2%		✓
Westbound travel time validation	+/- 15%	-0.2%		+0.5%		✓

The corridor performance is assessed for the AM and PM peak periods. An existing year assessment has not been undertaken, as the difference in performance between the current and 2036 road networks would be primarily driven by population and employment growth over that period.

An overview of the 2036 'no project' and 2036 'with project' microsimulation model extents is presented in Figure 4-6 and Figure 4-7 respectively.

Figure 4-6 – 2036 ‘no project’ microsimulation model extent

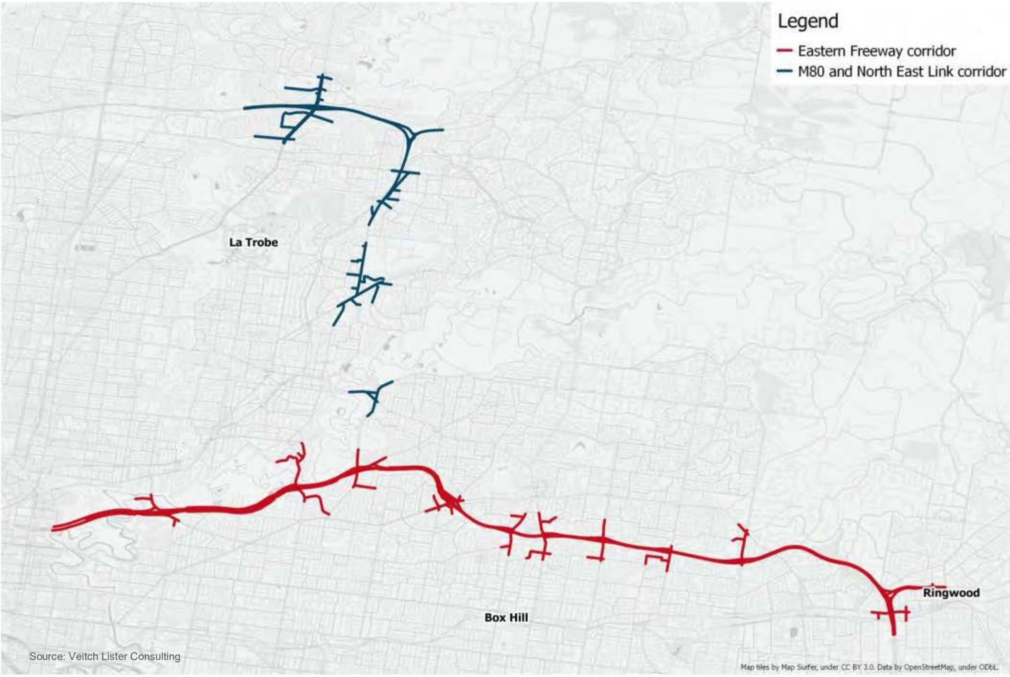
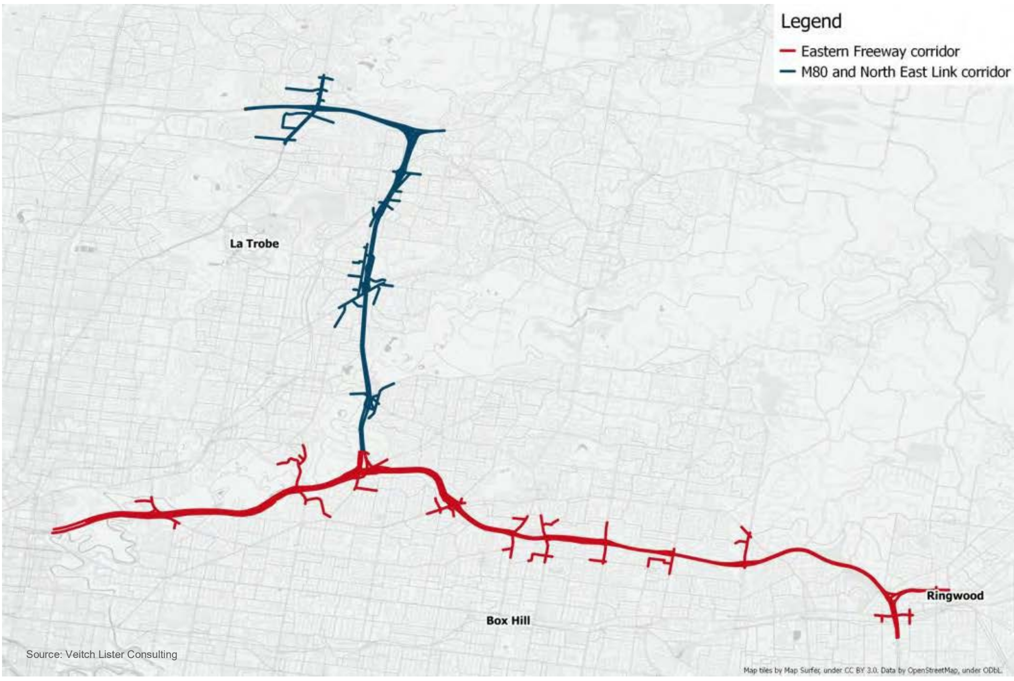


Figure 4-7 – 2036 ‘with project’ microsimulation model extent



Base year demand matrices were developed using observed origin-destination surveys. This data was compared to typical traffic conditions, and was found to be within one to two per cent of average volumes.

The future forecast demand matrices are developed using strategic transport modelling outputs with an out-of-model adjustment applied. This adjustment improves the overall robustness of the future demand matrices by pivoting future demand from existing traffic data rather than relying solely on raw strategic modelling outputs. The process also accounts for the 'partially-constrained' nature of strategic models by applying capacity constraints at network pinch points, and moving excess demand to the shoulder periods. Shoulder periods are not assessed as they are assumed to operate at similar or better performance as the peak periods, which experience the highest traffic demand across the day.

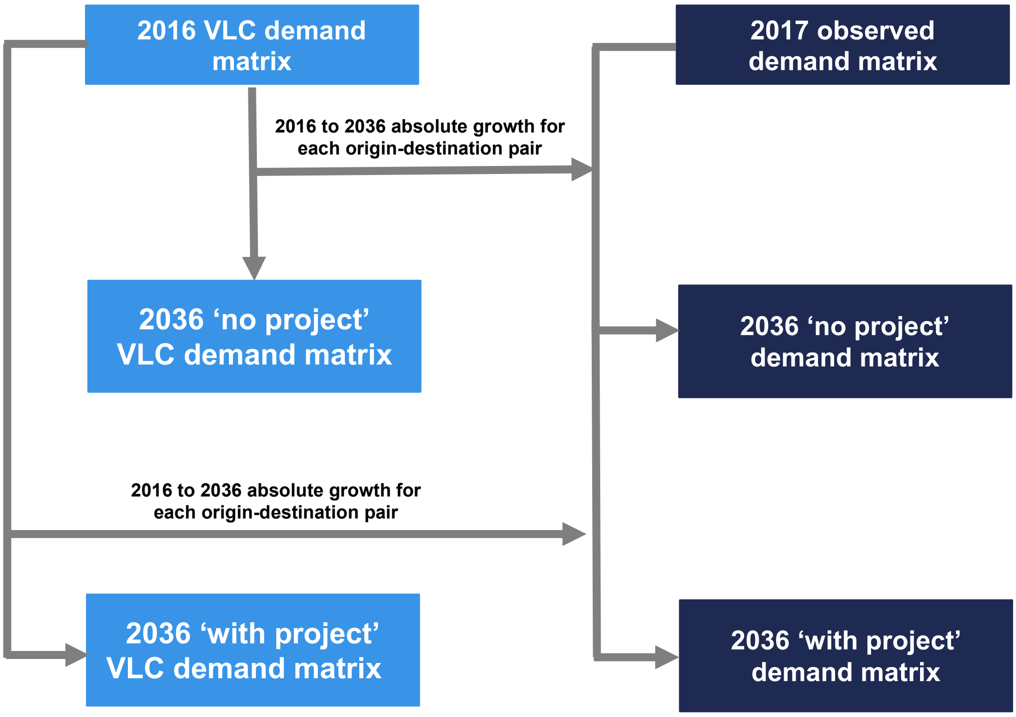
The adjustment is applied at the origin-destination pair level and therefore absolute (rather than multiplicative) growth between the 2016 and 2036 scenarios is applied. This is because the demands at the individual origin-destination level are often small in absolute terms, which can lead to unrealistically large growth when taken in percentage terms. Applying absolute growth also allows for movements which do not exist currently (such as North East Link), which cannot otherwise be developed using percentage changes.

The adjustment is applied as follows:

1. Origin-destination matrices corresponding to the microsimulation study area are extracted from the strategic model (2016, 2036 'no project' and 2036 'with project' scenarios)
2. The 2016 matrices are subtracted from the 2036 'no project' and 'with project' matrices, resulting in matrices which represent an absolute strategic forecast growth for each scenario
3. The forecast growth matrices for each scenario are added to the 2017 origin-destination survey-based matrices, resulting in future forecast demand matrices for each scenario
4. Future demand matrices are subject to a capacity-constraining process using the software package VISUM. This process nominates two 'pinch points' on the road network – the EastLink and North East Link tunnels – and shifts any origin-destination pairs which are found to exceed their theoretical capacity limits to outside the peak periods. Capacity limits for these two locations are based on VicRoads guidance (Motorway Design Volume Guide, December 2017).

This process has been illustrated for an example future demand matrix in Figure 4-8.

Figure 4-8 – Microsimulation model–demand matrix development example



Output from the microsimulation modelling is based on Level of Service (either density or delay) and queue length. Density has been reported at mid-block, merge/diverge and weave areas while delays and queue lengths have been reported by approach of the signalised intersections.

Hourly 95th percentile queue lengths have been extracted from the VISSIM model. For each movement, the maximum queue length from the stop line was recorded for each one-minute interval of the modelled hour. From these data points, a 95th percentile was calculated for each movement, and the largest 95th percentile queue for any movement was reported as the overall 95th percentile queue for the approach.

4.5.3 Spreadsheet modelling

A spreadsheet model has been used in conjunction with strategic and microsimulation modelling outputs for the project study area assessment. The spreadsheet model estimates mid-block traffic volumes for an average weekday (24-hour period) as well as the AM and PM peak periods.

Traffic volumes are estimated at an individual road link level, and the methodology used is dependent on its location. The following sections outline this process in further detail:

Road links inside the microsimulation model boundary

The spreadsheet model adopts AM and PM peak mid-block volumes from the microsimulation model for all links within the microsimulation model boundary. This is to ensure consistency between the traffic volumes used in the study area assessment, and the performance outcomes of the project corridor assessment.

Daily traffic volumes for these locations are developed using strategic modelling outputs. The process to derive these is described in the following sections.

Road links outside the microsimulation model boundary

If the road link is outside the boundary of the microsimulation model, the spreadsheet model uses strategic modelling outputs to estimate both daily and peak volumes.

Under this methodology a capacity-constraining process is applied to the peak strategic modelling volumes. This is because strategic transport models are 'partially-constrained', in that traffic volumes on a given road link may exceed its theoretical capacity in the instance of excessive demand, particularly in peak periods. The spreadsheet model converts partially constrained volumes from the strategic transport model into fully constrained volumes for use in this, and other, assessments. Mid-block capacities are sourced from the higher of Austroads guidance or existing traffic survey data.

The following sections outline this process in further detail.

Method to develop peak and daily 2036 'no project' volumes from the strategic model

Peak and daily 2036 'no project' case volumes were derived as follows:

1. Obtain an observed 2017 traffic volume from traffic surveys
2. Extract the corresponding traffic volume from the 2016 VLC Zenith model
3. Extract the corresponding traffic volume from the 2036 'no project' scenario as estimated by the VLC Zenith model
4. Calculate the annual percentage growth in volume between the 2016 and 2036 'no project' VLC Zenith models
5. Factor the observed 2017 traffic volume by the annual percentage change calculated in step four to derive an estimated 2036 'no project' volume
6. For peak volumes: if the resultant 2036 'no project' volume exceeds the theoretical capacity of the road link the excess demand is shifted to the shoulder periods.

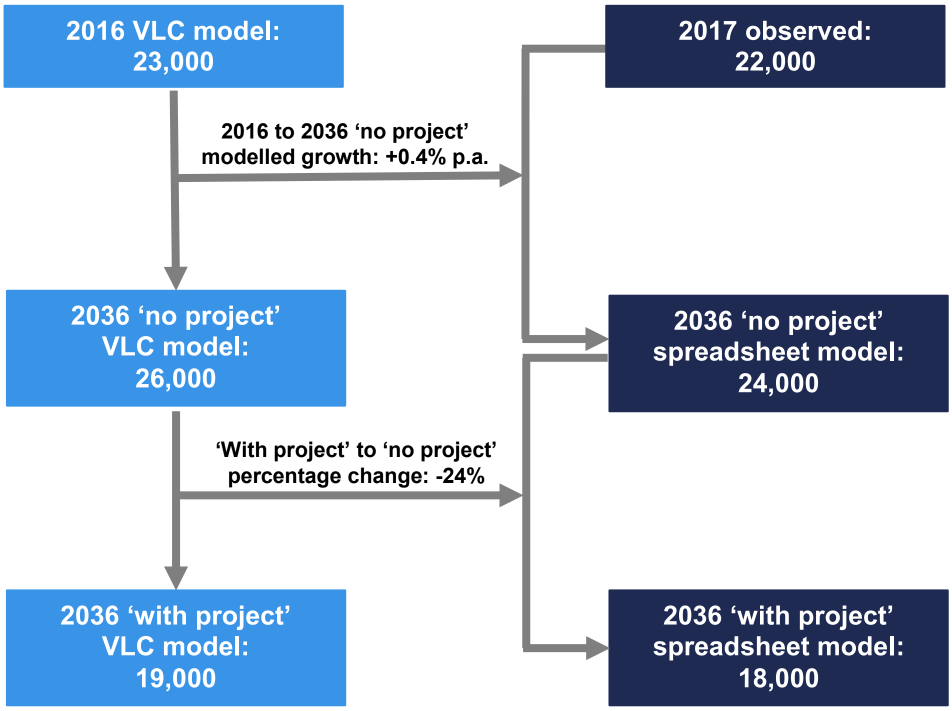
Method to develop peak and daily 2036 'with project' volumes from the strategic model

After the estimated 2036 'no project' case volumes have been derived, the 2036 'with project' volumes can be estimated as follows:

1. Extract the road segment traffic volume from the 2036 'no project' scenario as estimated by the VLC Zenith model
2. Extract the road segment traffic volume from the 2036 'with project' scenario as estimated by the VLC Zenith model
3. Calculate the percentage change in volume between the 2036 'no project' and 2036 'with project' VLC Zenith models
4. Apply the percentage change to the estimated 2036 'no project' case volume (derived in the previous process)
5. For peak volumes: if the resultant 2036 'with project' volume exceeds the theoretical capacity of the road link the excess demand is shifted to the shoulder periods.

This process has been illustrated for an example daily volume in Figure 4-9.

Figure 4-9 – Spreadsheet modelling process – daily traffic volume example

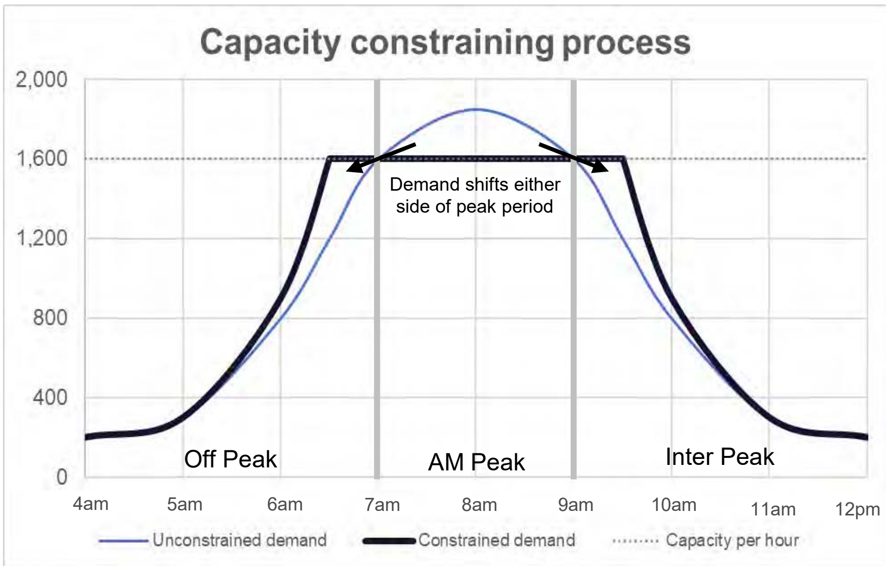


While the example provided in Figure 4-9 above shows a reduction in forecast traffic volumes when compared with the VLC model, the process has been applied to locations where the demand may be higher or lower than the observed traffic counts. As such, the spreadsheet process is not just suppressing VLC demand across the network.

Where demand in the peak periods exceeds the capacity of the road link, demand is shifted evenly to the period before and after the peak as shown in Figure 4-10. Total demand for the road throughout a 24-hour period remains unchanged. This process is applied to both the 2036 'no project' and 2036 'with project' scenarios. Traffic volumes for the shoulder periods have not been assessed as they are assumed to operate at lower levels of traffic demand as the peak periods, which experiences the highest traffic demand across the day.

A secondary effect of this process is that strategic modelling results are rebased to observed traffic surveys, which accounts for any variation in base year traffic validation from the strategic model.

Figure 4-10 – Capacity constrained traffic volume assessment



The impacts of the constraining process on the peak period traffic volumes are presented in Figure 4-11 and Figure 4-12 for the 2036 'no project' and 2036 'with project' scenarios respectively. These figures show the vast majority of the sites within the spreadsheet model have not materially changed through the capacity-constraining process.

Figure 4-11 – Impact of capacity constraining process – 2036 'no project'

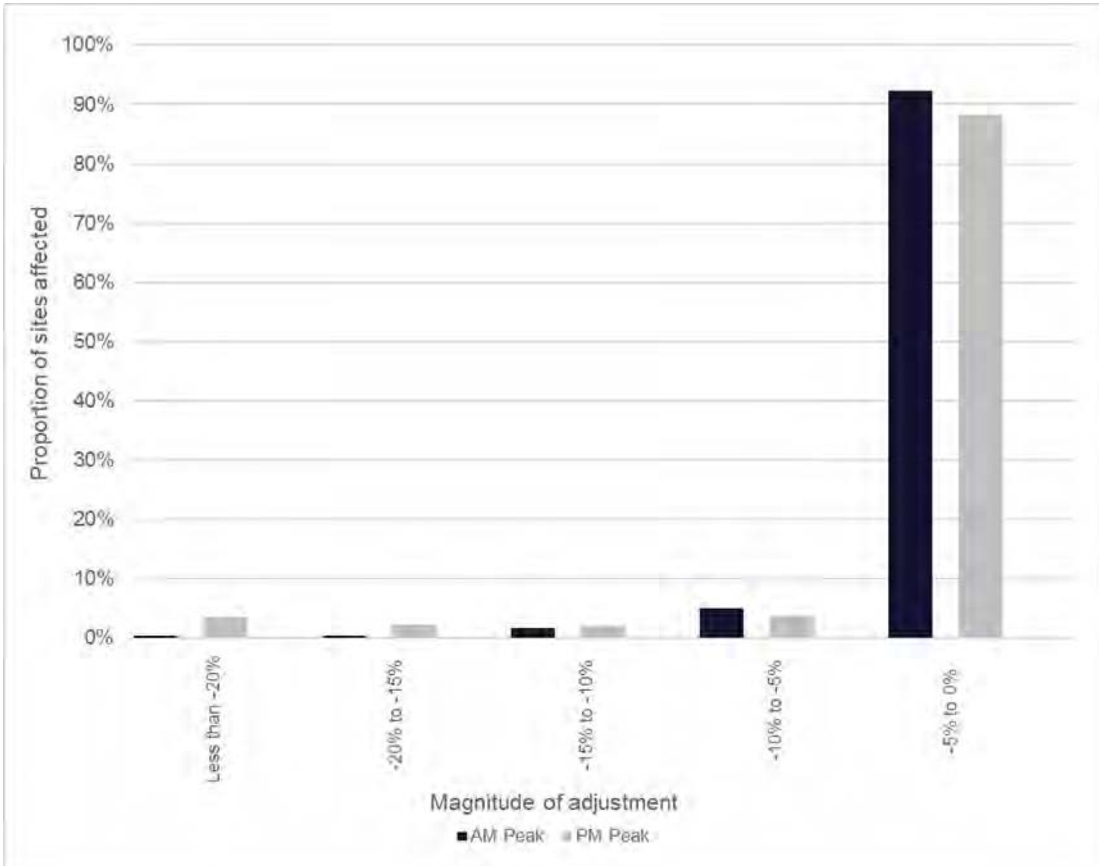
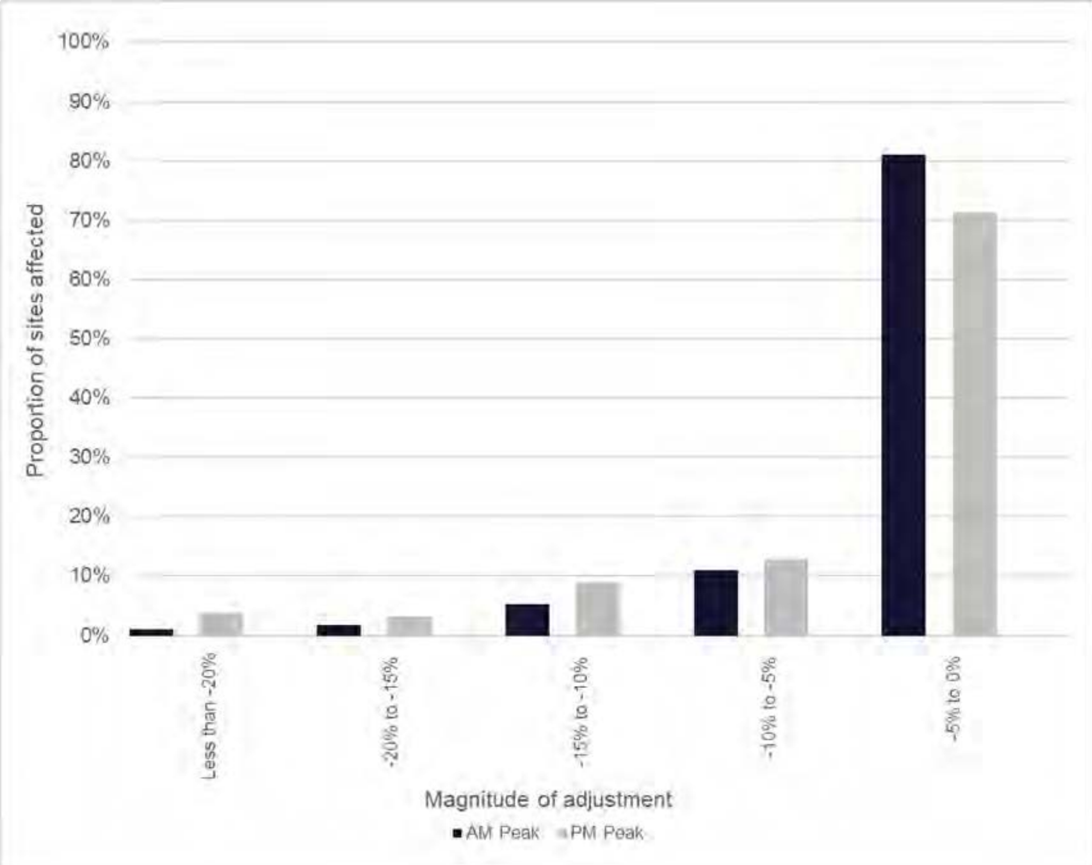


Figure 4-12 – Impact of capacity constraining process – 2036 ‘with project’



Traffic volumes for 2026 have also been extracted and capacity constrained through the spreadsheet modelling process for use in the noise and air quality assessments. These volumes have not been used in the transport impact assessment as this document analyses the network impacts 10 years after the project’s opening, which is reflected in the 2036 forecasts.

4.5.4 Crash assessment

The existing conditions crash assessment has been performed using the VicRoads CrashStats database. CrashStats contains historical information about reported road incidents to Victoria Police, including modes involved (vehicles, pedestrians and cyclists) as well as details surrounding the location and cause of each incident. This information is available for 2012 to 2016 and has been used in the existing conditions assessment. The 2016 data was the latest full year of data available at the time of undertaking this assessment.

The 2036 ‘no project’ and ‘with project’ crashes have been estimated using the strategic transport model. Modelled vehicle kilometres travelled were converted into crashes using the VicRoads accident rates. The specific steps undertaken to derive the 2036 ‘no project’ crashes were as follows:

1. Obtain the total observed crashes from 2016
2. Calculate total crashes from the 2016 VLC Zenith model using VicRoads accident rates, provided in Table 4-8 below

3. Calculate total, freeway and non-freeway crashes from the 2036 ‘no project’ VLC Zenith model scenario using VicRoads accident rates
4. Calculate the percentage growth in total crashes between the 2016 and 2036 ‘no project’ VLC Zenith models
5. Factor the observed 2016 crashes by the percentage change calculated in step 4 to derive total estimated 2036 ‘no project’ crashes
6. Split the total estimated 2036 ‘no project’ crashes (as calculated in step 5) into freeway and non-freeway crashes using the modelled proportions as calculated in step 3.

The steps undertaken to derive the 2036 ‘with project’ crashes were:

1. Calculate total crashes from the 2036 ‘no project’ VLC Zenith model scenario using VicRoads accident rates
2. Calculate total, freeway and non-freeway crashes from the 2036 ‘with project’ VLC Zenith model scenario using VicRoads accident rates
3. Calculate the percentage change in total crashes between the 2036 ‘no project’ and 2036 ‘with project’ VLC Zenith models
4. Obtain the estimated 2036 ‘no project’ crashes as calculated in step 6 of the list above, and apply the percentage change calculated in step 3 of this list to derive total estimated 2036 ‘with project’ crashes
5. Split the total estimated 2036 ‘with project’ crashes (as calculated in step 4) into freeway and non-freeway crashes using the modelled proportions as calculated in step 2.

The adopted accident rates for the crash analysis are provided in Table 4-8. The rates have been sourced from VicRoads, and have been aggregated to match VLC model link types.

Table 4-8 – Adopted accident rates

Road type	Casualty accident rate (accidents/10^8 VKT)
Local	30.8
Undivided Major	27.4
Other Divided	21.3
Freeway	6.9

Source: VicRoads, Accident Analysis by Road Profile Study Operation Report, January 1996 Table 3.1 (Updated T Boyd, 2010)

4.5.5 Construction impacts

This report assesses construction impacts using the construction methodology as supplied by the project’s construction advisors. This includes the forecast number of heavy vehicles and workers on site, as well as their access routes. These findings are presented in Section 10.

4.6 Justification

Existing conditions assessment year

The existing conditions assessment is primarily based on traffic surveys conducted in 2017 and 2018 across the north-eastern road network. Some data was originally collected during the options assessment phase in 2017, and additional sites were surveyed once a preferred corridor was identified.

In addition to the surveys, a 2016 transport model was also made available for network-wide assessments. The year 2016 was chosen for the existing conditions modelling as it was a Census year, and therefore had a greater availability of data for model calibration and validation. The 2016 model is only used in the existing conditions assessment where no observed 2017 or 2018 data is available.

Impact assessment year

The impact assessment has focused on the forecast year of 2036. This year has been chosen in order to assess network performance approximately 10 years after the anticipated opening of North East Link, as is standard industry practice. Adopting a more distant horizon year in the impact assessment deteriorates the reliability of the results, as forecasting uncertainty increases with the length of the forecasting period. This is mainly related to reliability of the input assumptions which become more uncertain into the future.

Strategic transport modelling

The EES scoping requirements prescribe the use of '*predictive modelling*' in the traffic and transport assessment of North East Link. A strategic transport model has been made available to the EES project team for the purposes of performing the impact assessment. Use of strategic transport models in the appraisal of major transport projects is standard practice across all states in Australia.
The strategic modelling results are assumed to be robust and suitable for use in this impact assessment, as discussed further in Section 4.7.

Spreadsheet modelling

A spreadsheet model has additionally been developed to account for the limitations of the strategic model. The spreadsheet model estimates fully-constrained traffic volumes based on the strategic model's partially-constrained volume forecasts. The spreadsheet model results are constrained to the theoretical capacity of each individual road, thereby improving the robustness of the resultant forecasts. This process has been reviewed and supported by VicRoads.

Microsimulation modelling

A microsimulation model has been used to assess the traffic performance of the project corridor. These models simulate vehicle-to-vehicle interaction and driver behaviour across a road corridor. They take into consideration the traffic impacts of congestion, intersection delays, queuing and merging/weaving of freeways. The microsimulation model provides detailed output to assist in the assessment of traffic performance which is not possible with a strategic transport model.
A microsimulation model is also preferable over a standalone intersection model which cannot accurately take into consideration the impact of adjacent intersections or the performance of vehicles along freeways.

Travel behaviour trends and new technologies

The input assumptions to the transport modelling have been based on Transport for Victoria's Transport Modelling Reference Case, which generally assumes a 'business as usual' future with respect to economic performance, government policy, travel behaviour and investment in the transport network. Therefore, the impact assessment assumes a 'business as usual' approach to estimating travel demand and behaviour into the future. No separate forecast data or government policy is available for road pricing, ride-sharing or new forms of travel such as autonomous or flying vehicles and therefore no allowance has been made for these in this assessment.

4.7 Limitations and assumptions

The following limitations and assumptions have been made in the development of this traffic and transport impact assessment:

- The output from the strategic transport model is suitable for use and meets the validation and calibration requirements of VicRoads.
- The input assumptions which underpin the strategic modelling results (such as population and employment forecasts) have been sourced from the Victorian Government. It is assumed these inputs reflect a 'business as usual' future with respect to economic performance, government policy, travel behaviour and investment in the transport network.
- Victoria in Future (VIF) 2015 population and employment forecasts provided by the Victorian Government have been used in this assessment. The VIF 2015 forecasts were the latest available (at the time of preparing this report) in the format required for transport modelling. To account for this uncertainty, 'low' and 'high' sensitivity testing using 2031 and 2041 land use scenarios have been prepared and are presented in Section 11.
- No forecast data or government policy is available for road pricing, ride-sharing or new forms of travel such as autonomous or flying vehicles. As such, no allowance for these types of vehicles is made in this assessment.
- Local roads (residential access or lower-order collectors) are not able to be analysed as part of this assessment. This is because the assessment is underpinned by strategic modelling, which is not granular enough to provide forecasts for local roads. As such, the assessment is focused on generally higher-order collectors and arterial roads, and it is assumed that any change on these roads would be similar to nearby local roads. Local roads would typically receive net benefits as the decongestion on adjacent roads reduces the need for rat-running.
- Assumptions regarding land use development at the Manningham Road interchange are still in development at the time of preparing this assessment and have not been included.
- The existing traffic data collected reflects typical conditions on the road network.
- The assessment has been performed for average weekday conditions only, and does not account for weekends or holiday periods.
- The construction impact assessment is based on advice provided by NELP. This is an assumed construction methodology and project timeline as provided at the time of preparing this assessment. The successful contractor may propose a different methodology which may alter the impacts associated with construction.

- Mitigating measures (such as intersection upgrades) have not been identified for the construction haulage routes as the actual routes have not yet been confirmed. Any intersection upgrades or treatments will be identified as part of the Transport Management Plans the contractor will need to develop prior to works commencing.
- Changes in traffic volumes or travel times between the Business Case and this report are due to changes in the project design and further development of the strategic transport model.

4.8 Peer review

This assessment has been independently peer reviewed by GTA Consultants. The peer reviewer reviewed and provided feedback on drafts of this report, as well as the methodology, approach, assumptions and assessment criteria applied to the assessment. The peer reviewer's methodology is set out in their peer review report, which also included addressing whether there were any additional matters which should be considered as part of the impact assessment in order to address the EES scoping requirements, 'public works' Order or to otherwise adequately assess the likely impacts of the project relevant to this assessment or the management of those impacts. The peer reviewer also considered whether there were any gaps or matters in this assessment which they disagreed with. The final peer review report is attached as Appendix A of this report. This sets out the peer reviewer's conclusions, and whether all of their recommendations have been addressed in this report.

In relation to the recommendations made by GTA Consultants, the responses are provided in Table 4-9.

Table 4-9 – Response to peer review

Recommendation	Response
Recommendation #1: A sensitivity test for Watsonia Road be considered which reflects the attractiveness of this route between its intersection with Grimshaw Street and Greensborough Road.	A sensitivity test has been undertaken using the strategic transport and microsimulation models, which will be considered outside of this assessment.
Recommendation #2: It is recommended the TTIA and Reference Design explore left-in/left-out arrangements to and from Avon Street at Bulleen Road.	The traffic and transport impact assessment has assessed a North East Link reference project which assumes the truncation of Avon Street from Bulleen Road. There is an ongoing stakeholder engagement process with respect to access arrangements at Avon Street. Once access arrangements have been finalised they will be communicated to all project stakeholders.
Recommendation #3: Commentary is provided on the proposed Bulleen Road Park and Ride facility including estimated number of car parking bays, general facilities and proposed access arrangements for general traffic and bus traffic.	The traffic and transport impact assessment has assessed a North East Link reference project which does not include a design for the Bulleen Road Park and Ride. The scope of the facility is currently being developed in consultation with Transport for Victoria. This includes the number of proposed parking bays, access facilities and general traffic/bus access arrangements. Once this scope has been finalised it will be communicated to all project stakeholders.

5 Engagement

5.1 Stakeholder engagement

Stakeholders and the community were consulted to support the preparation of the North East Link EES and to inform the development of the project and understanding of potential impacts. Table 5-1 lists specific engagement activities that have occurred in relation to traffic and transport, with more general engagement activities occurring at all stages of the project.

Table 5-1 – Stakeholder engagement undertaken for traffic and transport

Activity	When	Matters discussed	Outcome
Risk Workshop (NELP offices)–AECOM/ GHD, DELWP, Boroondara City Council, Banyule City Council	13/03/2018	Introduction to the risk assessment process	Defined impacts and consequence guide to inform risk register development
Boroondara City Council	Fortnightly meetings	Update on transport impacts and redistributions Mitigating measures	Ongoing design development
Banyule City Council	Fortnightly meetings	Update on transport impacts and redistributions Mitigating measures	Ongoing design development
Whitehorse City Council	Fortnightly meetings	Update on transport impacts and redistributions Mitigating measures	Ongoing design development
Manningham City Council	Fortnightly meetings	Update on transport impacts and redistributions Mitigating measures	Ongoing design development
Yarra City Council	08/06/2018	Update on transport impacts and redistributions Mitigating measures	Ongoing design development
Transport for Victoria	Ongoing	Public transport services and patronage	Provision of forecasting assumptions for public transport services
VicRoads	Ongoing, embedded within NELP	Traffic performance on the VicRoads network, VicRoads design, network integration and ITS requirements.	Ongoing design development
Bicycle Network Victoria	Ongoing	Walking and cycling infrastructure	Ongoing design development

5.2 Community feedback

In addition to consultation with specific stakeholders, there has been ongoing consultation with the community throughout the North East Link design process and development of the EES. Feedback relevant to the traffic and transport assessment is summarised in Table 5-2 to Table 5-7, along with where and how we have addressed those topics in this report.

Table 5-2 – Community consultation feedback addressed by traffic and transport – transport network planning

Community and stakeholder feedback	Consideration in EES assessment
Requests for the project to be developed as a transport corridor for all kinds of transport, not just a road for vehicles.	The project will provide for general vehicles, public transport and walking/cycling. A high level summary of the scope of the project is provided in Section 9.1. Detailed assessment of public transport impacts is provided in Section 9.6, while walking and cycling assessments are provided in Section 9.7.
Concerns the new link between the M80 Ring Road and the Eastern Freeway will be at or above capacity by the time it opens.	The EES assesses the performance of the project 10 years after opening. The project will be required to meet its design target of a Level of Service of D. A Level of Service of D means that traffic flow along the freeway is stable, but incidents may cause delays. The analysis in Section 9.3 shows the project would be operating at Level of Service D or better in both peak periods in 2036, 10 years after opening.
Requests for project planning to consider the traffic implications of future road upgrades and new projects, particularly the E6 outer ring road.	Predicted upgrades to the transportation network by 2036 have been included in the assessment. These upgrades are summarised in Section 8.1.2. Further sensitivity testing has been undertaken to assess additional changes to the transport network (those potentially not predicted to occur by 2036) such as E6. This analysis is summarised in Section 11.
Concerns the project does not offer transport benefits for suburbs in Melbourne's outer north-east (such as Eltham).	The benefits of the project would cover a large area of north-east Melbourne. The forecast changes in traffic volumes are provided in Section 9.2.2, which shows reduced traffic volumes in areas such as Eltham.
Concerns North East Link and the upgrades to the Eastern Freeway will encourage more people to drive, particularly to the CBD, increase general congestion and discourage the use of other transport modes.	North East Link would not encourage more people to drive across Melbourne or to the CBD. Section 9.2.1 provides a summary of the mode share with and without North East Link. It shows there would be no change in mode share due to the project. No net increase in traffic is anticipated for roads in the CBD once North East Link is open.

Table 5-3 – Community consultation feedback addressed by traffic and transport – Eastern Freeway upgrades

Community and stakeholder feedback	Consideration in EES assessment
Concerns traffic increases on the Eastern Freeway will result in congested conditions and requests for more detailed information about future traffic volumes.	Traffic modelling of the Eastern Freeway shows that North East Link would improve traffic conditions along the Eastern Freeway compared with the 'no project' scenario. Section 8.3 shows the predicted traffic conditions in the 'no project' scenario with deteriorating Levels of Service and vehicle speeds. However, Section 9.3 shows the predicted Levels of Service and vehicle speeds in the 'with project' scenario, which would improve in both peak periods. Forecast traffic volumes in the 'with project' scenario are provided in Section 9.3.1 with detailed results provided in Appendix D – Forecast traffic volumes.
Concerns linking North East Link to the Eastern Freeway near Bulleen Road will increase congestion at this location.	North East Link includes works to widen the Eastern Freeway to accommodate the traffic travelling to and from the project. The traffic analysis in Section 9.3 shows the project would meet the Level of Service performance targets in both peak periods in 2036.
Concerns the number of lanes included in the upgrades is excessive and requests to reduce the number of lanes.	Widening the Eastern Freeway to increase the number of lanes is required to meet the performance targets of Level of Service D. Without these lanes, traffic performance on the Eastern Freeway would deteriorate which may see traffic diverting to and further congesting local roads and the arterial network.
Concerns the project will increase traffic at the Alexandra Parade/Hoddle Street and EastLink tunnel ends of the Eastern Freeway and concerns these locations will become more congested than they are today.	Peak period traffic volumes along Alexandra Parade, Hoddle Street and the EastLink tunnels are not predicted to increase significantly due to the project. Any increases in traffic volumes at these locations would be within typical day-to-day fluctuations and could be accommodated by the road network. Details of the forecast changes in peak period volumes are provided in Appendix D – Forecast traffic volumes and an assessment of the performance of the transport network is provided in Section 9.3.
Concerns traffic increases on the Eastern Freeway will result in congested conditions and requests for more detailed information about future traffic volumes.	Traffic modelling of the upgrades to the Eastern Freeway show that traffic conditions along the freeway would improve compared with the 'no project' scenario. Section 8.3 shows the predicted traffic conditions in the 'no project' scenario with deteriorating Levels of Service and vehicle speeds. However, Section 9.3 shows the predicted Levels of Service and vehicle speeds in the 'with project' scenario would improve in both peak periods. Forecast traffic volumes in the 'with project' scenario are provided in Section 9.3.1 with detailed results provided in Appendix E – Microsimulation results.

Community and stakeholder feedback	Consideration in EES assessment
Concerns that traffic will increase on Bulleen Road south and north of the Eastern Freeway to access North East Link via the interchange at Manningham Road.	North East Link is predicted to increase traffic volumes along Bulleen Road (both south and north of the Eastern Freeway). This is due to a redistribution of traffic, with non-local trips on Bulleen Road north of the Eastern Freeway diverting to North East Link. Local trips would then utilise this newly created spare capacity along Bulleen Road (north of the Eastern Freeway), rather than Burke Road. While traffic volumes are predicted to increase, it would be outside peak periods when there would be spare capacity on the road network. The changes in the forecast traffic demand are summarised in Section 9.2 and the traffic performance is summarised in Section 9.3.
Concerns that traffic will increase on roads that run alongside or connect to the Eastern Freeway, particularly in Balwyn North.	Traffic volumes on roads running parallel to the Eastern Freeway would typically reduce due to the additional capacity provided. Forecast traffic volumes on roads adjacent to the Eastern Freeway are provided in Section 9.2.
Concerns the project will increase overall truck volumes and the size of individual vehicles on the Eastern Freeway (High Performance Freight Vehicles).	Truck volumes along the Eastern Freeway would increase due to the connection between the Eastern Freeway and the M80 Ring Road. The upgrade of the Eastern Freeway will also allow for high performance freight vehicles. Forecast truck volumes are provided in Section 9.5.

Table 5-4 – Community consultation feedback addressed by traffic and transport – North East Link

Community and stakeholder feedback	Consideration in EES assessment
Request for confirmation the project will reduce truck traffic and congestion on local and arterial roads across Melbourne's north-east.	Truck volumes on the local and arterial road network across the north-east are predicted to reduce due to the project. Forecast changes in truck volumes are summarised in Section 9.5.
Concerns tolls will discourage car drivers from using North East Link and reduce the overall capacity of the project to ease congestion.	The strategic transport model includes tolling and takes into consideration the willingness to pay tolls. Given the significant travel time savings predicted by the project, it is predicted that tolls would not significantly discourage use of the new link. The forecast traffic volumes for the project, which includes tolls, are summarised in Section 9.2.
Concerns tolls will discourage trucks from using North East Link and reduce the overall capacity of the project to take trucks off local and arterial roads.	The strategic transport model includes tolling and takes into consideration the willingness to pay tolls. Given the significant travel time savings predicted by the project, it is predicted that tolls would not significantly discourage use of the new link. The forecast truck volumes for the project, which includes tolls, are summarised in Section 9.5.

Community and stakeholder feedback	Consideration in EES assessment
Concerns trucks carrying placarded or over dimensional loads will not be able to travel in the North East Link tunnels and will remain on local roads, particularly Rosanna Road.	Over-height and placarded trucks will not be permitted to use the North East Link tunnels and therefore will still use the arterial road network (which includes Rosanna Road). However, as discussed in Section 9.5.4, truck volumes along Rosanna Road are predicted to reduce by up to 75 per cent with the introduction of North East Link.
Requests for existing truck curfews to remain in place and for truck bans to be introduced on Rosanna Road.	It is not proposed to remove the existing truck curfews with the introduction of North East Link. It is not proposed to introduce truck bans on Rosanna Road as this route will still be used by some trucks not permitted to travel through the tunnels.
Requests to keep toll-free roads open for local trips in Greensborough, Watsonia, Macleod, Yallambie and Rosanna and for the same level of connectivity available today (or better) to be available once the project is operational.	Toll-free connections will be provided along the full length of the project. It is not proposed to downgrade any road to force drivers to use North East Link. A summary of the project and its connections are provided in Section 9.1.
Requests to improve east-west connectivity via local roads in Greensborough, Watsonia, Macleod and Yallambie. Improvements to the project design to allow for easier, more direct connections between Elder Street, Greensborough Road, and Watsonia railway station parking lot was frequently requested.	East-west connectivity would be improved with the redistribution of north-south traffic onto North East Link. With less north-south traffic, more priority could be provided to east-west movements. The forecast traffic performance in 2036 without North East Link is provided in Section 8.3, with the North East Link performance provided in Section 9.3. This latter assessment shows how the Level of Service for east-west traffic would improve due to the project.
Concerns traffic volumes will increase along arterial roads connected to North East Link interchanges (Grimshaw Street, Greensborough Road, Lower Plenty Road, Manningham Road and Bulleen Road).	There would be some local traffic increases in the vicinity of the proposed interchanges. These increases are presented in Section 9.2. However, these interchanges are designed to meet the performance requirements of the project, with the analysis presented in Section 9.3. Typically, even with the additional traffic volumes, these areas perform between in the 'with project' scenario compared with the 'no project' scenario.
Concerns traffic will bank up around the new interchanges proposed at Grimshaw Street, Lower Plenty Road and Manningham Road.	Each of the interchanges has been designed to meet the forecast traffic demand associated with the project. Traffic analysis provided in Section 9.3 shows that all interchanges would meet the performance targets. These locations typically operate better in the 'with project' scenario compared with the 'no project' scenario.
Concerns improved access to La Trobe University and the La Trobe employment cluster via North East Link will increase traffic on local roads between the Lower Plenty Road interchange and these destinations, particularly Erskine Road.	The forecast changes in traffic volumes due to the project are presented in Section 9.2. This shows that some traffic volumes on some local roads, such as Erskine Road, are predicted to increase. However, the bulk of these increases would be outside peak periods. Traffic analysis summarised in Section 9.3 shows that roads like Erskine Road would be able to accommodate the predicted increases in traffic volumes.

Table 5-5 – Community consultation feedback addressed by traffic and transport – public transport

Community and stakeholder feedback	Consideration in EES assessment
Concerns the new busway along the Eastern Freeway will prevent future opportunities for a rail link to Doncaster.	The Doncaster Busway is designed so it can be developed into a rail link to Doncaster in the future. This is outlined in Section 9.6.1.
Requests for more frequent bus services along the Eastern Freeway using the new busway.	The Doncaster Busway will enable an increase in the frequency of buses along the Eastern Freeway. Section 9.6.1 summarises these predicted increases to bus frequency.
Requests for the new busway not to result in existing bus stops along the Eastern Freeway to be removed and requests for information about how services that don't currently stop at Doncaster Park and Ride will operate.	It is not proposed to remove any existing bus stops along the Eastern Freeway. Existing bus services will continue to travel along their current routes, unless changes are proposed by Transport for Victoria. A summary of the performance of key bus routes is provided in Section 9.6.4.
Requests for more information about how the new busway would connect to Hoddle Street and to the CBD.	The Doncaster Busway will travel along the Eastern Freeway shoulders between Chandler Highway and Hoddle Street. The connection to and from Hoddle Street will remain the same. The scope of the Doncaster Busway is summarised in Section 9.6.1.
Requests for significantly more car parking at Watsonia railway station and Doncaster Park and Ride.	The final number of parking bays at Watsonia railway station and Doncaster Park and Ride is being developed with Transport for Victoria. The existing number of parking spaces will be maintained and expanded where possible. These locations are discussed in Section 9.6.8.
Requests to upgrade facilities for commuters at Watsonia railway station and Doncaster Park and Ride including lift access at Watsonia railway station.	Car access to Watsonia railway station will change slightly with North East Link. Access to the car park will be via the existing roundabout at Watsonia Road/Lambourn Road/Devonshire Road. A new shared use path from the eastern side of Greensborough Bypass (near Elder Street) to Watsonia railway station will provide access for pedestrians and cyclists across North East Link. This is discussed in further detail in Section 9.2.4. The project is working with Transport for Victoria to determine the requirements for the facilities at the Doncaster Park and Ride.
Concerns that the adjusted access between Elder Street, Greensborough Road and Watsonia railway station will negatively impact bus travel times and requests for bus access to be considered in the project design.	North East Link provides an opportunity to review the bus routes across the north-east of Melbourne. Transport for Victoria is currently reviewing the bus network and will determine any corresponding changes.

Table 5-6 – Community consultation feedback addressed by traffic and transport – walking and cycling

Community and stakeholder feedback	Consideration in EES assessment
Requests for a logically connected cycling and walking network that provides efficient journeys for commuters, connections to key local destinations such as shops and schools and supports tourist routes.	The upgrades to walking and cycling provided by North East Link are discussed in Section 9.7. The scope of works has been developed with local councils and walking/cycling groups. North East Link will close the gaps in the existing walking and cycling network, providing a connection between the paths along the M80 Ring Road and the Eastern Freeway.
Requests to preserve all existing walking and cycling connections, or where this is not possible, for affected paths and bridges to be rebuilt as close as possible to their original location. Links frequently mentioned included: • Keeping all existing shared use paths along the Eastern Freeway in Koonung Creek parklands • Rebuilding the existing walking and cycling bridges at Nell Street, Greensborough and Macorna Street, Watsonia North as close as possible to their original locations • Maintaining the informal local walking access from Coleen Street, Yallambie to Greensborough Road and through to Macleod railway station.	There are no proposals to close existing shared use paths. However, some relocation of paths may be required during the project's construction. Any existing pedestrian structures over the freeway or arterial roads that would need to be closed or removed for construction will be rebuilt. The scope of the shared use path upgrades is provided in Section 9.7.
Requests for separate paths for walkers and cyclists to be provided, or to be wide enough to safely accommodation cyclists, pedestrians and dog walkers.	It is not possible to provide separated shared use paths along North East Link due to space constraints. However, these may be provided if space is available and the warrants are met.

Table 5-7 – Community consultation feedback addressed by traffic and transport – construction

Community and stakeholder feedback	Consideration in EES assessment
Requests for more information about traffic disruptions during construction. Congestion on freeways, arterial roads and local roads across the north-east, general traffic delays, closures of local roads, access to homes, shops and community facilities and length of disruptions were key areas of concern. The importance of maintaining east-west connectivity via Kempston Street in Greensborough during construction was frequently mentioned.	Details regarding the impacts of construction are presented in Section 10. This includes details of the proposed closures and the predicted impacts to the transportation network. Traffic performance and travel time impacts are provided in Section 10. There would be some impacts during construction due to reduced capacity at some locations, however the delays are considered to be low.
Requests for more information about potential impacts to parking at Watsonia railway station and access during construction.	During construction it is proposed to relocate some of the car parking at Watsonia railway station into the high voltage easement on the eastern side of the Greensborough Bypass. These proposed changes are discussed in Section 10.5.15.
Concerns about the impacts of truck movements during construction, particularly through residential areas.	Predicted haulage routes and volumes are discussed in Section 10.2 and 10.3. Trucks would generally remain on arterial roads for the haulage of spoil and materials. Any construction routes will require Transport Management Plans to be approved by the relevant road authority, as managed by EPR T2.
Concerns about disruptions to shared use paths during construction including detours and severance.	Shared use paths will be maintained during construction. If closures were required, suitable diversion routes will need to be developed. Any disruptions to shared use paths will require Transport Management Plans to be approved by the relevant authority, as managed by EPR T2.
Concerns about disruptions to public transport services during construction, particularly bus services along the Eastern Freeway, and requests for more information about how services would be maintained.	Public transport services will need to be maintained during constructions, including services along the Eastern Freeway. Any disruptions to public transport services will require Transport Management Plans to be approved by the relevant authority, as managed by EPR T2.

6 Existing conditions

6.1 Background

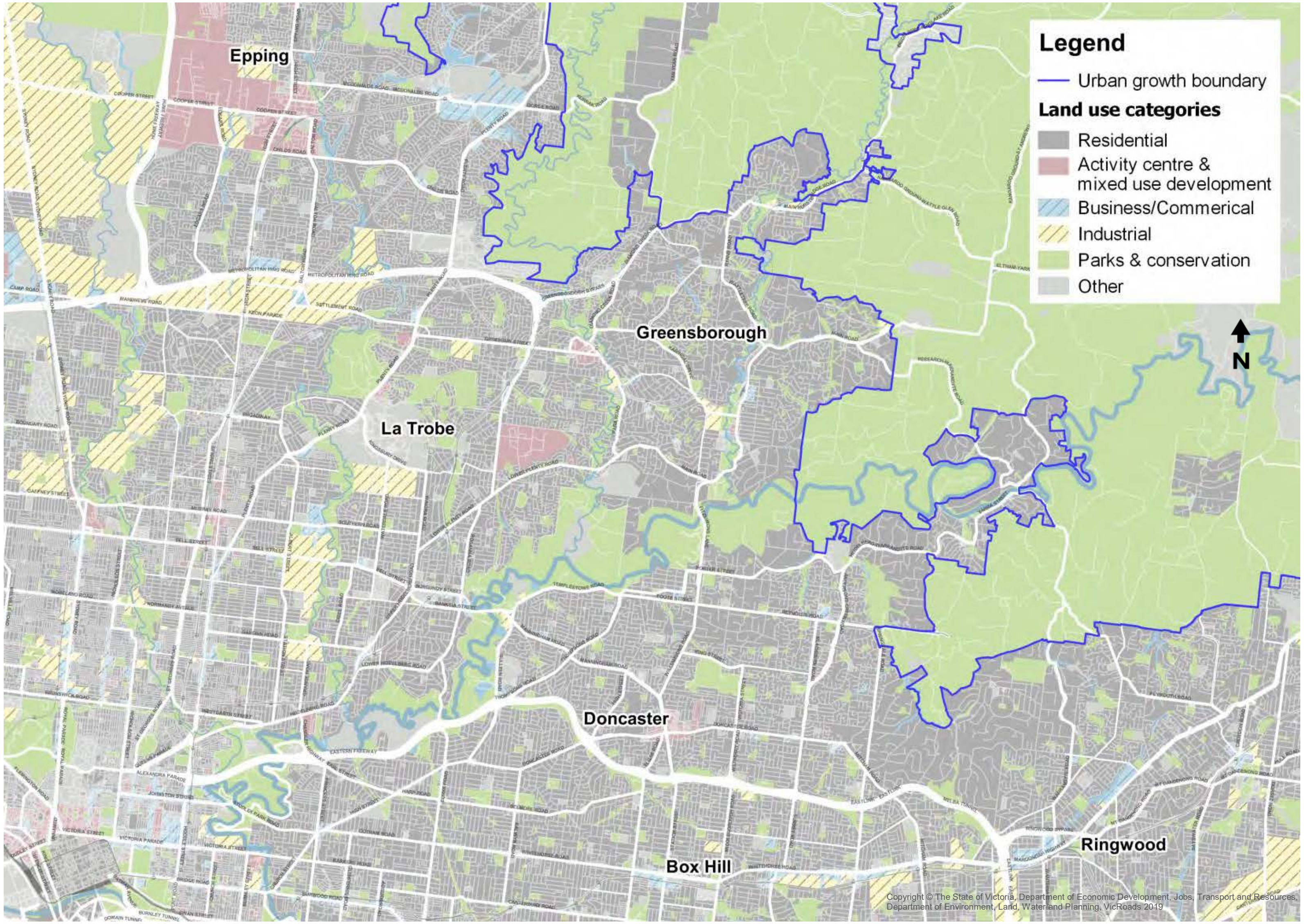
This chapter provides an assessment of the existing transport network's characteristics and performance, focusing on the areas local to North East Link.

6.1.1 Local land use profile

An overview of the land use profile for Melbourne's north-east is presented in Figure 6-1.

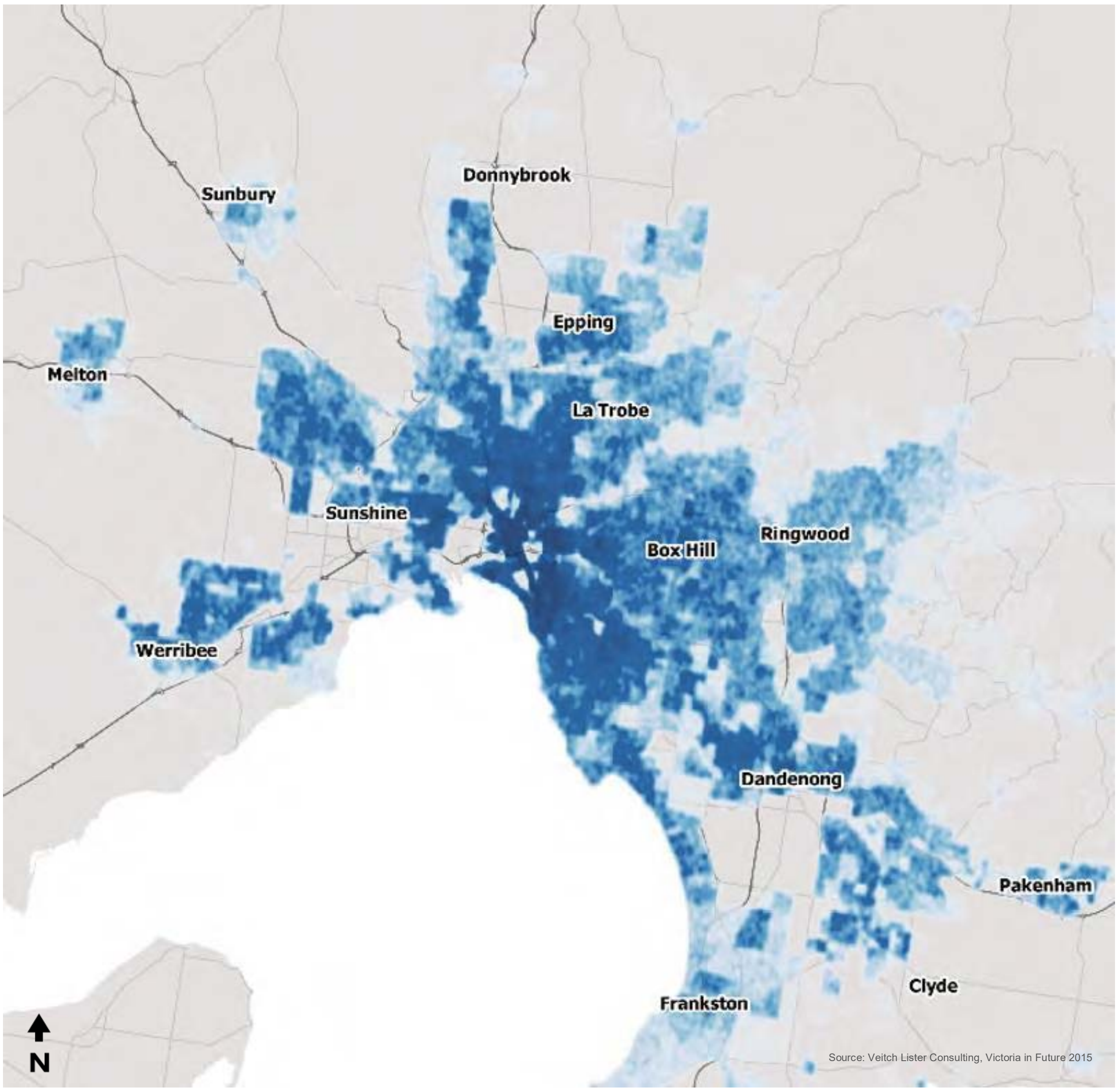
The area primarily comprises residential dwellings, with some commercial and retail clusters located around major activity centres. Large industrial precincts are also located in Preston, Heidelberg West, Reservoir, Somerton and Epping which generates demand for truck movements to and from these regions. Further to the north-east, the urban growth boundary (shown in blue) has been administered to protect parklands along the Yarra River and to promote rural conservation. Residential zoning along Melbourne's north-eastern fringe has already expanded to the edges of the urban growth boundary, and therefore further development and densification in these areas is anticipated to be limited.

Figure 6-1 – Land use in the north-east



Approximately one million people reside in the north-east. The population is relatively evenly dispersed with the exception of the areas adjoining the Yarra River. A population density plot based on Victoria in Future 2015 is shown in Figure 6-2. Population densities are more concentrated in inner areas and become dispersed further away from the CBD. The north-east generally has lower population densities than the north or south-east.

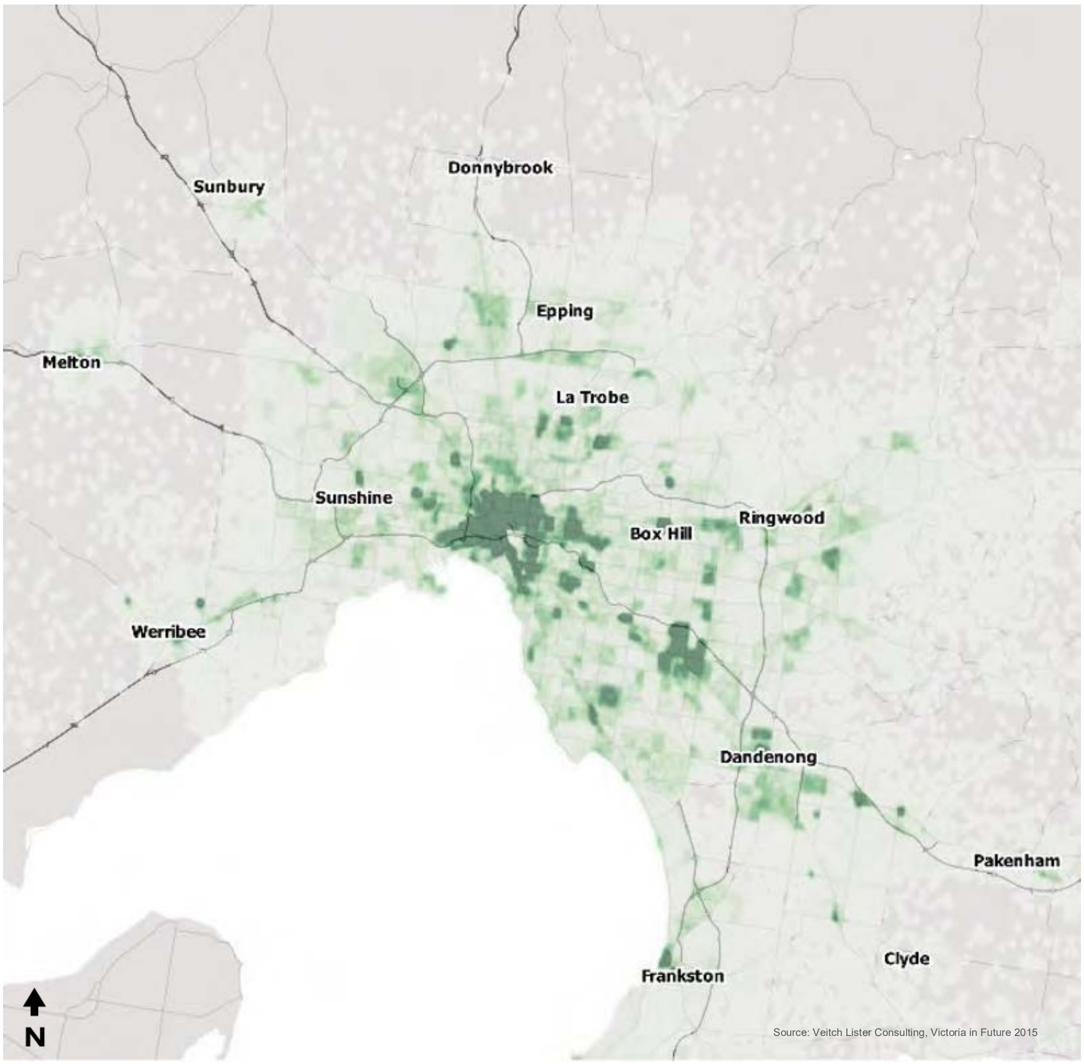
Figure 6-2 – Population density for the 2016 model (based on Victoria in Future, 2015)



However, employment is concentrated around activity centres and industrial precincts as shown in Figure 6-3. Employment clusters can be found near Box Hill, La Trobe, and Dandenong as well as a very large cluster in the CBD and inner suburbs.

As a result of this distribution, the majority of the north-east could be considered ‘commuter suburbs’, resulting in large tidal flow movements across the transport network away from the region and towards the inner city.

Figure 6-3 – Employment density for the 2016 model (based on Victoria in Future, 2015)



An overview of the Metropolitan Activity Centres (MACs), National Employment and Innovation Clusters (NEICs) and other precincts of interest within the study area is presented in the following sections.

Box Hill MAC

Box Hill is an established activity centre in Melbourne's eastern suburbs and features a commercial hub of approximately 16,000 jobs across health, education, government and retail. High-density residential development has intensified over the past decade, with the local population doubling over this period to approximately 4,000 residents.

The precinct is well-served by public transport, with access to the CBD provided by both heavy rail and trams from the centre of Box Hill. An integrated bus station also provides direct access to connecting services to the eastern and northern suburbs. Both north-south and east-west road connectivity across the eastern suburbs is facilitated by a mature, grid-structured arterial network. The hub is directly serviced by several arterials including Whitehorse Road, Station Street, Elgar Road and Middleborough Road. Box Hill is also approximately five kilometres south of the Eastern Freeway, which provides a high-capacity link to the CBD and inner suburbs.

A summary of the Box Hill's local transport network and land use profile is shown in Figure 6-4.

Figure 6-4 – Overview of Box Hill precinct

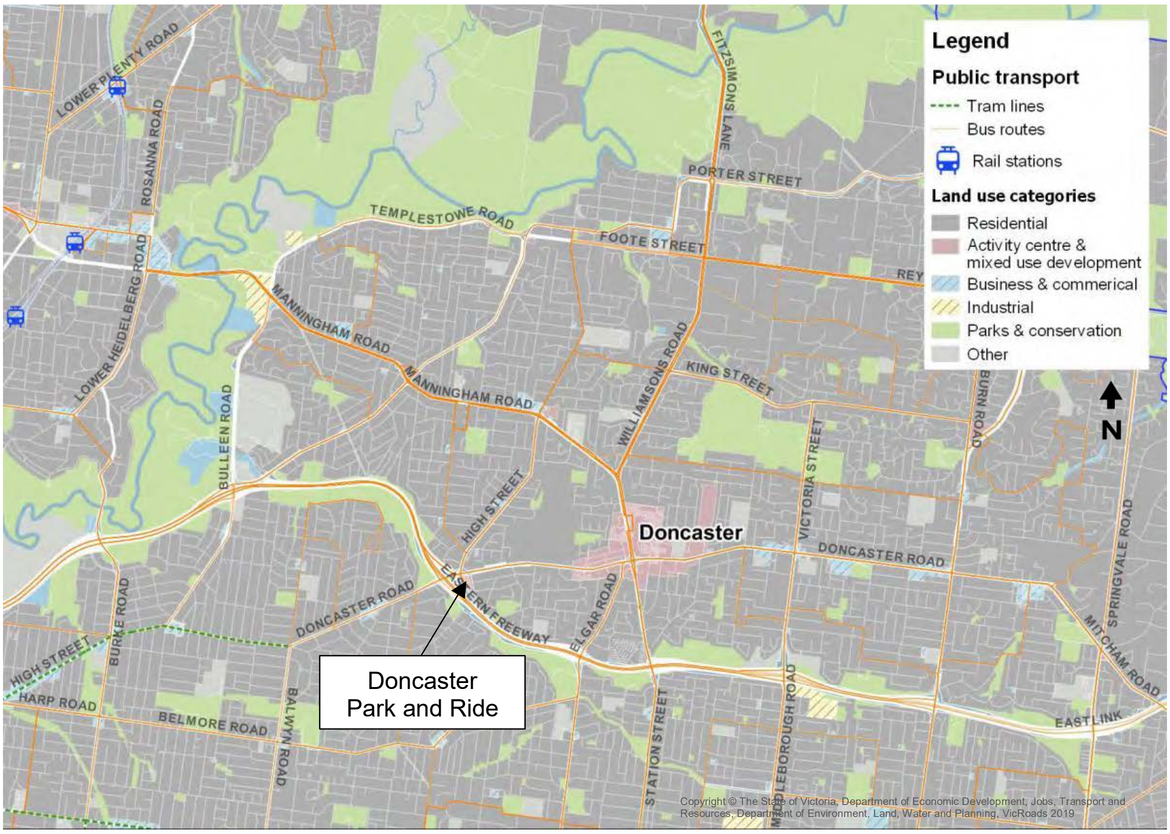
Doncaster

The Doncaster Hill Activity Centre is located in the City of Manningham, approximately two kilometres north-east of the Eastern Freeway. Doncaster Hill is a relatively established area, containing civic and education precincts, as well as a major retail and entertainment centre at Doncaster Shoppingtown. More recently Doncaster Hill has been earmarked for high-density residential development, which has seen its population double between the 2011 and 2016 Census to approximately 2,500 residents.

The precinct's main corridors span along Doncaster Road, Williamsons Road and Tram Road which provide access to the Eastern Freeway. Public transport within the area is largely dependent on the local bus network. The Doncaster Area Rapid Transit (DART) bus services operate via a 'park and ride' facility on the corner of Doncaster Road and the Eastern Freeway, which has been highlighted in Figure 6-5. DART services provide high-frequency peak period services towards the CBD and inner suburbs via the Eastern Freeway.

The Yarra River lies north of Doncaster, which divides it from Melbourne's north-eastern suburbs of Eltham, Heidelberg and Rosanna. Local connections across the Yarra River are limited to Manningham Road and Fitzsimons Lane.

Figure 6-5 – Overview of Doncaster precinct



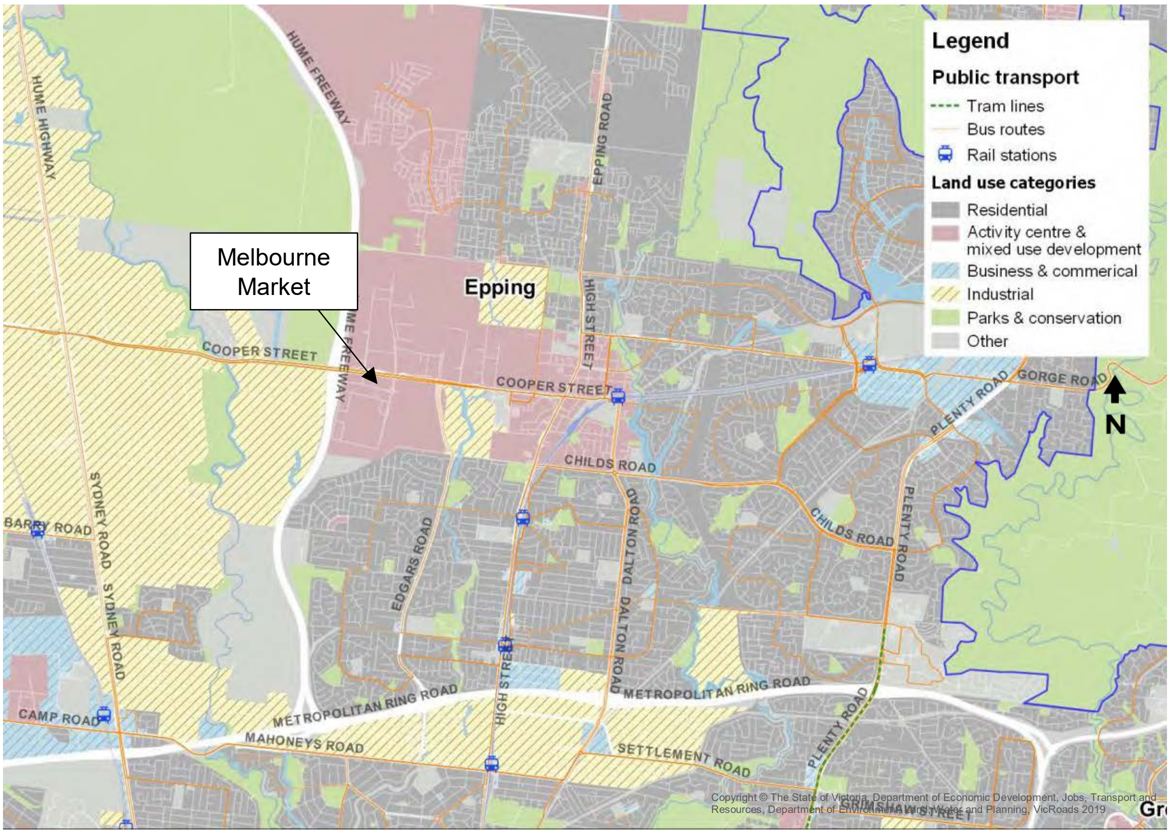
Epping MAC and Melbourne Market

Epping lies in Melbourne's outer northern suburbs, approximately 20 kilometres north of the CBD. The activity centre features the Pacific Epping retail and entertainment hub, as well as the Northern Hospital health precinct. Both are located within close proximity of Epping railway station, which is serviced by the Mernda rail line.

Further west along Cooper Street is the Melbourne Wholesale Fruit Vegetable & Flower Market, shown in Figure 6-6, which generates approximately 2,700 vehicle entries per day (or 5,400 total trips). The area is surrounded by several industrial precincts, including Somerton to the west and Thomastown to the south.

The area is bounded by the Hume Freeway to the west, which provides access to the M80 Ring Road and northern regional Victoria. Several north-south arterials also provide connectivity to the M80 Ring Road, including Edgars Road, High Street and Dalton Road.

Figure 6-6 – Overview of Epping precinct

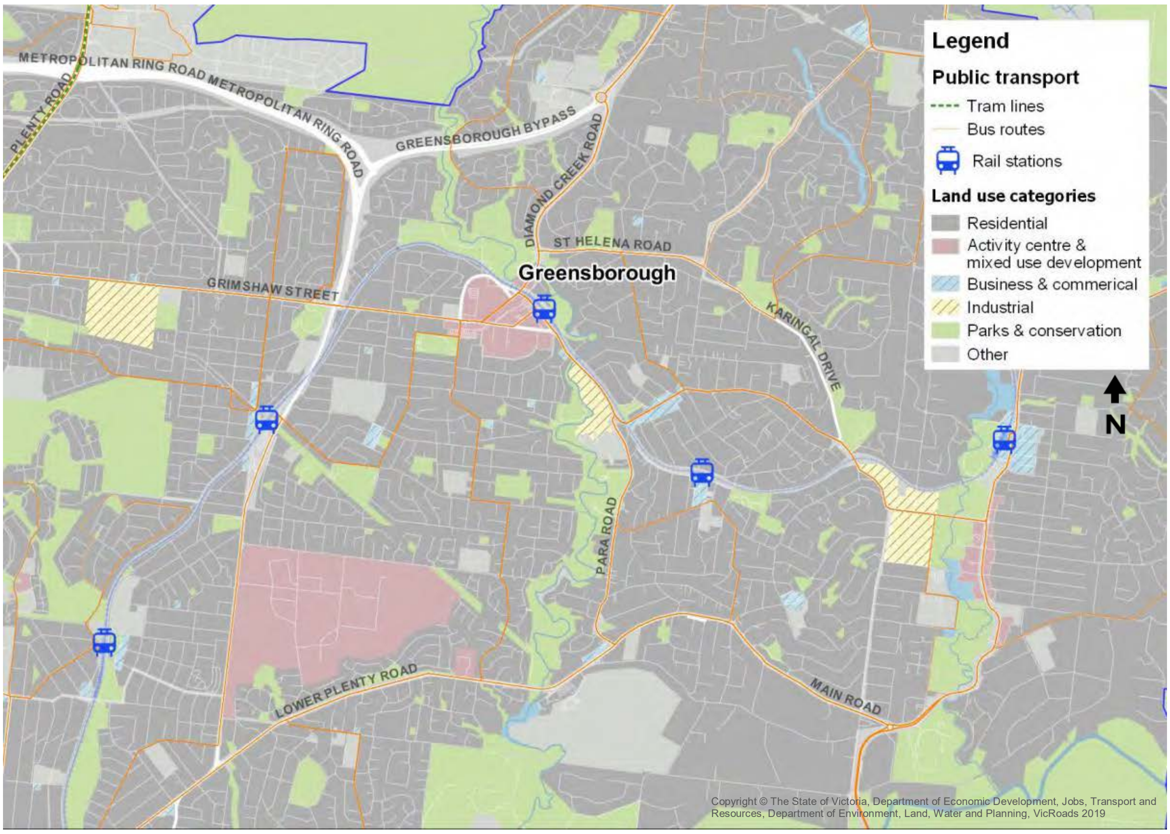


Greensborough

The Greensborough Activity Centre is located at the junction of Grimshaw Street and Para Road, immediately west of the Plenty River, as shown in Figure 6-7. It is approximately 19 kilometres north-east of the Melbourne CBD and is situated near the urban growth boundary.

The centre comprises primarily commercial, retail and educational spaces, with a small amount of residential properties dispersed throughout. Greensborough is serviced by a railway station in the town centre which is part of the Hurstbridge rail line, as well as the 901 and 902 orbital SmartBus routes. The precinct draws on the surrounding population catchments of Watsonia, Eltham and Yallambie.

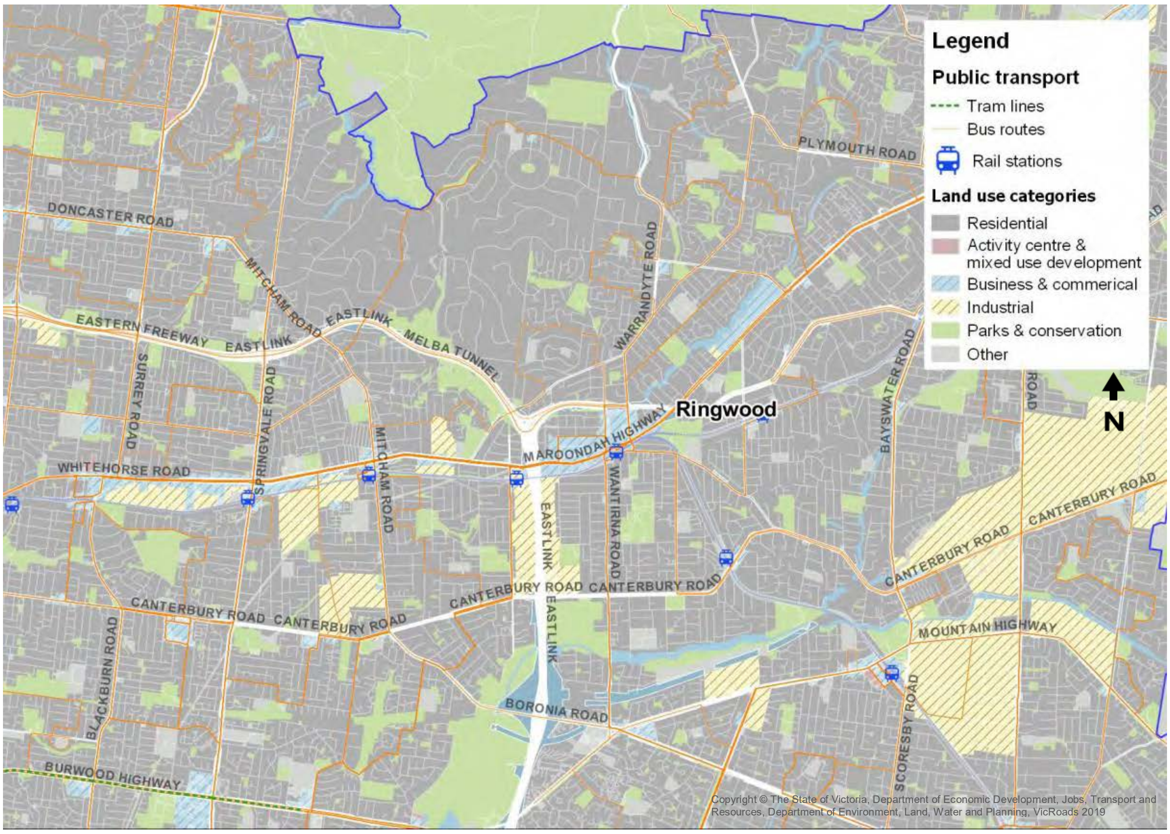
Figure 6-7 – Overview of Greensborough precinct



Ringwood MAC

The Ringwood MAC is located at the intersection of the Eastern Freeway and EastLink, approximately 25 kilometres east of Melbourne's CBD, as shown in Figure 6-8. The precinct serves as a retail and commercial hub for the outer eastern suburbs and has been the focus of several urban renewal initiatives by Maroondah City Council in recent years. Ringwood railway station is located at the junction of the Lilydale and Belgrave rail lines and is serviced by both.

Figure 6-8 – Overview of Ringwood precinct

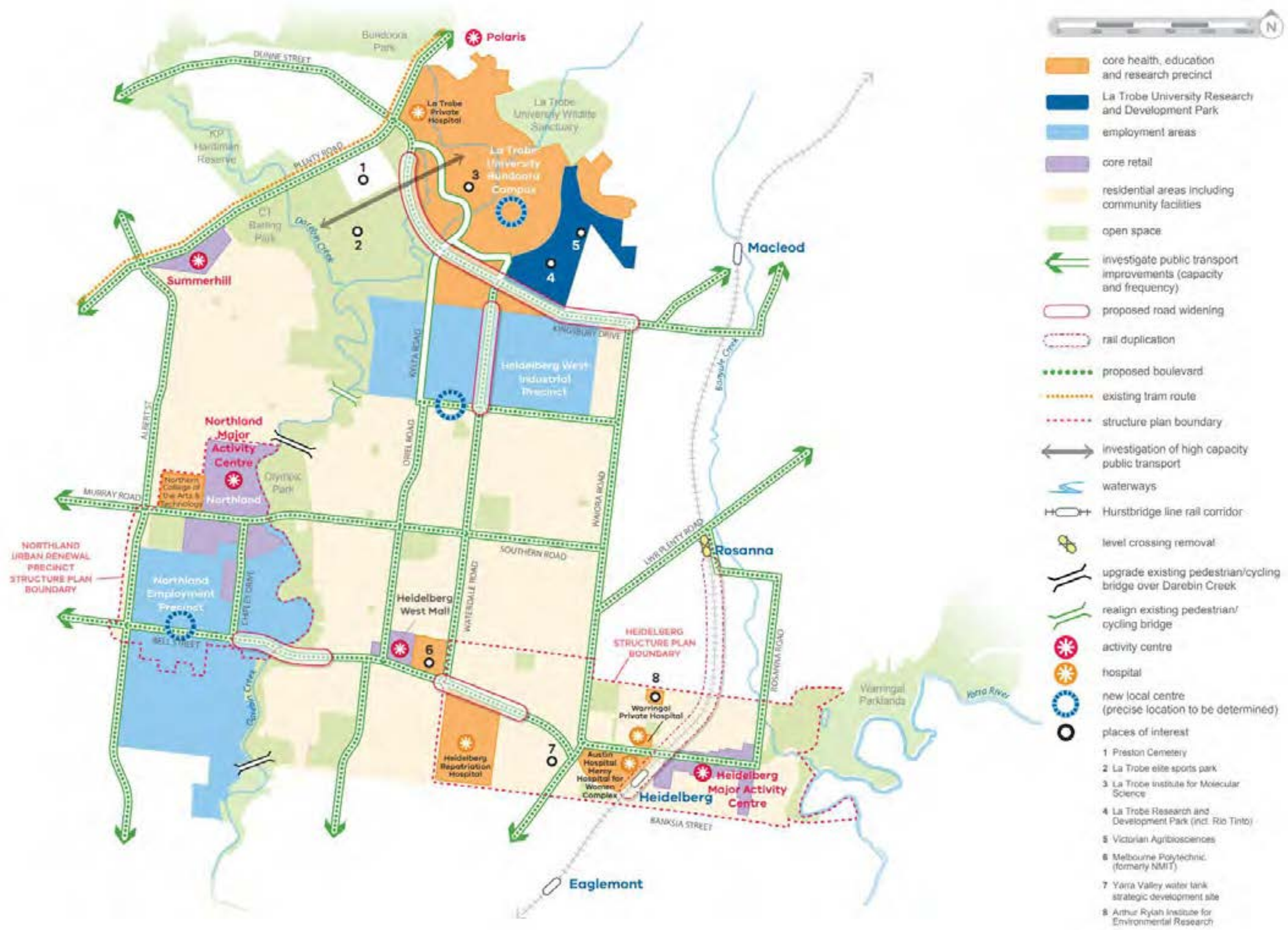


La Trobe NEIC

The proposed La Trobe NEIC will merge a cluster of five existing activity centres in the Heidelberg area, with a likely emphasis on the health sector. An overview of the existing precinct, as well as proposed developments are shown in Figure 6-9.

The proposal aims to revitalise the existing employment precincts at Heidelberg and Northland, by attracting businesses from innovative sectors such as advanced manufacturing and research and development. At present there are approximately 28,500 jobs located within the existing cluster, and approximately 37,000 tertiary enrolments at La Trobe University. These are serviced by arterial road connections such as Bell Street, Plenty Road, Greensborough Road and Rosanna Road.
The Hurstbridge rail line services the Austin Health centre, via Heidelberg railway station in the town centre. La Trobe University is alternatively serviced via trams along Plenty Road, with supplementary bus connections to the CBD and eastern suburbs.

Figure 6-9 – Overview of La Trobe precinct



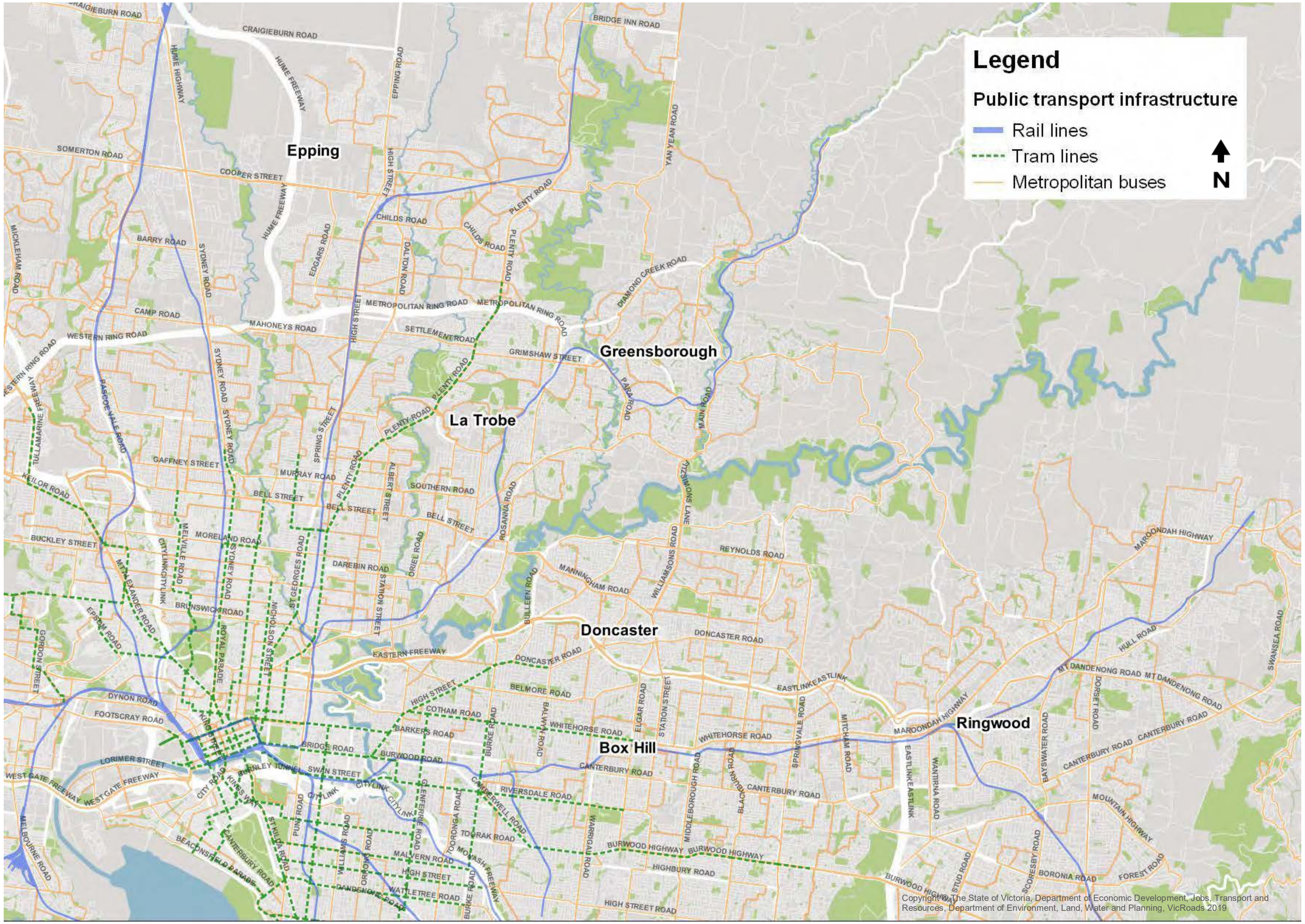
Source: La Trobe National Employment and Innovation Cluster Draft Framework, 2017

6.1.2 Local transport network

An overview of the transport network in Melbourne's north-eastern suburbs is shown in Figure 6-10. Freeways and arterial roads are shown in white, while the metropolitan train and tram networks are shown in blue and green respectively. A summary of the key elements of the network include:

- **The Eastern Freeway** is a high-capacity freeway linking the eastern suburbs from EastLink to the inner suburbs and CBD. The freeway is sign-posted at 100 km/hr and ranges between six to 10 lanes, with priority 'T2' lanes for vehicles carrying at least two people. DART buses have priority use of the freeway's emergency lanes to operate high-frequency services between the eastern suburbs and the CBD.
- **The M80 Ring Road** is an orbital high-capacity freeway spanning Greensborough in the north-east to Laverton in the south-west. It facilitates high volumes of traffic between the northern and western suburbs and is currently undergoing a program of upgrades and widening works to meet the needs of population growth in these areas. The M80 Ring Road comprises the Metropolitan and Western Ring Roads, and connects the Hume, Tullamarine, Calder, Princes and West Gate freeways in an orbital link around Melbourne. The majority of the freeway is sign-posted at 100 km/hr, with the exception of the segment between Plenty Road and Greensborough Bypass which is 80 km/hr.
- **Plenty Road** between the M80 Ring Road and High Street serves as a major north-south arterial and a tram route for the No. 86 service between Bundoora RMIT and Waterfront City Docklands. The corridor also facilitates bicycle paths and bus services for the northern suburbs. It is a key route connecting central Melbourne, the inner northern suburbs and the La Trobe NEIC, and serves as the primary access route to the M80 Ring Road from the north. The northern section of Plenty Road beyond Kingsbury Drive is generally sign-posted at 80 km/hr, which drops to 60 km/hr further south.
- **Greensborough Road/Rosanna Road/Bulleen Road** is the preferred route for vehicles travelling between the M80 Ring Road and Eastern Freeway. It serves multiple functions as a north-south traffic route, a freight route, a Principle Bicycle Network route, providing access to local neighbourhoods and enabling freight journeys between the M80 Ring Road and the Eastern Freeway. Sign-posted speeds along the corridor range from 80 km/hr along Greensborough Bypass at the northern end, to 60 km/hr further south along Greensborough Road and Rosanna Road and 70 km/hr along Bulleen Road.
- **Fitzsimons Lane/Main Road/Para Road** provides alternative connectivity for traffic between the M80 Ring Road and the Eastern Freeway and serves SmartBus orbital routes 901 and 902 Fitzsimons Lane, Main Road and Para Road are sign-posted at 80 km/hr, 70 km/hr and 60 km/hr respectively.
- **Rail services** such as the Hurstbridge line connect the La Trobe and Greensborough areas north-east of the Yarra River, while the Mernda line provides accessibility to northern suburbs such as Preston and Epping. The Lilydale and Belgrave lines also provide high-frequency peak services in the eastern suburbs, for precincts such as Box Hill and Ringwood.
- **Tram services** are less extensive in the region and include the 109 service to Box Hill as well as the No. 86 tram service to Bundoora along Plenty Road.
- **SmartBus and Doncaster Area Rapid Transit (DART) buses** also operate in the study area, providing orbital and CBD connections respectively. The suburbs of Doncaster and Templestowe in particular rely on bus networks due to their low density and broad geographical reach.

Figure 6-10 – The north-eastern transport network



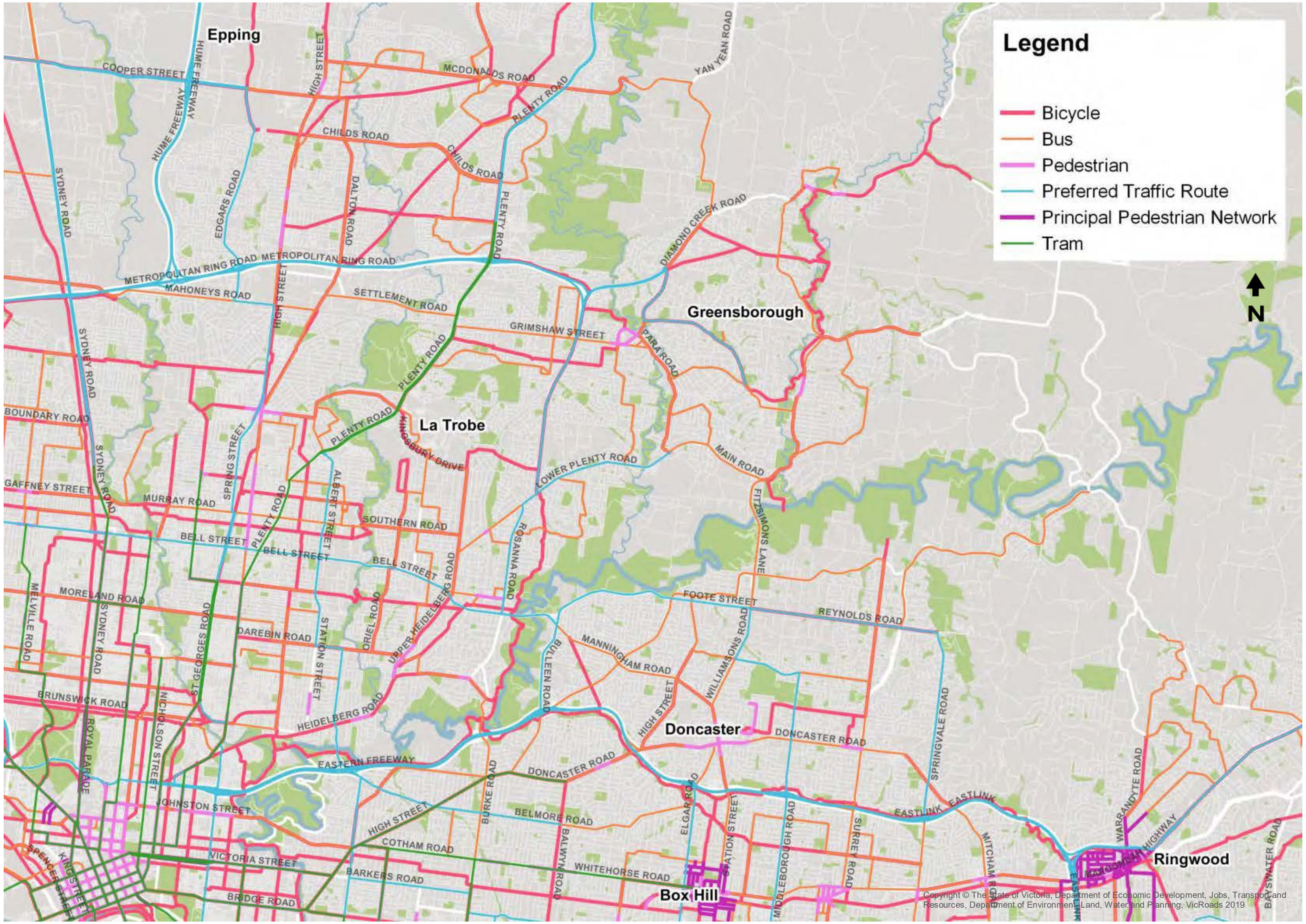
VicRoads has developed the SmartRoads framework to manage competing demands for the road network between private vehicles, trucks, public transport, pedestrians and cyclists. The SmartRoads approach involves the development of a road use hierarchy, which determines the level of priority for arterial roads across Victoria. A map of the SmartRoads hierarchy for the north-east is presented in Figure 6-11.

Arterial roads which have been designated as preferred traffic routes in the north-east include the Greensborough Road – Rosanna Road – Bulleen Road corridor, Bell Street, Banksia Street as well as the Templestowe Road – Foote Street – Reynolds Road corridor. All freeways, including the Eastern Freeway, EastLink and M80 Ring Road, have also been nominated to this category.

Priority bicycle routes typically avoid preferred traffic routes and are also often defined along creek and river trails. The exception to this is Greensborough Road, which has been designated as a bicycle route between Lower Plenty Road and the M80 Ring Road.

Bus priority has been allocated to the Eastern Freeway and extensively to arterials in the Doncaster/Templestowe area, to facilitate DART bus services. The La Trobe University precinct's feeder routes, including Kingsbury Drive, Plenty Road and Lower Plenty Road have also been allocated bus priority.

Figure 6-11 – SmartRoads network in the north-east



Transport for Victoria (TfV) is also currently developing the Movement and Place Framework, which will replace the SmartRoads road use hierarchy. The framework defines categories for each road link with respect to functionality, transport mix and environmental conditions to guide the planning and development of an integrated transport network. The following is a representation of the network given the current level of development.

The classification systems of significance to the north-east include:

- **Movement**: This will indicate the overall level of travel demand across all modes, ranging from M1 (high volume transport movements, such as freeways and railway lines) to M5 (local access links). Underpinning the overall Movement classification will be modal classifications such as General Traffic, Public Transport, Freight, Cycling and Pedestrians. The Eastern Freeway, M80 Ring Road and Hume Freeway form the highest movement links in the study area, followed by corridors that facilitate movements across the region such as arterial roads. In general, the north-east has a sparser network of arterial road corridors than the eastern suburbs, with only two north-south corridors (Bulleen Road – Rosanna Road – Greensborough Road and Williamsons Road – Fitzsimons Lane – Main Road) facilitating Yarra River crossing movements.
- **Place**: This will provide an indication of the overall level of activity within a given precinct, with Plan Melbourne place classifications and land use zones being important inputs to defining the place classifications. These classifications will range from P1 (very high level of activities with state-level significance, such as the CBD) to P5 (local access links used by residents and local workers only). These Place classifications are under development, with key places for the north-east from Plan Melbourne presented in Figure 6-12. These include the La Trobe National Economic and Innovation Cluster (NEIC) that includes Heidelberg and La Trobe University, the Metropolitan Activity Centres of Box Hill and Ringwood and Major Activity Centres of Doncaster and Greensborough. There are also important industrial areas at Epping and Campbellfield.
- **General traffic** (GT): Links which indicate high-volume traffic movements of strategic metropolitan significance will be classified as GT1, while GT5 links are assigned to local access roads. Again, the Eastern Freeway, M80 Ring Road and Hume Freeway have been assigned the highest-volume category in this regard. This is followed by many parts of the arterial road network being classified as either GT2 or GT3 links, with Preferred Traffic Routes in Smartroads currently making up a significant proportion of the GT2 network. These classifications are presented in Figure 6-13.
- **Freight**: Roads assigned to this category define preferred routes for trucks and commercial vehicles. This category will be developed taking into consideration, the strategic importance of the route, freight volumes and the types of freight vehicles that are allowed on different roads, with permissible vehicles shown in Figure 6-14. Key freight link indicates strategic and high-volume freight corridors which will include the motorway network and other key links. A key freight route through the north-east is the Greensborough Road – Rosanna Road – Bulleen Road corridor, which currently functions as a key freight route, with curfews on sections, as shown in Figure 6-14. There are also freight routes which cater for specialised types of freight, such as Over Dimensional vehicles.
- **Bus**: High-volume bus corridors are identified through the Principal Public Transport Network and are particularly concentrated throughout the Doncaster/Templestowe region to facilitate DART along with orbital SmartBus services. These are presented in Figure 6-15, along with the broader public transport network. Notably the Eastern Freeway, due to its dedicated bus lane, is part of the Priority Public Transport Network.

- **Walking**: Higher order walking networks and links are anticipated to be defined around employment hubs, activity centres and public transport interchanges and key stops. In the north-east, the higher order networks can be found in areas surrounding the La Trobe/Heidelberg, Greensborough, Ringwood and Box Hill centres. Prioritised walking links should be safe, connected and comfortable. Walking links typically avoid high-volume roads where sufficient alternatives are available, however there is a notable overlap of these categories along the Greensborough Road – Rosanna Road – Bulleen Road corridor. This is currently defined as an GT2 and key freight corridor, indicating high levels of overall traffic and truck priority, but there are also key walking links to support access to range of activities to and within the Heidelberg, Rosanna and Watsonia activity centres and their respective railway stations.
- **Cycling**: The cycling network is defined by the Principal Bicycle Network (PBN). Key corridors within this network have been designated as Strategic Cycling Corridors (SCCs). SCCs are defined by the Victorian Cycling Strategy 2018-28 as the most important routes for cycling for transport that link up important destinations including the central city, National Employment and Innovation Clusters (NEICs), Metropolitan Activity Centres (MACs) and other important destinations. SCCs should provide a safe, lower-stress cycling experience without undue impact on other modes. To ensure SCCs are meeting their intention, the specific alignments of SCC links were being reviewed in consultation with local councils at the time of publishing this report. The existing SCC network throughout the north-east are presented in Figure 6-16. The region features several SCCs including Lower Plenty Road, Main Road, Fitzsimons Lane and Plenty Road. Other links support more local access and connections.

Figure 6-12 – Places as defined in Plan Melbourne

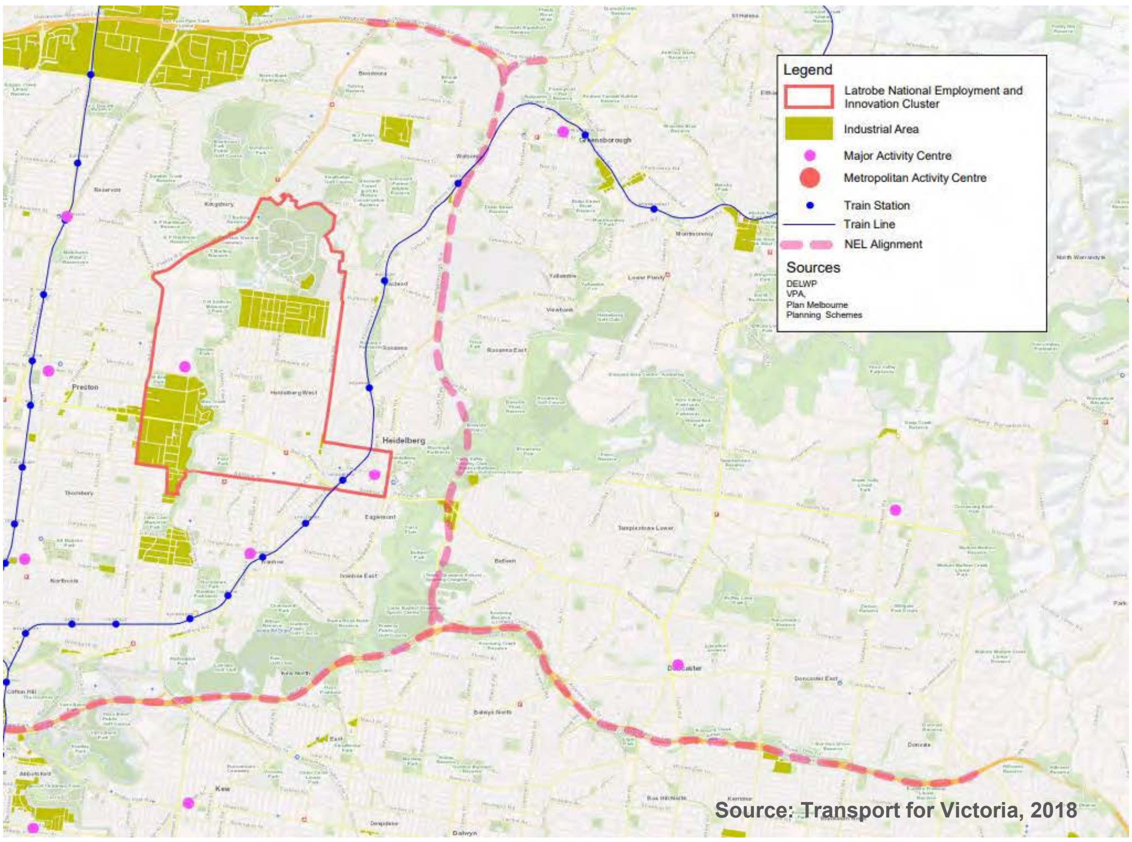
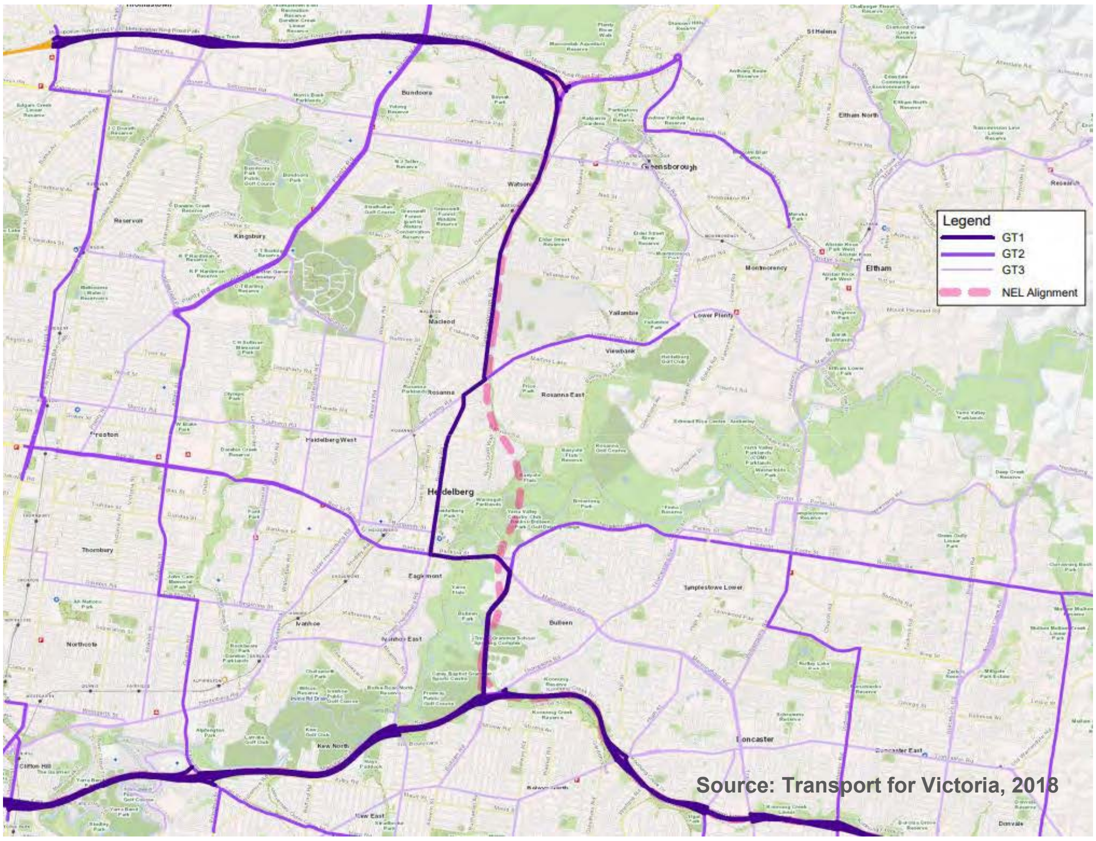


Figure 6-13 – Draft Movement and Place Framework – General Traffic Classifications



Notes:

- *GT1: Links that support mass movement of people by private vehicle on routes with a State or National level movement function and provide access to State level places. All of Melbourne's freeway/motorway network has been classified as GT1.*
- *GT2: Significant movement of people by private vehicle on routes connecting multiple municipalities or providing primary access to Regional level places. At present, the Preferred Traffic Routes (and future Preferred Traffic Routes) identified under VicRoads' previous SmartRoads framework have been classified as GT2.*
- *GT3: Moderate movement of people by private vehicle on routes connecting municipalities or providing primary access to Municipal level places. At present, all remaining VicRoads declared arterial roads (those that have not been classified as GT1 or GT2) are have been classified as GT3*

Figure 6-14 – Key freight routes

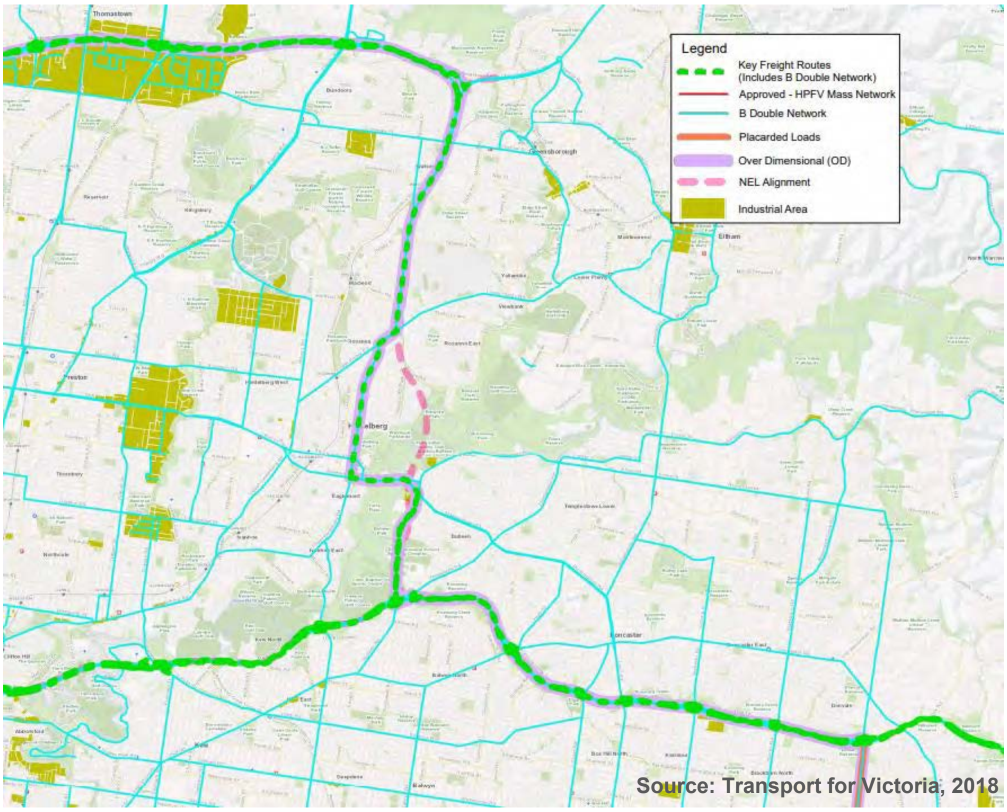


Figure 6-15 – Public Transport Network incorporating PPTN and SmartBus routes

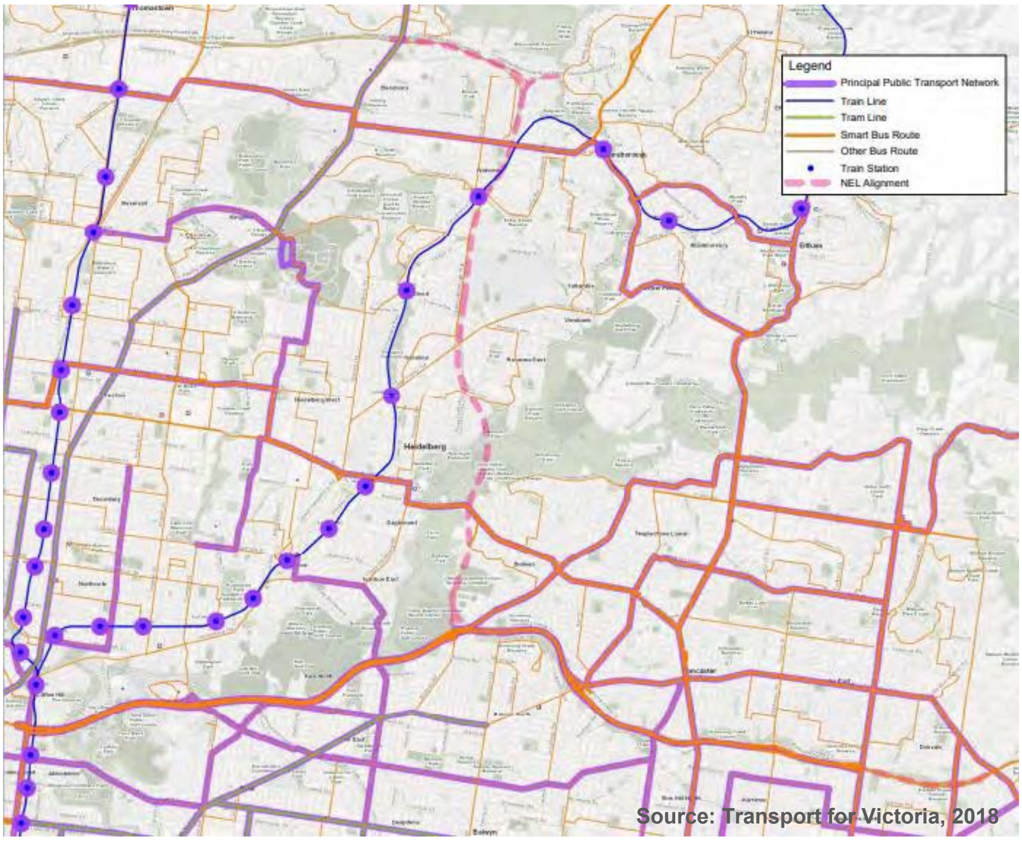
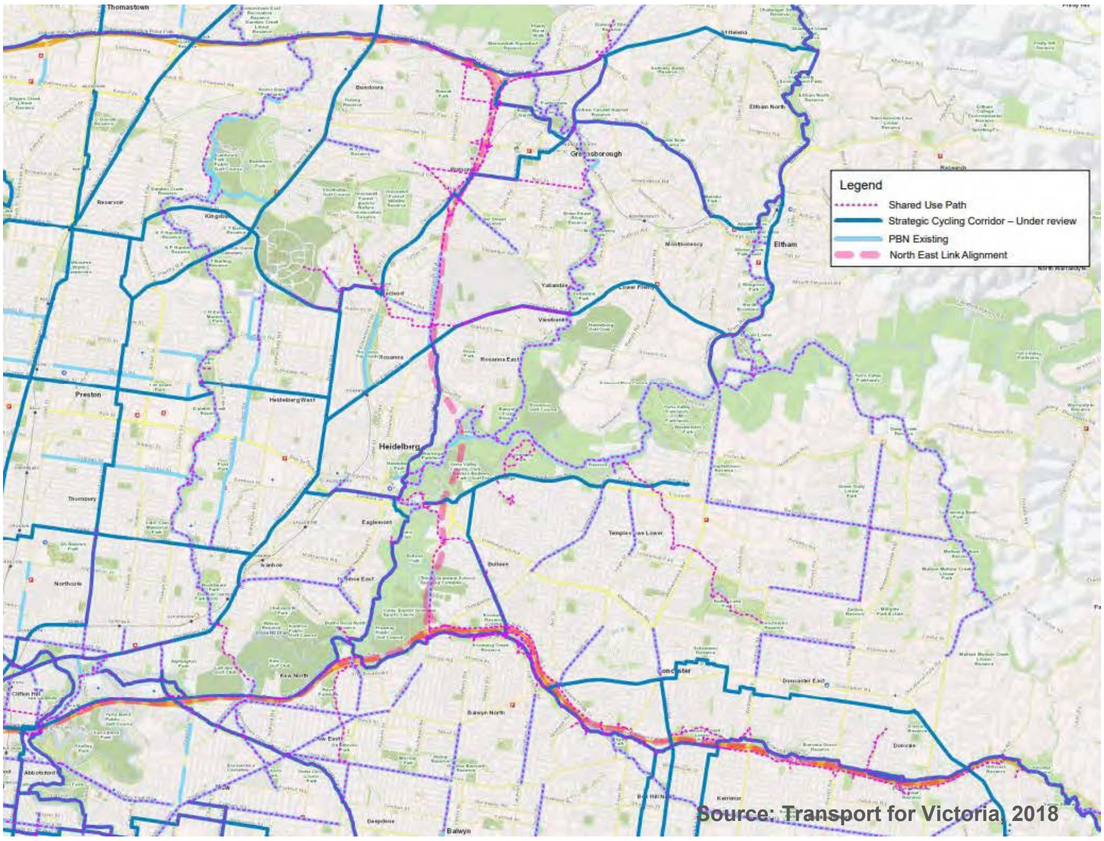


Figure 6-16 – Strategic Cycling Corridor and Principal Bicycle Network



***Note**: Alignment of Strategic Cycling Corridors currently being refined with council input, at the time of publishing this report.*

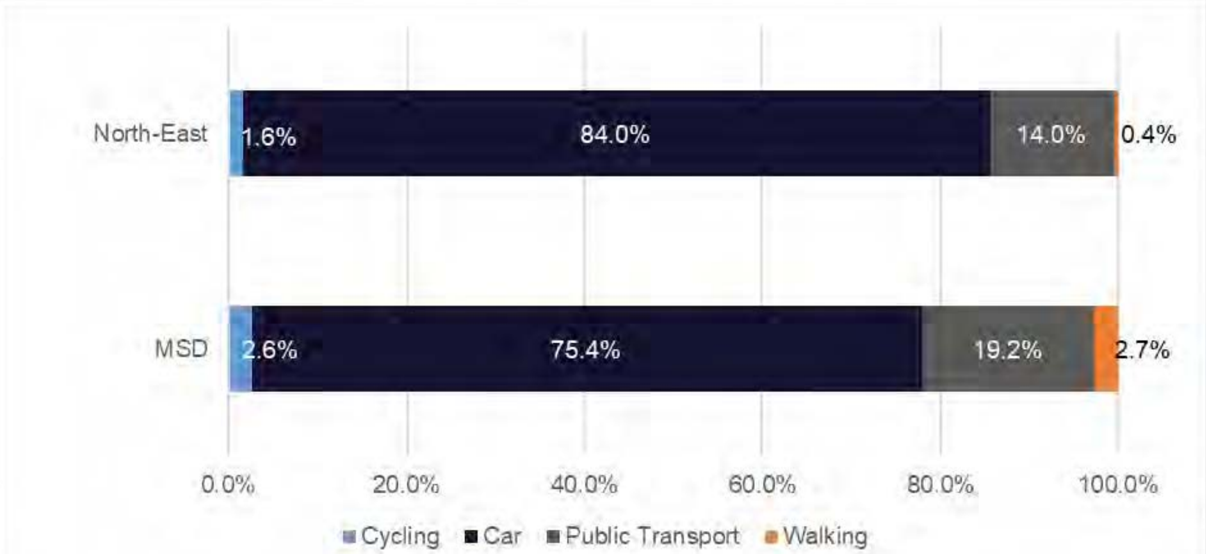
6.2 Road network overview

6.2.1 Travel demand in the north-east

Household travel surveys indicate that private vehicles are the dominant mode of transport in the north-east, responsible for 84 per cent of all trips. Public transport mode share accounts for approximately 14 per cent of travel demand, while walking and cycling trips make up approximately 2 per cent.

Compared with metropolitan Melbourne, there is a higher reliance on car travel and a lower reliance on public transport. These trends are presented in Figure 6-17.

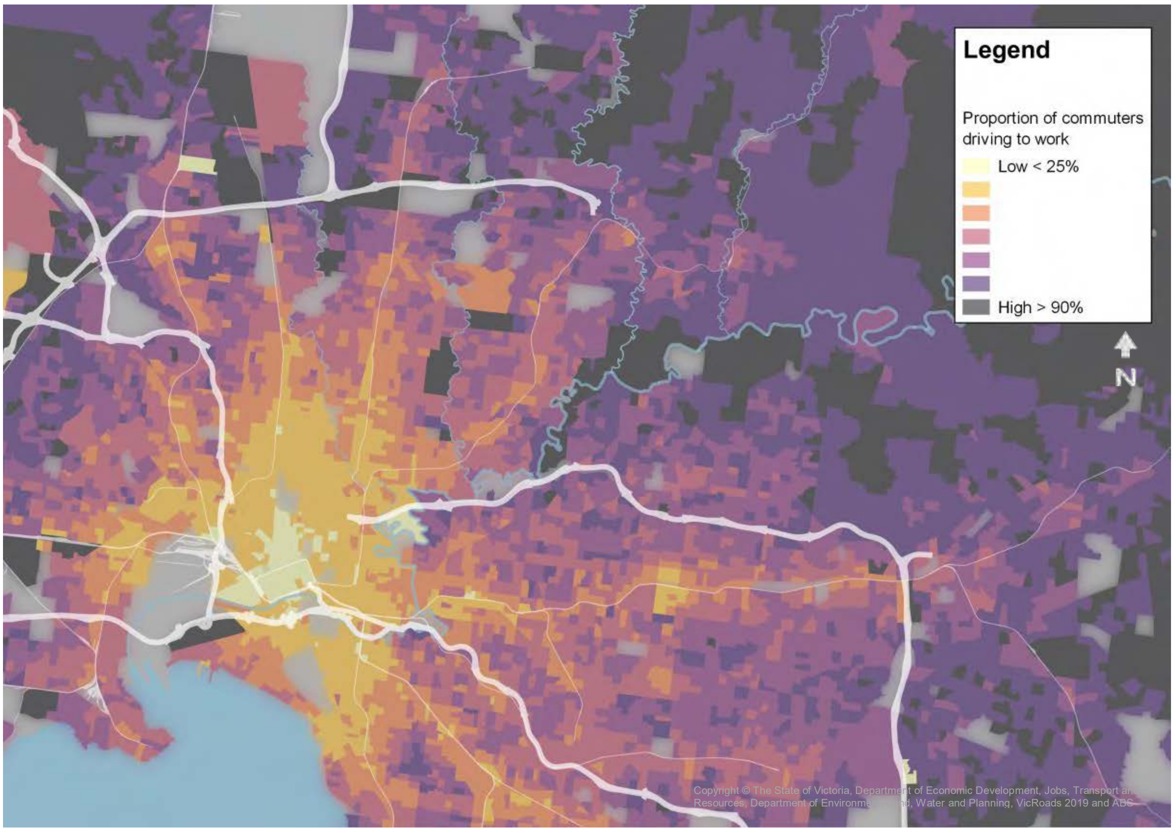
Figure 6-17 – Transport mode share in the north-east vs metropolitan Melbourne (MSD)



Source: Victorian Integrated Survey of Travel and Activity 2012-13

These trends are also reflected in commuter travel in the north-east, as recorded in the ABS Journey to Work survey. A map showing the proportion of car commuters by origin is shown in Figure 6-18, with darker areas indicating higher levels of private vehicle usage. In general, the reliance on cars is lower in the inner suburbs and increases further away from the CBD. It is also typically lower along heavy rail corridors, which provide high-capacity services to the employment-rich districts of the CBD and inner suburbs. Compared with the eastern or northern suburbs, the study area appears to have a higher overall reliance on private vehicle travel for commuting.

Figure 6-18 – Proportion of people driving to work, by origin, 2016 Census



The general preference for car over public transport reflects its superior travel times for most destinations. The chart in Figure 6-19 shows the ratio of car to public transport travel times in the AM peak, for trips originating from Box Hill. Private vehicle travel is typically 30 to 40 minutes faster than public transport for most destinations apart from the CBD, which can be accessed by express heavy rail services. The same comparison was also undertaken for trips originating from La Trobe, which is presented in Figure 6-20. Private vehicle travel is significantly faster than public transport for most destinations across Melbourne, often by over an hour.

It is therefore anticipated that private vehicles would continue to be dominant mode of travel in the north-east.

Figure 6-19 – Comparison of AM peak car and public transport travel times from Box Hill, 2016 model

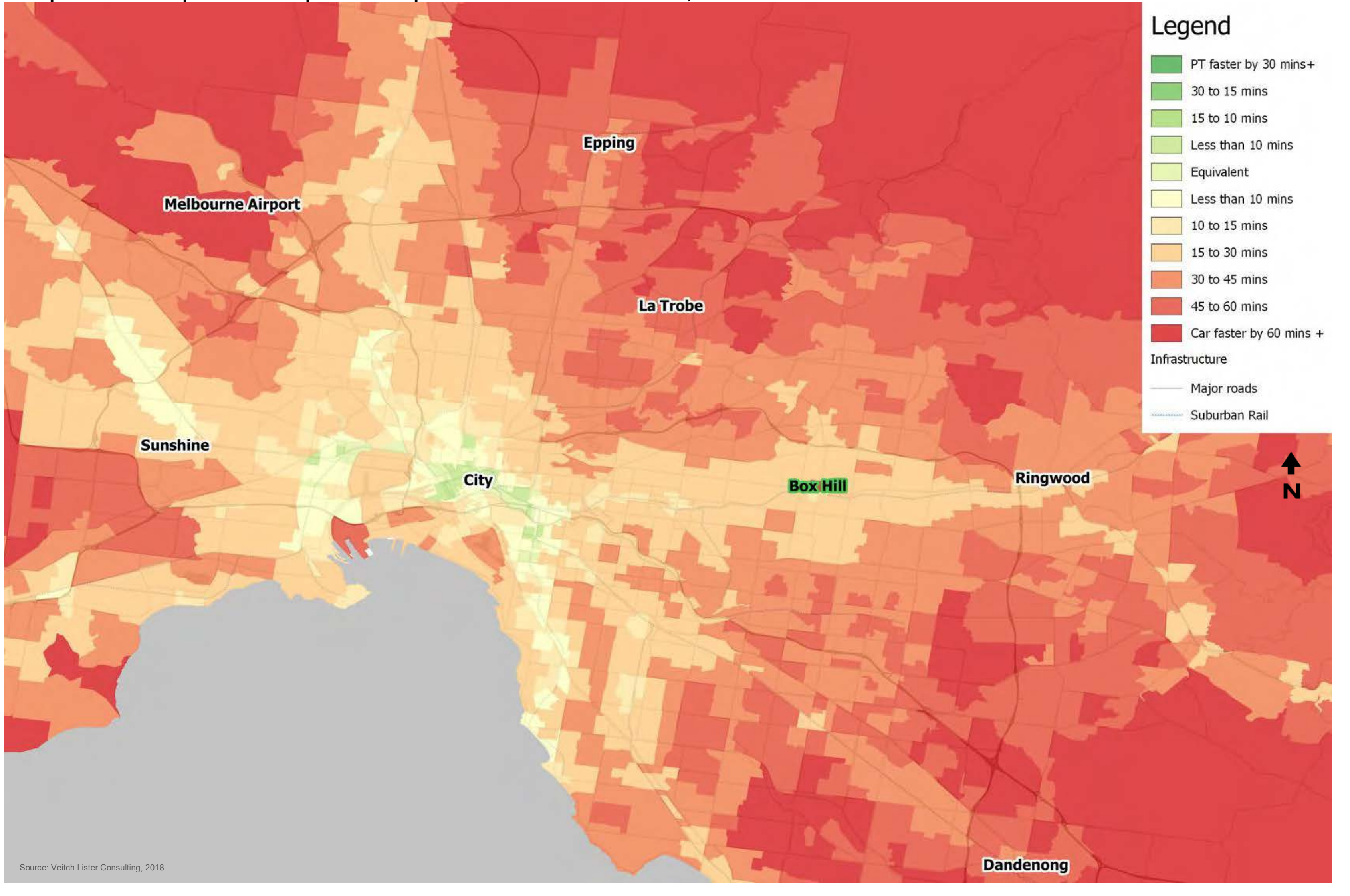
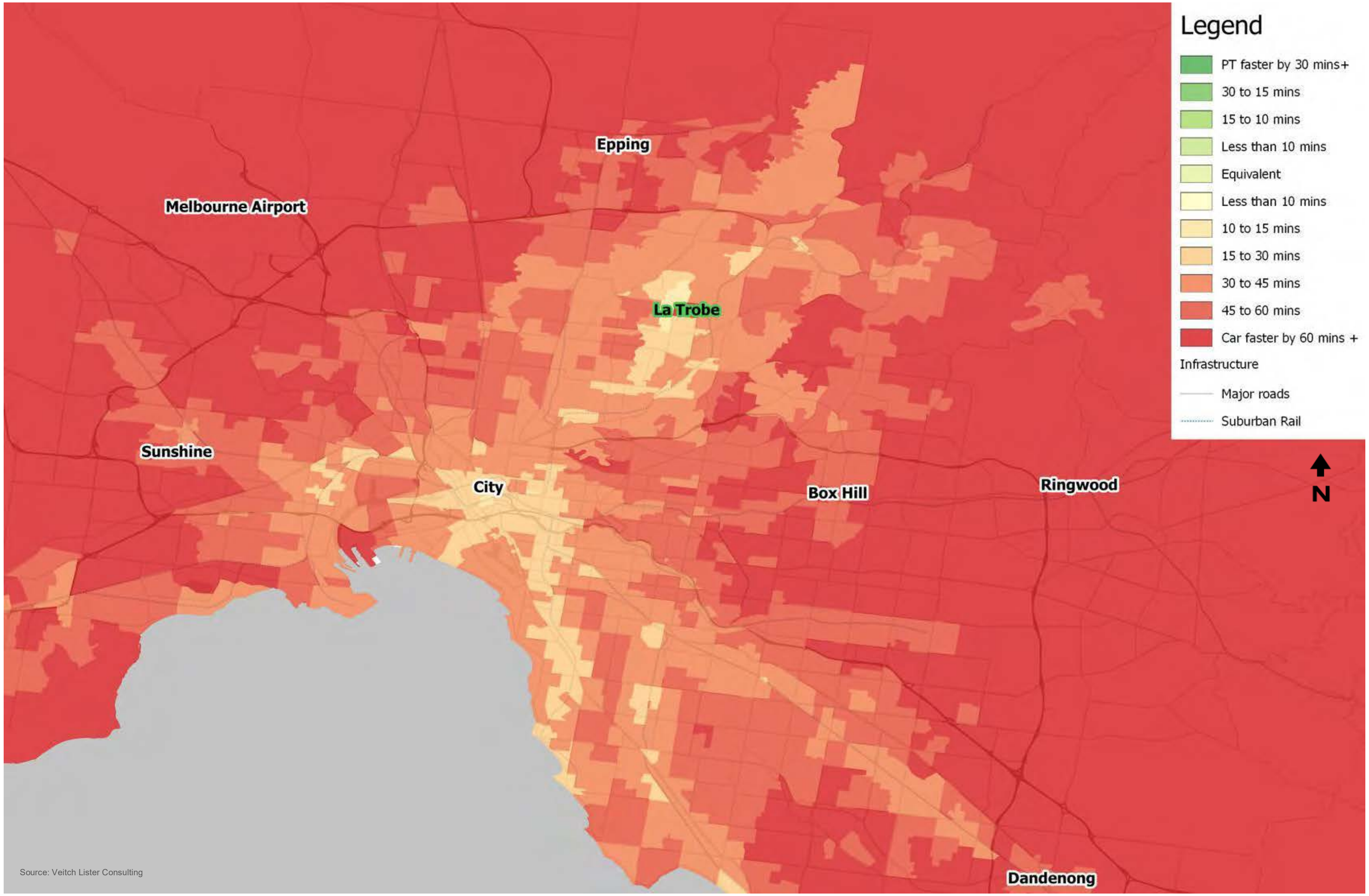


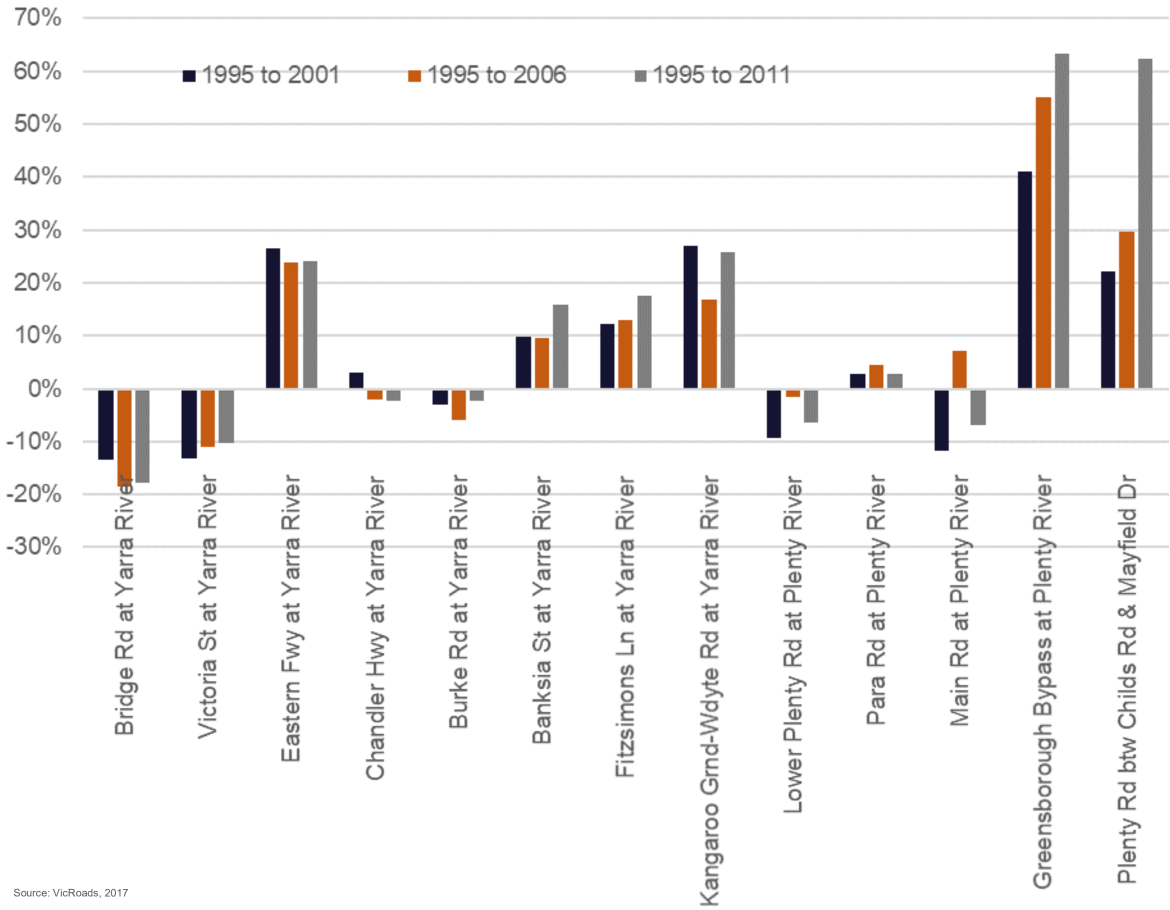
Figure 6-20 – Comparison of AM peak car and public transport travel times from La Trobe, 2016 model



As a result, the north-east is heavily reliant upon its road network for travel. This reliance has become more entrenched as traffic volumes on the outer suburban arterial road network have grown over the past decade, as presented in Figure 6-21.

While traffic volumes in the inner city (Eastern Freeway, Chandler Highway, Burke Road) generally decreased or plateaued between 1995 and 2011, traffic volumes in the north-east (Fitzsimons Lane, Greensborough Bypass, Plenty Road) grew significantly. Reduced traffic volumes in the inner city reflects these roads operating at or near capacity and could be related to increases in operating costs of private vehicles or greater access to public transport.

Figure 6-21 – Daily traffic growth on north-eastern roads



Source: VicRoads, 2017

6.2.2 Network performance

The key performance indicators for the existing transport network are defined below. These indicators have been based on strategic modelling results, which can be benchmarked across existing year and forecast modelling scenarios. Detailed summaries of the network statistics are provided in Table 6-1.

The metrics relate to the study area and metropolitan Melbourne.

- **Total trips**: the number of vehicle trips overall.
- **Total vehicle kilometres travelled (VKT)**: the total number of kilometres travelled by all vehicles in the network.
- **Vehicle hours travelled due to congestion**: the quantity of additional hours travelled across the road network due to traffic congestion, in hours.
- **Total vehicle hours travelled (VHT)**: the total quantity of travel time across the road network, in hours.
- **Average speed of vehicles**: the total vehicle kilometres travelled divided by the total vehicle hours travelled.
- **Public transport boardings**: counted when a passenger enters a vehicle (one trip may consist of one or more boardings).

The statistics indicate the north-east is generally more congested than metropolitan Melbourne on average. While the north-east accounts for approximately 18 per cent of all vehicle kilometres travelled, it accounts for a higher proportion of congested vehicle hours travelled, at 25 per cent. Average traffic speeds in the north-east are also typically 16 per cent slower than average across metropolitan Melbourne.

Table 6-1 – Network statistics, 2016 model

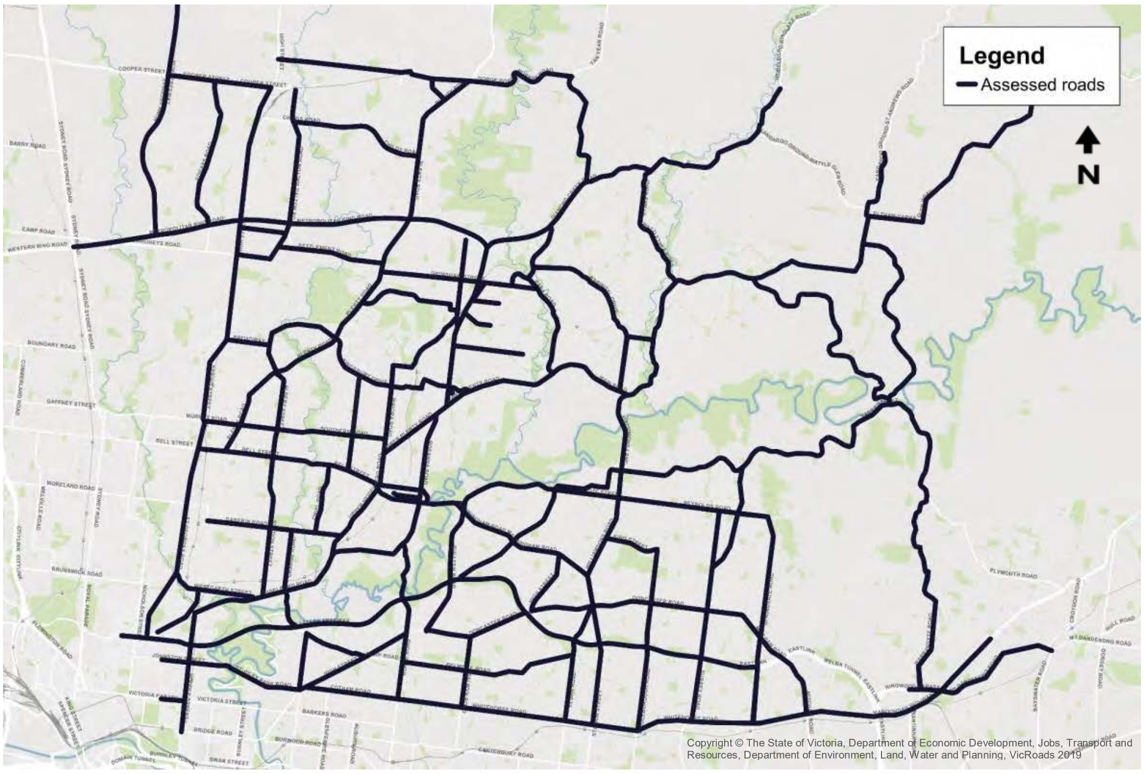
Metric	Time period	Metropolitan Melbourne	North-east	Proportion north-east vs metropolitan Melbourne
Road Vehicle Trips (Car + LCV + HCV)	Daily	12,579,000	2,509,000	20%
	AM peak (2 hour)	1,998,000	393,000	20%
	PM peak (2 hour)	2,000,000	394,000	20%
Total vehicle kilometres travelled (km)	Daily	123,577,000	22,342,000	18%
	AM peak (2 hour)	20,008,000	3,565,000	18%
	PM peak (2 hour)	21,100,000	3,746,000	18%
Vehicle hours travelled due to congestion (hrs)	Daily	515,000	131,000	25%
	AM peak (2 hour)	193,000	48,000	25%
	PM peak (2 hour)	176,000	43,000	24%
Total vehicle hours travelled (hrs)	Daily	2,771,000	586,000	21%
	AM peak (2 hour)	571,000	123,000	22%
	PM peak (2 hour)	571,000	122,000	21%
Average speed (km/hr)	Daily	45	38	84%
	AM peak (2 hour)	35	29	83%
	PM peak (2 hour)	37	31	84%
Public transport trips	Daily	1,476,000	260,000	18%

Source: VLC Zenith Model for the Melbourne GCCSA

6.2.3 Traffic volumes

The study area roads evaluated for their existing year performance are highlighted in navy in Figure 6-22. The assessment covers all freeways within the north-east including the M80 Ring Road, Hume and Eastern Freeways, as well as all Yarra River crossings and key arterial roads.

Figure 6-22 – Locations assessed in the north-east study area



Surveys have been conducted in the study area to assess traffic volumes and road network performance. The results of the survey are presented in Figure 6-23, Figure 6-24 and Figure 6-25 and have been presented as ranges to account for day-to-day and seasonal variations. Note that EastLink has not been included in the traffic volume assessment as this data is commercially sensitive. The EastLink tunnels have been assessed for performance through microsimulation modelling in the 2036 ‘no project’ and 2036 ‘with project’ scenarios, as outlined in Section 8.3 and Section 9.3 respectively.

Local roads (residential access or lower-order collectors) have not been analysed as part of this assessment. This is discussed in further detail in Section 4.7.

Key observations include:

- The busiest section on the Eastern Freeway was between Tram Road and Middleborough Road, carrying up to almost 180,000 vehicles per day. The western end of the freeway at Hoddle Street recorded the lowest volumes, ranging approximately 120,000 to 140,000 vehicles per day. This reflects the capacity constraints of the freeway terminus, which flows directly into an arterial road network. The Eastern Freeway is the busiest thoroughfare in the study area and is heavily relied upon for road trips in the north-east.

- The M80 Ring Road to the north carries approximately 140,000 to 160,000 vehicles per day west of the Hume Freeway. Traffic volumes generally decrease as the freeway approaches its terminus at the Greensborough Bypass, with approximately 80,000 to 90,000 vehicles per day recorded east of Plenty Road.
- Greensborough Bypass carries up to 80,000 vehicles per day just south of the M80 Ring Road and is a major arterial servicing north-south traffic within the study area. Traffic volumes further south near the Simpson Barracks were recorded as closer to 68,000 vehicles, indicating that many local trips are being undertaken along this corridor.
- Rosanna Road carries up to 50,000 vehicles per day and is a continuation of the north-south corridor from Greensborough Road, allowing access to the Heidelberg town centre as well as the Eastern Freeway via Manningham Road and Bulleen Road.
- Manningham Road carries between 64,000 and 83,000 vehicles per day across the Yarra River. It is a major arterial providing both east-west connectivity via Bell Street, and north-south connectivity via Rosanna Road and Bulleen Road.
- Bulleen Road also carries up to 50,000 vehicles per day, facilitating traffic movements between the Eastern Freeway interchange and Manningham Road. It continues the north-south corridor from the M80 Ring Road via Greensborough Road and Rosanna Road.
- Plenty Road is another major north-south corridor through the study area. The road carries up to 64,000 vehicles per day north of the M80 Ring Road, which reduces to 23,000 per day further south at Murray Road. The route provides direct connectivity to La Trobe University and the proposed NEIC precinct.
- Chandler Highway carries between 38,000 and 50,000 vehicles per day across the Yarra River. The route connects Grange Road from the north (19,000 to 26,000 vehicles per day) to Princess Street (28,000 to 35,000) and Earl Street (13,000 to 16,000) in the east.
- The Burke Road bridge is the next river crossing to the east of Chandler Highway, carrying between 35,000 and 45,000 vehicles per day. South of the Yarra River, traffic demand disperses onto the arterial road network and traffic volumes on Burke Road reduce to between 26,000 and 33,000 per day.
- Further east, Fitzsimons Lane carries up to 68,000 vehicles per day across the Yarra River. It provides connectivity between arterial roads in the east such as Williamsons Road (23,000 to 30,000), Reynolds Road (26,000 to 34,000) and Main Road to the north (up to 32,000).
- The final river crossing in the study area is the Warrandyte Bridge, which carries up to 21,000 vehicles per day. The bridge is located almost eight kilometres away from the nearest crossing at Fitzsimons Lane, meaning that residents are heavily dependent on the route for north-south accessibility.

Traffic volumes for the AM and PM peaks are provided in Appendix D – Forecast traffic volumes.

Figure 6-23 – Total average weekday traffic volumes (AWDT), 2017 – study area north

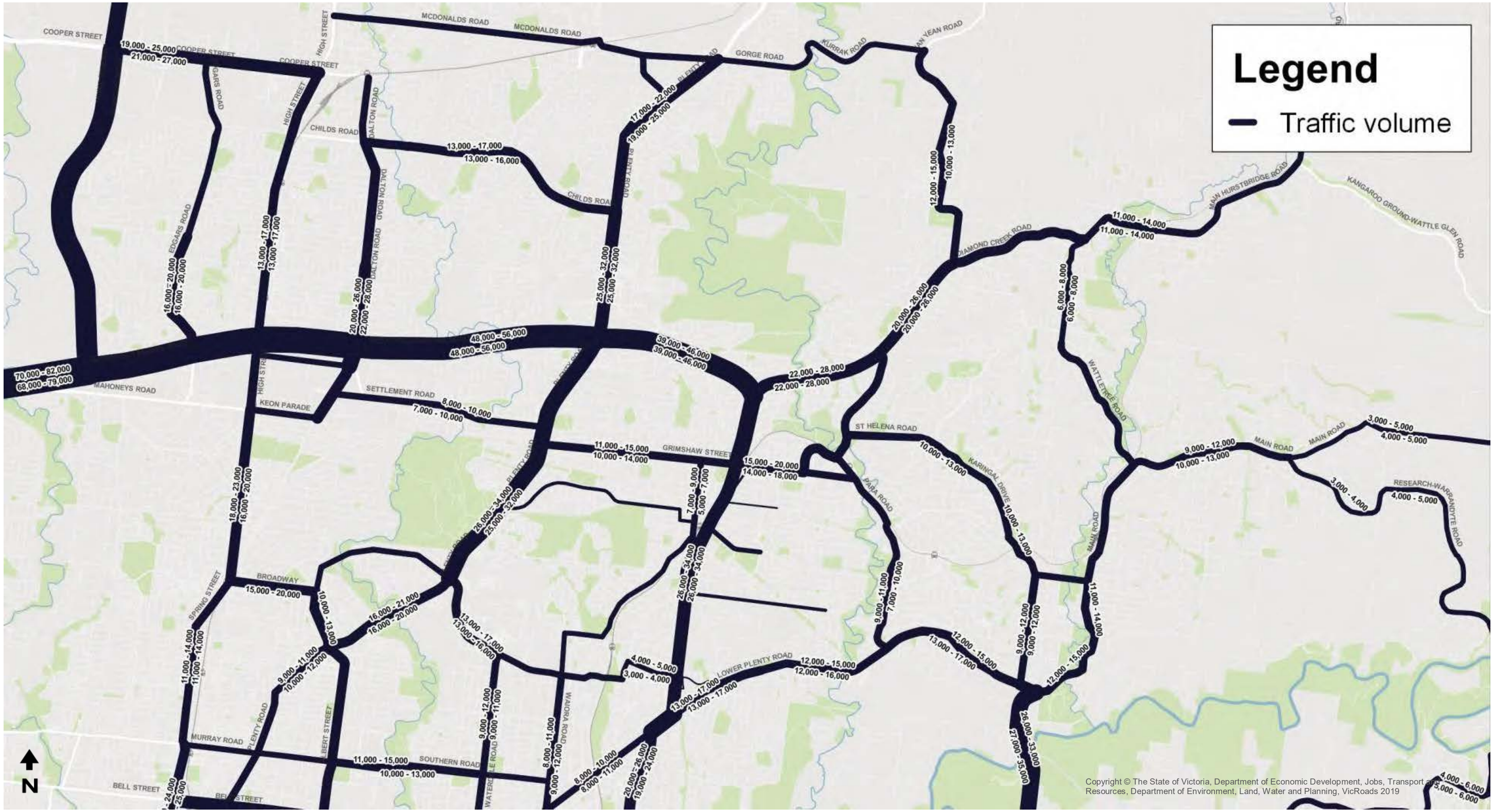


Figure 6-24 – Total average weekday traffic volumes (AWDT), 2017 – study area south

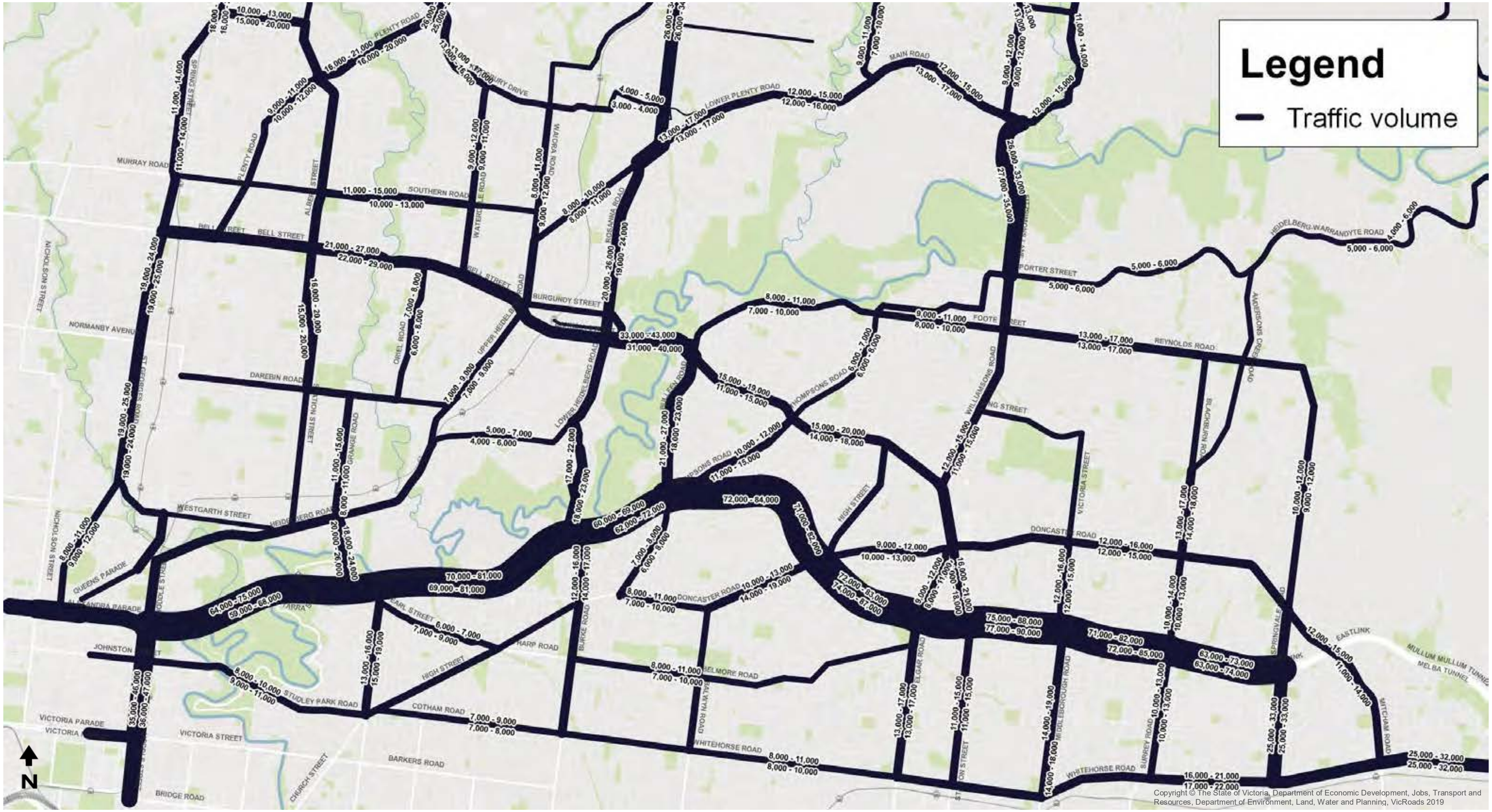


Figure 6-25 – Total average weekday traffic volumes (AWDT), 2017 – study area east

Table 6-2 – Total traffic volumes (AWDT), 2017

Name	Location	Direction	2017 daily volume – one way (24 hour)
Banksia St/Manningham Rd	At Yarra River	Eastbound	33,000–43,000
Banksia St/Manningham Rd	At Yarra River	Westbound	31,000–40,000
Bell St	Station St to Oriel Rd	Eastbound	21,000–27,000
Bell St	Station St to Oriel Rd	Westbound	22,000–29,000
Belmore Rd	Burke Rd to Balwyn Rd	Eastbound	8,000–11,000
Belmore Rd	Burke Rd to Balwyn Rd	Westbound	7,000–10,000
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Northbound	13,000–17,000
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Southbound	14,000–18,000
Blackburn Rd	Eastern Fwy to Doncaster Rd	Northbound	10,000–14,000
Blackburn Rd	Eastern Fwy to Doncaster Rd	Southbound	10,000–13,000
Bolton St	Bridge St to Main Rd	Northbound	9,000–12,000
Bolton St	Bridge St to Main Rd	Southbound	9,000–12,000
Broadway	High St to Boldrewood Pde	Eastbound	10,000–13,000
Broadway	High St to Boldrewood Pde	Westbound	15,000–20,000
Bulleen Rd	Doncaster Rd to Eastern Fwy	Northbound	7,000–8,000
Bulleen Rd	Doncaster Rd to Eastern Fwy	Southbound	6,000–8,000
Bulleen Rd	Eastern Fwy to Manningham Rd	Northbound	21,000–27,000
Bulleen Rd	Eastern Fwy to Manningham Rd	Southbound	18,000–23,000
Burke Rd	Doncaster Rd to Eastern Fwy	Northbound	12,000–16,000
Burke Rd	Doncaster Rd to Eastern Fwy	Southbound	14,000–17,000
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Northbound	17,000–22,000
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Southbound	18,000–23,000
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Northbound	20,000–26,000
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Southbound	18,000–24,000
Childs Rd	Dalton Rd to Plenty Rd	Eastbound	13,000–17,000
Childs Rd	Dalton Rd to Plenty Rd	Westbound	13,000–16,000
Cooper St	Hume Fwy to Edgars Rd	Eastbound	19,000–25,000
Cooper St	Hume Fwy to Edgars Rd	Westbound	21,000–27,000
Cotham Rd	Glenferrie Rd to Burke Rd	Eastbound	7,000–9,000
Cotham Rd	Glenferrie Rd to Burke Rd	Westbound	7,000–8,000
Dalton Rd	North of M80 Ring Road	Northbound	20,000–26,000
Dalton Rd	North of M80 Ring Road	Southbound	22,000–28,000
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Eastbound	20,000–26,000
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Westbound	20,000–26,000
Doncaster Rd	Balwyn Rd to Bulleen Rd	Eastbound	8,000–11,000
Doncaster Rd	Balwyn Rd to Bulleen Rd	Westbound	7,000–10,000
Doncaster Rd	Balwyn Rd to Eastern Fwy	Eastbound	10,000–13,000
Doncaster Rd	Balwyn Rd to Eastern Fwy	Westbound	14,000–19,000
Doncaster Rd	Blackburn Rd to Wetherby Rd	Eastbound	12,000–16,000

Name	Location	Direction	2017 daily volume – one way (24 hour)
Doncaster Rd	Blackburn Rd to Wetherby Rd	Westbound	12,000–15,000
Doncaster Rd	East of Eastern Fwy	Eastbound	9,000–12,000
Doncaster Rd	East of Eastern Fwy	Westbound	10,000–13,000
Earl St	Princess St to Willsmere Rd	Northbound	6,000–7,000
Earl St	Princess St to Willsmere Rd	Southbound	7,000–9,000
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Eastbound	71,000–82,000
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Westbound	72,000–85,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Eastbound	60,000–69,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Westbound	62,000–72,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Eastbound	70,000–81,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Westbound	69,000–81,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Eastbound	64,000–75,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Westbound	59,000–68,000
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Eastbound	71,000–82,000
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Westbound	72,000–84,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Eastbound	72,000–83,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Westbound	74,000–87,000
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Eastbound	75,000–88,000
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Westbound	77,000–90,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Eastbound	63,000–73,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Westbound	63,000–74,000
Edgars Rd	North of M80 Ring Road	Northbound	16,000–20,000
Edgars Rd	North of M80 Ring Road	Southbound	16,000–20,000
Elgar Rd	Belmore Rd to Whitehorse Rd	Northbound	13,000–17,000
Elgar Rd	Belmore Rd to Whitehorse Rd	Southbound	13,000–17,000
Elgar Rd	North of Eastern Fwy	Northbound	9,000–12,000
Elgar Rd	North of Eastern Fwy	Southbound	8,000–11,000
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Eastbound	2,000–3,000
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Westbound	2,000–3,000
Erskine Rd	Ferguson St to Argyle St	Eastbound	4,000–5,000
Erskine Rd	Ferguson St to Argyle St	Westbound	3,000–4,000
Fitzsimons Ln	At Yarra River	Northbound	27,000–35,000
Fitzsimons Ln	At Yarra River	Southbound	26,000–33,000
Foote St	West of Fitzsimons Ln	Eastbound	9,000–11,000
Foote St	West of Fitzsimons Ln	Westbound	8,000–10,000
Grange Rd	Darebin Rd to Heidelberg Rd	Northbound	11,000–15,000
Grange Rd	Darebin Rd to Heidelberg Rd	Southbound	8,000–11,000
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Eastbound	22,000–28,000
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Westbound	22,000–28,000

Name	Location	Direction	2017 daily volume – one way (24 hour)
Greensborough Rd	South of Watsonia Rd	Northbound	26,000–34,000
Greensborough Rd	South of Watsonia Rd	Southbound	26,000–34,000
Grimshaw St	Greensborough Hwy to The Circuit	Eastbound	15,000–20,000
Grimshaw St	Greensborough Hwy to The Circuit	Westbound	14,000–18,000
Grimshaw St	Plenty Rd to Watsonia Rd	Eastbound	11,000–15,000
Grimshaw St	Plenty Rd to Watsonia Rd	Westbound	10,000–14,000
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Northbound	4,000–6,000
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Southbound	5,000–6,000
High St	Keon Pde to Broadway	Northbound	18,000–23,000
High St	Keon Pde to Broadway	Southbound	16,000–20,000
High St	North of Settlement Rd	Northbound	13,000–17,000
High St	North of Settlement Rd	Southbound	13,000–17,000
Hoddle St	Johnston St to Victoria St	Northbound	35,000–46,000
Hoddle St	Johnston St to Victoria St	Southbound	36,000–47,000
Hume Fwy	M80 Ring Road to Cooper St	Northbound	41,000–48,000
Hume Fwy	M80 Ring Road to Cooper St	Southbound	41,000–48,000
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Northbound	1,500–2,500
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Southbound	1,500–2,500
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Northbound	8,000–11,000
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Southbound	8,000–10,000
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Northbound	3,000–4,000
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Southbound	3,000–4,000
Karingal Drive	East of St Helena Rd	Northbound	10,000–13,000
Karingal Drive	East of St Helena Rd	Southbound	10,000–13,000
Kingsbury Drive	West of Waterdale Rd	Eastbound	13,000–17,000
Kingsbury Drive	West of Waterdale Rd	Westbound	13,000–16,000
Lower Heidelberg Rd	Near Ivanhoe Park	Eastbound	5,000–7,000
Lower Heidelberg Rd	Near Ivanhoe Park	Westbound	4,000–6,000
Lower Plenty Rd	Greensborough Rd to Para Rd	Eastbound	13,000–17,000
Lower Plenty Rd	Greensborough Rd to Para Rd	Westbound	13,000–17,000
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Eastbound	8,000–10,000
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Westbound	8,000–11,000
M80 Ring Road	Dalton Rd to Plenty Rd	Eastbound	48,000–56,000
M80 Ring Road	Dalton Rd to Plenty Rd	Westbound	48,000–56,000
M80 Ring Road	Hume Fwy to Sydney Rd	Eastbound	70,000–82,000
M80 Ring Road	Hume Fwy to Sydney Rd	Westbound	68,000–79,000
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Eastbound	39,000–46,000
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Westbound	39,000–46,000
Main Hurstbridge Rd	At Diamond Creek	Eastbound	11,000–14,000

Name	Location	Direction	2017 daily volume – one way (24 hour)
Main Hurstbridge Rd	At Diamond Creek	Westbound	11,000–14,000
Main Rd	At Diamond Creek	Northbound	12,000–15,000
Main Rd	At Diamond Creek	Southbound	11,000–14,000
Main Rd	At Plenty River	Eastbound	12,000–15,000
Main Rd	At Plenty River	Westbound	12,000–16,000
Main Rd	Para Rd to Bolton St	Eastbound	12,000–15,000
Main Rd	Para Rd to Bolton St	Westbound	13,000–17,000
Main Rd	East of Ingrams Rd	Eastbound	3,000–5,000
Main Rd	East of Ingrams Rd	Westbound	4,000–5,000
Main Rd	East of Wattletree Rd	Eastbound	9,000–12,000
Main Rd	East of Wattletree Rd	Westbound	10,000–13,000
Manningham Rd	Bulleen Rd to Thompsons Rd	Eastbound	15,000–19,000
Manningham Rd	Bulleen Rd to Thompsons Rd	Westbound	11,000–15,000
Manningham Rd	Thompsons Rd to High St	Eastbound	15,000–20,000
Manningham Rd	Thompsons Rd to High St	Westbound	14,000–18,000
Maroondah Hwy	Mitcham Rd to Eastlink	Eastbound	25,000–32,000
Maroondah Hwy	Mitcham Rd to Eastlink	Westbound	25,000–32,000
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Northbound	25,000–32,000
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Southbound	26,000–33,000
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Northbound	14,000–19,000
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Southbound	14,000–18,000
Middleborough Rd	North of Eastern Fwy	Northbound	12,000–16,000
Middleborough Rd	North of Eastern Fwy	Southbound	12,000–15,000
Mitcham Rd	At Eastern Fwy	Northbound	11,000–14,000
Mitcham Rd	At Eastern Fwy	Southbound	12,000–15,000
Murray Rd	At Darebin Creek	Eastbound	11,000–15,000
Murray Rd	At Darebin Creek	Westbound	10,000–13,000
Oriel Rd	Bell St to Livingston St	Northbound	7,000–8,000
Oriel Rd	Bell St to Livingston St	Southbound	6,000–8,000
Para Rd	Rattray Rd to Main Rd	Northbound	9,000–11,000
Para Rd	Rattray Rd to Main Rd	Southbound	7,000–10,000
Plenty Rd	At Darebin Creek	Eastbound	16,000–21,000
Plenty Rd	At Darebin Creek	Westbound	16,000–20,000
Plenty Rd	Albert St to Murray Rd	Northbound	9,000–11,000
Plenty Rd	Albert St to Murray Rd	Southbound	10,000–12,000
Plenty Rd	Main Dr to Greenwood Dr	Northbound	26,000–34,000
Plenty Rd	Main Dr to Greenwood Dr	Southbound	25,000–32,000
Plenty Rd	McDonalds Rd to Bush Blvd	Northbound	17,000–22,000
Plenty Rd	McDonalds Rd to Bush Blvd	Southbound	19,000–25,000
Plenty Rd	North of Mckimmies Rd	Northbound	25,000–32,000

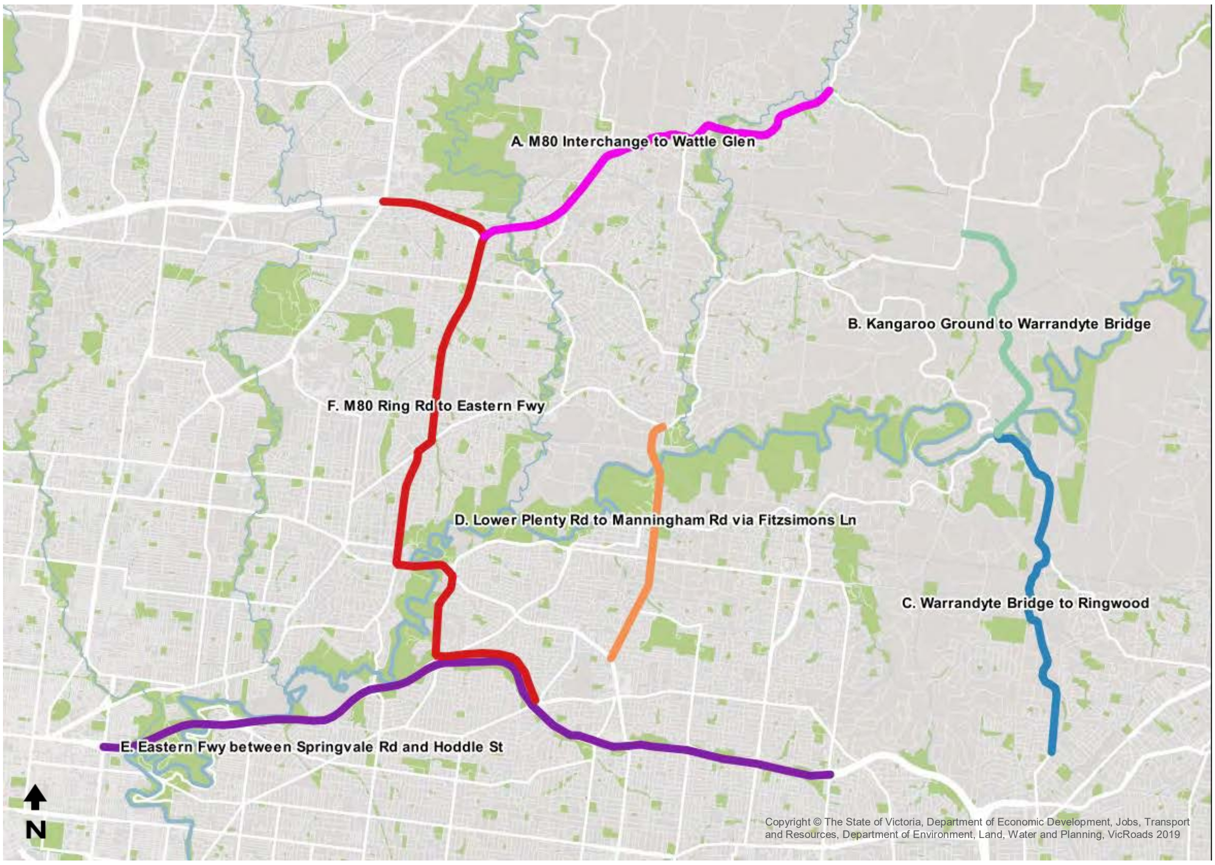
Name	Location	Direction	2017 daily volume – one way (24 hour)
Plenty Rd	North of Mckimmies Rd	Southbound	25,000–32,000
Princess St	Duke St to Wills St	Northbound	13,000–16,000
Princess St	Duke St to Wills St	Southbound	15,000–19,000
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Northbound	4,000–5,000
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Southbound	3,000–4,000
Reynolds Rd	Blackburn Rd to Williamsons Rd	Eastbound	13,000–17,000
Reynolds Rd	Blackburn Rd to Williamsons Rd	Westbound	13,000–17,000
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Northbound	6,000–8,000
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Southbound	6,000–8,000
Rosanna Rd	Brown St to Reid St	Northbound	20,000–26,000
Rosanna Rd	Brown St to Reid St	Southbound	19,000–24,000
Ryans Rd	Diamond Creek Rd to Allendale Rd	Northbound	6,000–8,000
Ryans Rd	Diamond Creek Rd to Allendale Rd	Southbound	6,000–8,000
Settlement Rd	At Darebin Creek	Eastbound	8,000–10,000
Settlement Rd	At Darebin Creek	Westbound	7,000–10,000
Spring St	Broadway to Murray Rd	Northbound	11,000–14,000
Spring St	Broadway to Murray Rd	Southbound	11,000–14,000
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Northbound	10,000–12,000
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Southbound	9,000–12,000
Springvale Rd	Whitehorse Rd to Eastern Fwy	Northbound	25,000–33,000
Springvale Rd	Whitehorse Rd to Eastern Fwy	Southbound	25,000–33,000
St Georges Rd	Bell St to Normanby Ave	Northbound	19,000–24,000
St Georges Rd	Bell St to Normanby Ave	Southbound	19,000–25,000
St Georges Rd	Holden St to Alexandra Pde	Northbound	8,000–11,000
St Georges Rd	Holden St to Alexandra Pde	Southbound	9,000–12,000
St Georges Rd	Normanby Ave to Merri Pde	Northbound	19,000–25,000
St Georges Rd	Normanby Ave to Merri Pde	Southbound	19,000–24,000
Station St	Bell St to Darebin Rd	Northbound	15,000–20,000
Station St	Bell St to Darebin Rd	Southbound	16,000–20,000
Station St	Whitehorse Rd to Eastern Fwy	Northbound	11,000–15,000
Station St	Whitehorse Rd to Eastern Fwy	Southbound	11,000–15,000
Studley Park Rd	At Yarra River	Eastbound	8,000–10,000
Studley Park Rd	At Yarra River	Westbound	9,000–11,000
Surrey Rd	Whitehorse Rd to Eastern Fwy	Northbound	10,000–13,000
Surrey Rd	Whitehorse Rd to Eastern Fwy	Southbound	10,000–13,000
Templestowe Rd	Near Birrarrung Park	Eastbound	8,000–11,000
Templestowe Rd	Near Birrarrung Park	Westbound	7,000–10,000
Thompsons Rd	Manningham Rd to Foote St	Northbound	6,000–7,000
Thompsons Rd	Manningham Rd to Foote St	Southbound	6,000–8,000
Thompsons Rd	North-east of Eastern Fwy	Eastbound	10,000–12,000

Name	Location	Direction	2017 daily volume – one way (24 hour)
Thompsons Rd	North-east of Eastern Fwy	Westbound	11,000–15,000
Tram Rd	North of Eastern Fwy	Northbound	14,000–18,000
Tram Rd	North of Eastern Fwy	Southbound	16,000–21,000
Upper Heidelberg Rd	Banksia St to Studley Rd	Northbound	7,000–9,000
Upper Heidelberg Rd	Banksia St to Studley Rd	Southbound	7,000–9,000
Waiora Rd	Southern Rd to Dougharty Rd	Northbound	8,000–11,000
Waiora Rd	Southern Rd to Dougharty Rd	Southbound	9,000–12,000
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Eastbound	5,000–6,000
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Westbound	5,000–6,000
Waterdale Rd	Southern Rd to Dougharty Rd	Northbound	9,000–12,000
Waterdale Rd	Southern Rd to Dougharty Rd	Southbound	9,000–11,000
Watsonia Rd	Princes St to Bungay St	Northbound	7,000–9,000
Watsonia Rd	Princes St to Bungay St	Southbound	5,000–7,000
Whitehorse Rd	Surrey Rd to Springvale Rd	Eastbound	16,000–21,000
Whitehorse Rd	Surrey Rd to Springvale Rd	Westbound	17,000–22,000
Whitehorse Rd	Union Rd to Elgar Rd	Eastbound	8,000–11,000
Whitehorse Rd	Union Rd to Elgar Rd	Westbound	8,000–10,000
Williamsons Rd	Manningham Rd to King St	Northbound	12,000–15,000
Williamsons Rd	Manningham Rd to King St	Southbound	11,000–15,000
Yan Yean Rd	North of Diamond Creek Rd	Northbound	12,000–15,000
Yan Yean Rd	North of Diamond Creek Rd	Southbound	10,000–13,000

6.2.4 Travel times and accessibility

As part of this assessment, travel times for six key routes in the north-east have been analysed, which are highlighted in Figure 6-26. This section presents AM and PM peak travel times along each route for both directions.

Figure 6-26 – Study area travel time routes



A summary of the average surveyed travel times is presented in Table 6-3 and Table 6-4, for the westbound/southbound and eastbound/northbound directions respectively. Travel times are typically highest in the 'peak direction' such as the AM peak westbound/southbound or PM peak eastbound/northbound. Travel times in the 'counter-peak direction' (AM peak eastbound/northbound and PM peak westbound/southbound) are typically faster and are more representative of off-peak conditions.

Table 6-3 – Average surveyed travel times, 2017, peak direction

Route	Average surveyed travel time (minutes)			
	Direction	AM peak	Direction	PM peak
A – Wattle Glen to M80 Ring Road Interchange	WB	17	EB	15
B – Kangaroo Ground to Warrandyte Bridge	SB	12	NB	6
C – Warrandyte Bridge to Ringwood	SB	10	NB	14
D – Main Road to Manningham Road	SB	11	NB	20
E – Eastern Freeway, Springvale Road to Hoddle Street	WB	29	EB	23
F – M80 Ring Road to Eastern Freeway	SB	45	NB	43

Table 6-4 – Average surveyed travel times, 2017, counter-peak direction

Route	Average surveyed travel time (minutes)			
	Direction	AM peak	Direction	PM peak
A – Wattle Glen to M80 Ring Road Interchange	EB	12	WB	13
B – Kangaroo Ground to Warrandyte Bridge	NB	6	SB	6
C – Warrandyte Bridge to Ringwood	NB	10	SB	10
D – Main Road to Manningham Road	NB	9	SB	9
E – Eastern Freeway, Springvale Road to Hoddle Street	EB	12	WB	13
F – M80 Ring Road to Eastern Freeway	NB	35	SB	34

Travel time variability for each route is presented in Figure 6-27 to Figure 6-30. Median travel times are depicted at the intersection of the black and blue boxes, while the 25th and 75th percentiles are indicated by the bottom and top of the boxes respectively. The minimum and maximum surveyed travel times are demonstrated by the 'whiskers' of the box plots. A summary of the key findings can be found below:

- The most heavily congested and least reliable route is the M80 Ring Road to Eastern Freeway Route (Route F) via Greensborough Road, Rosanna Road and Bulleen Road. The route is characterised by high travel time variability as indicated by the long bars, particularly southbound in the AM peak. Recorded travel times for this period ranged between approximately 30 minutes and 1 hour, with a median of 44 minutes. PM peak northbound travel times were less variable but recorded a similar median of 42 minutes.
- The Eastern Freeway route (Route E) between Springvale Road and Hoddle Street was the next most variable route, with recorded travel times ranging from 20 to 38 minutes for the AM peak westbound survey. The PM peak eastbound travel times were less variable, ranging from 18 to 24 minutes. Travel time reliability was generally better in the counter-peaks (AM peak eastbound and PM peak westbound), recording lower variability than the peaks.
- Kangaroo Ground-Warrandyte Road (Route B), the average morning peak southbound trip was approximately 12 minutes long. However, the longest trip recorded approximately 21 minutes. The route recorded lower variability for other periods and directions.
- The median morning peak travel time for trips southbound between Lower Plenty Road and Manningham Road via Fitzsimons Lane (Route D) was approximately 11 minutes. The longest trip recorded along this route was approximately 75 per cent longer in duration than the median travel time, at 19 minutes. The PM peak northbound route also recorded large variations in travel times, with the maximum observed almost double the minimum.
- Routes A and C were found to have generally lower travel time variability than other routes.
- The AM peak southbound surveys generally recorded the largest travel time variability.

Figure 6-27 – AM peak travel time variability, southbound/westbound

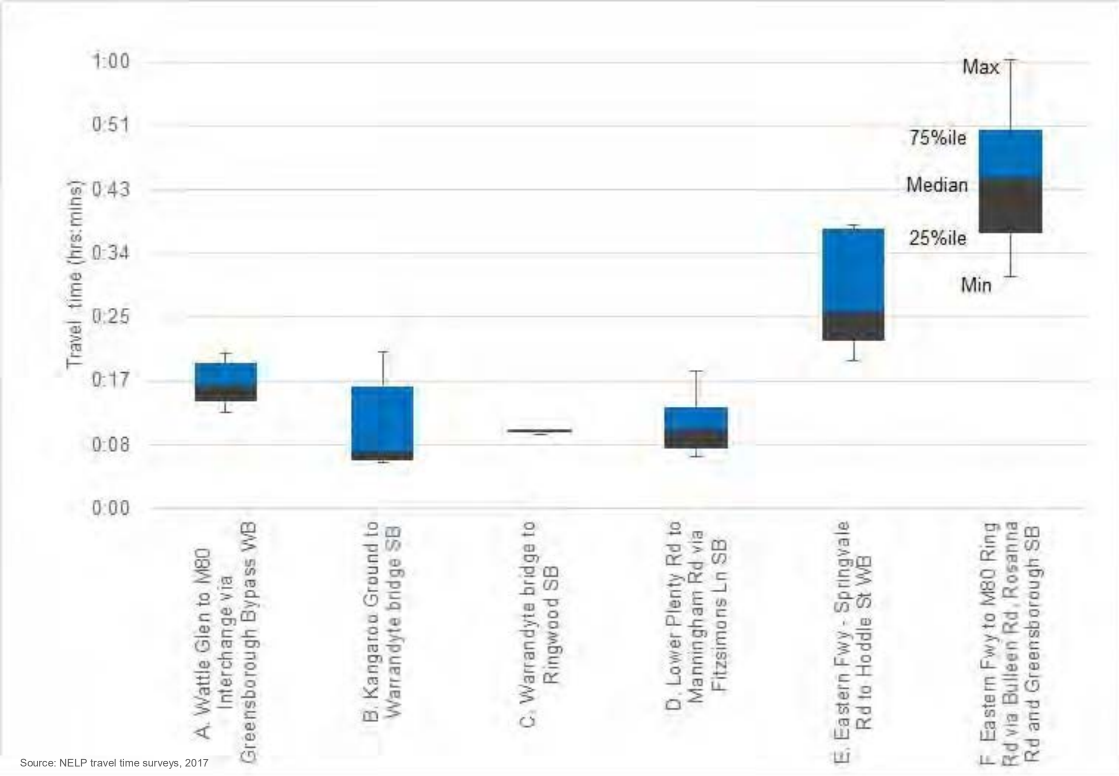


Figure 6-28 – AM peak travel time variability, northbound/eastbound

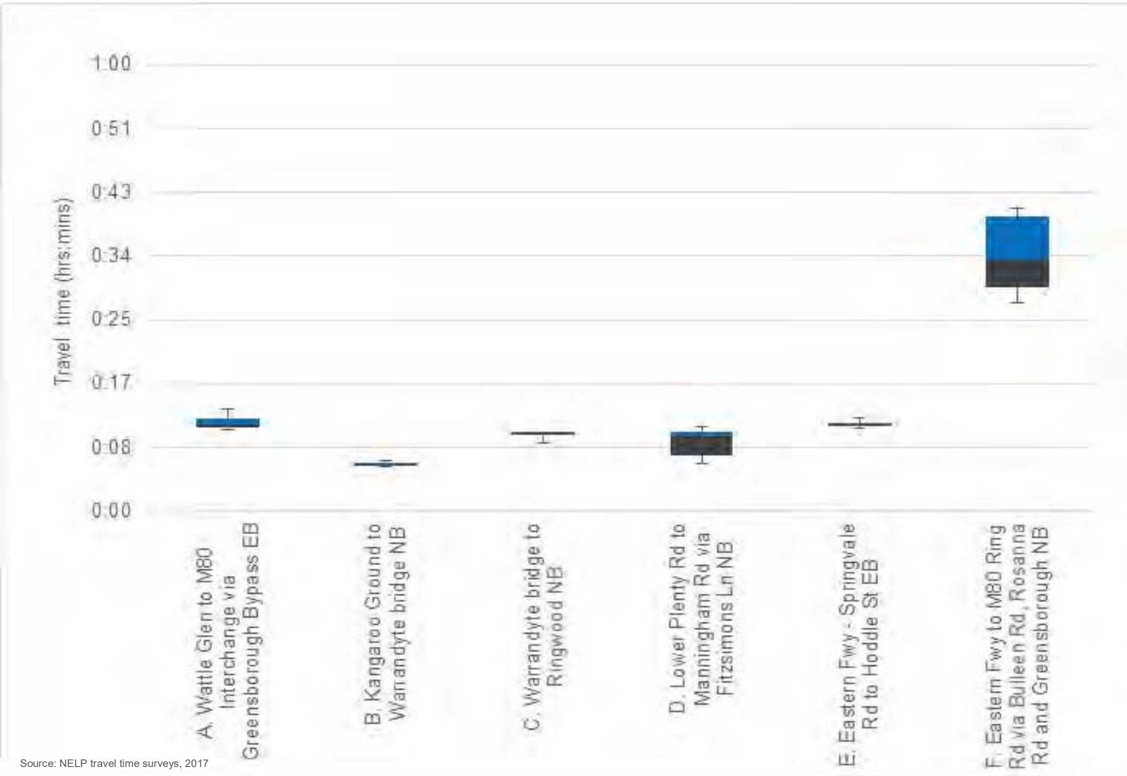
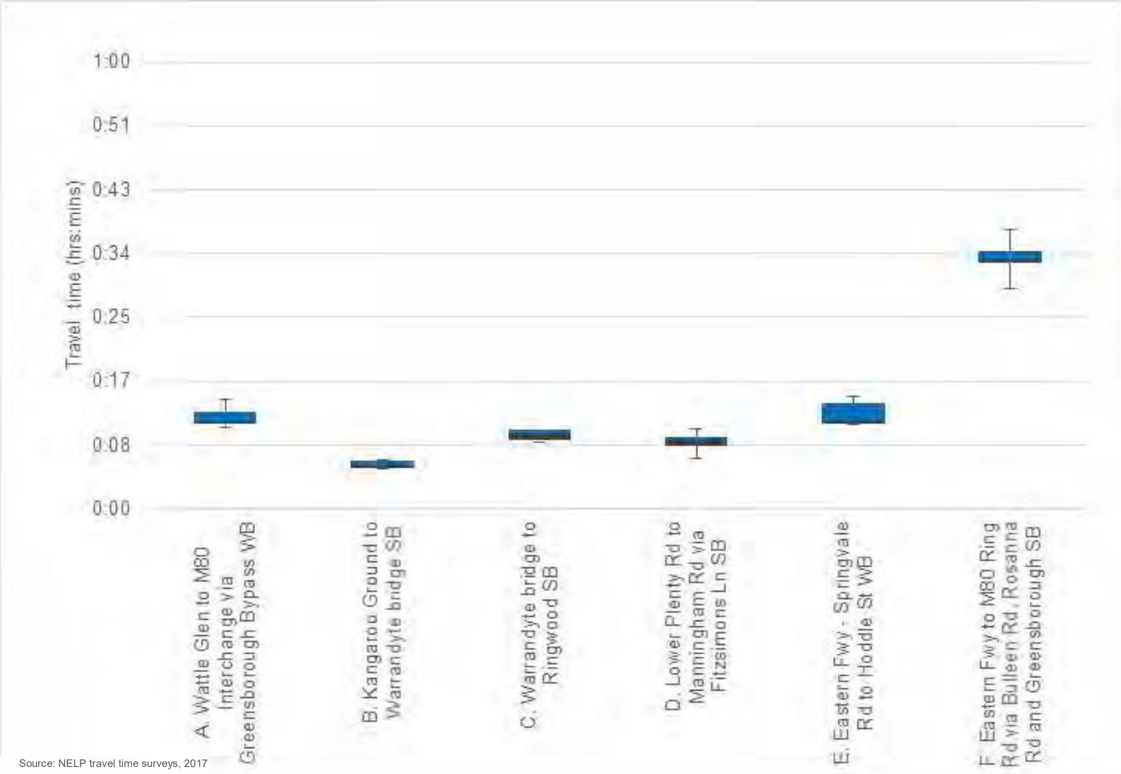
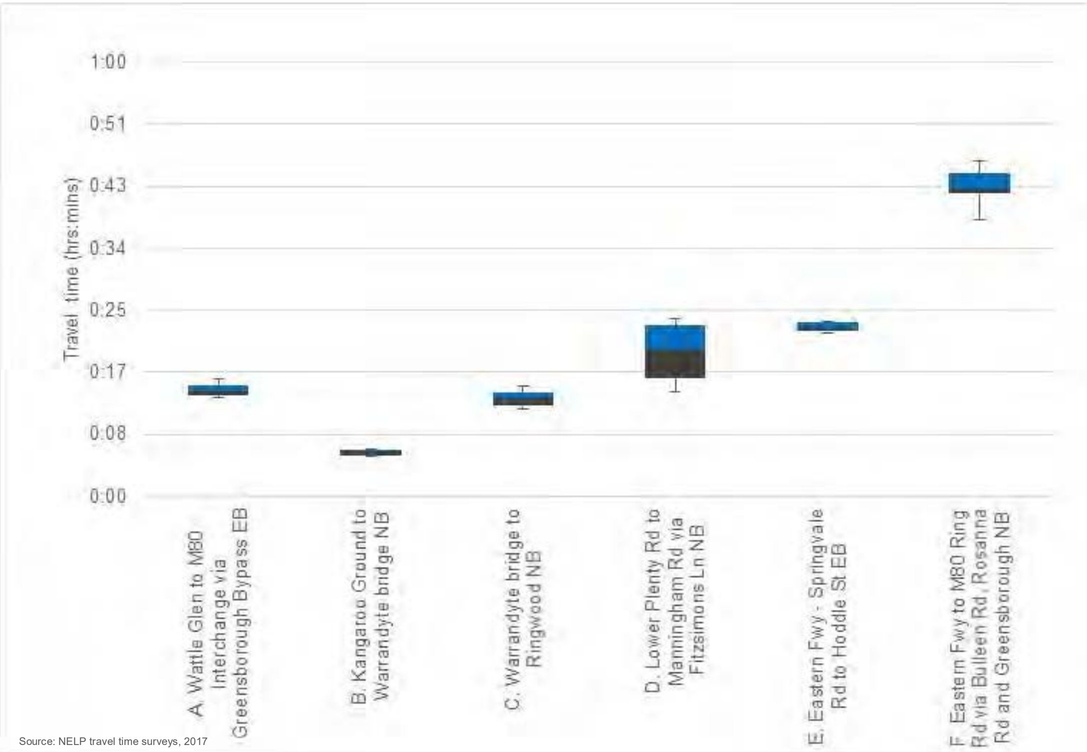


Figure 6-29 – PM peak travel time variability, southbound/westbound



Source: NELP travel time surveys, 2017

Figure 6-30 – PM peak travel time variability, northbound/eastbound



Source: NELP travel time surveys, 2017

Further analysis was conducted on Route F (M80 Ring Road to Eastern Freeway) which is presented in Figure 6-31 to Figure 6-34. Individual travel time 'runs' along this route are presented as the thin orange lines, while the average travel time is highlighted in black.

Key findings from this analysis are:

- Heavy delays are observed in both directions near the intersection of Manningham Road and Rosanna Road. The PM peak northbound direction experienced the largest delay, taking 10 minutes on average to complete the turn onto Rosanna Road from Dora Street.
- Travel times in the AM peak are generally more variable than the PM peak, with a larger spread of results observed.
- The M80 Ring Road and Greensborough Road generally have quicker and more consistent travel times, which is evident from the narrow bandwidths and flat gradients in these sections.
- Travel time variability is generally highest on Bulleen Road near the Eastern Freeway, with the individual travel time runs diverging significantly at this location.

Figure 6-31 – Travel time between M80 Ring Road at Plenty Road to Eastern Freeway at Doncaster Road southbound via Greensborough Road, Rosanna Road and Bulleen Road – AM peak

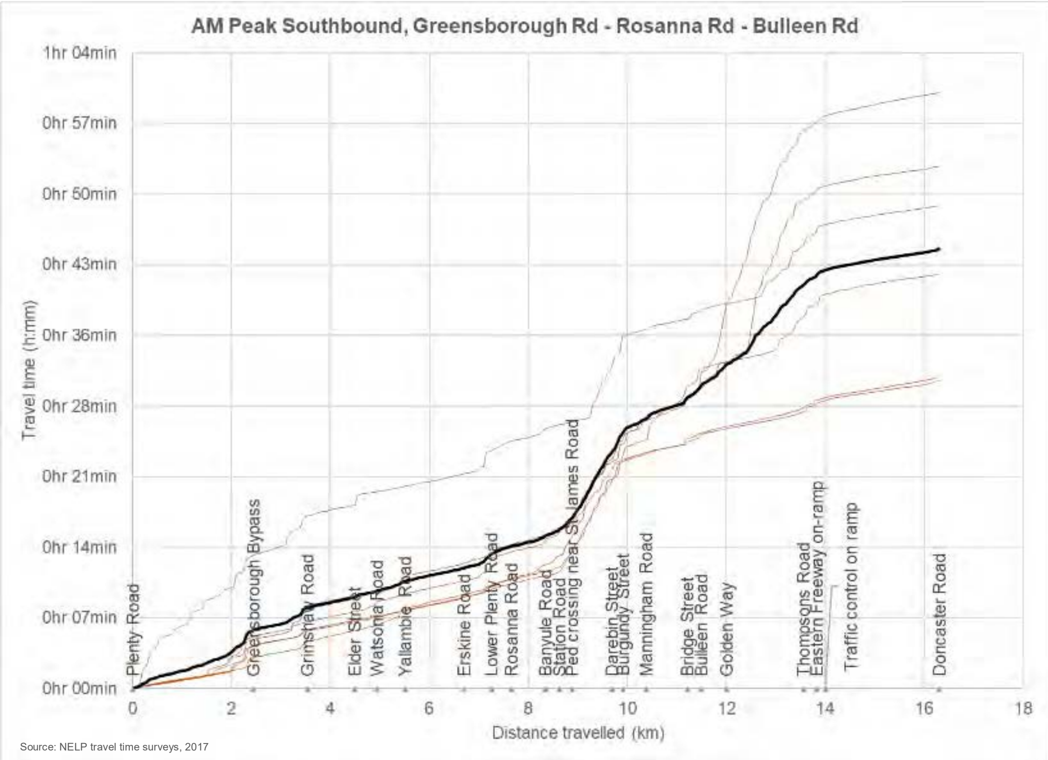


Figure 6-32 – Travel time between M80 Ring Road at Plenty Road to Eastern Freeway at Doncaster Road southbound via Greensborough Road, Rosanna Road and Bulleen Road – PM peak

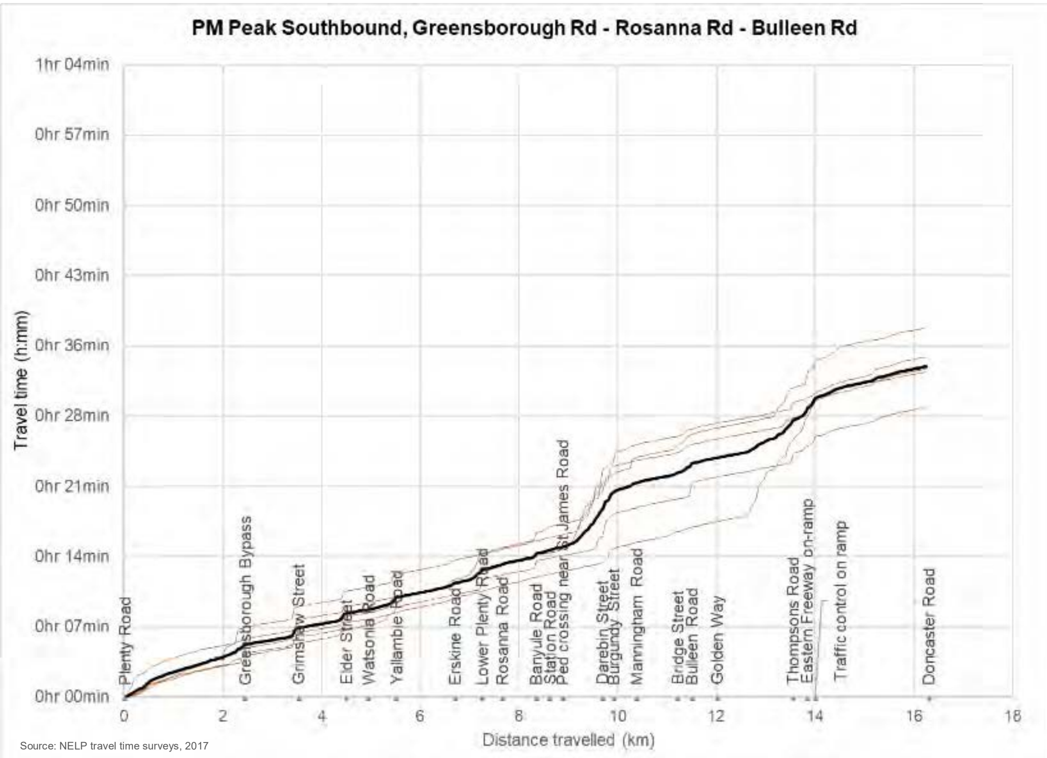


Figure 6-33 – Travel time between Eastern Freeway at Doncaster Road to M80 Ring Road at Plenty Road northbound via Greensborough Road, Rosanna Road and Bulleen Road – AM peak

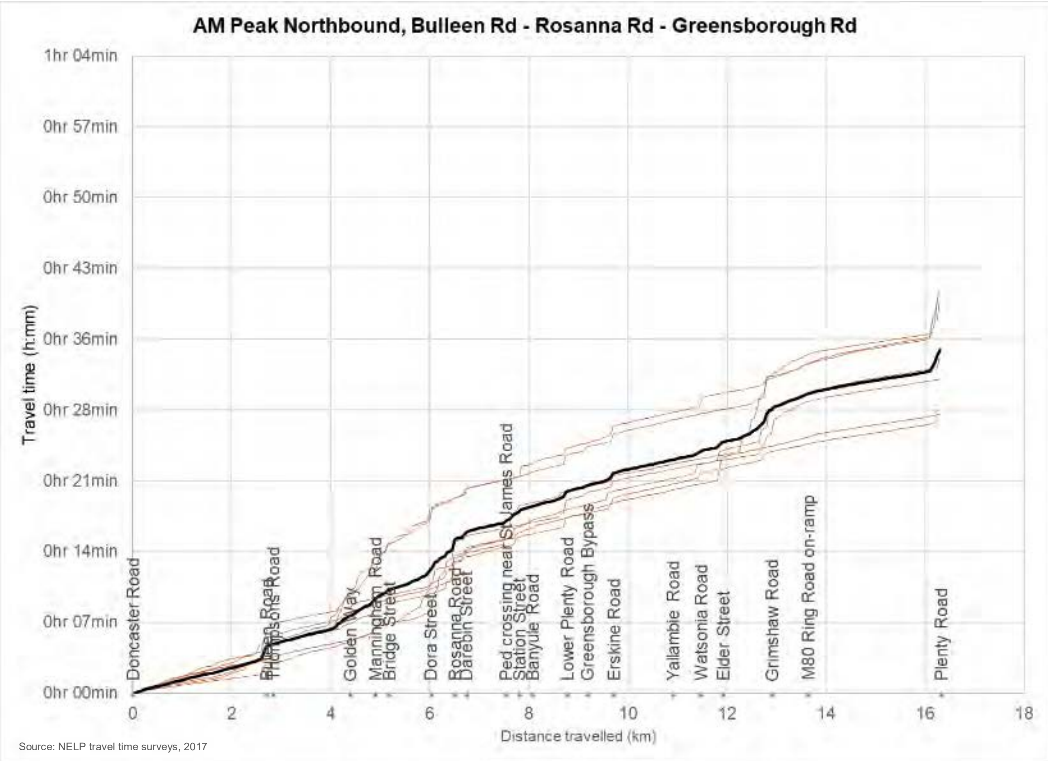
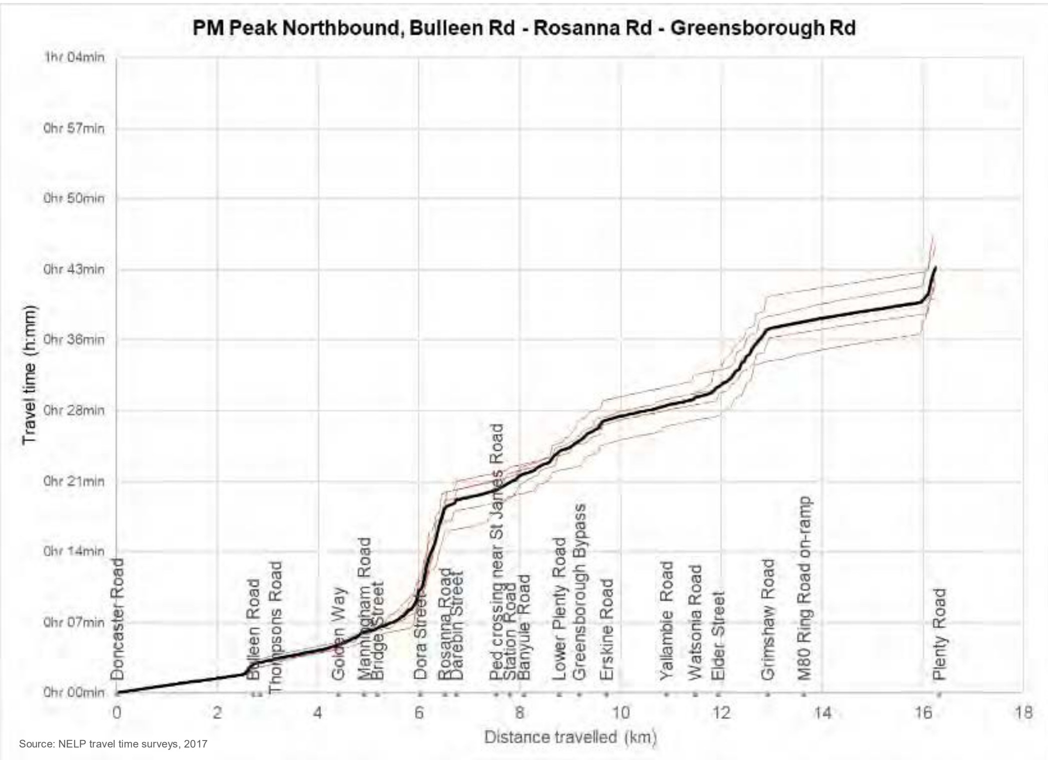


Figure 6-34 – Travel time between Eastern Freeway at Doncaster Road to M80 Ring Road at Plenty Road northbound via Greensborough Road, Rosanna Road and Bulleen Road – PM peak



The Eastern Freeway route from Springvale Road to Hoddle Street (Route E) was also analysed further, with the results presented in Figure 6-35 to Figure 6-38. Key findings include:

- The largest delays were observed in the AM peak westbound surveys, particularly at the approach to Hoddle Street. Observed travel times ranged from 20 minutes to 38 minutes across the morning peak period. The approach to Hoddle Street was also the most unreliable section, recording the largest spread of travel times of any segment.
- Counter peak travel times (ie eastbound in the AM peak and westbound in the PM peak) were generally consistent with only small variations between individual surveys. Travel times in the counter peaks are typically around 11 to 13 minutes.
- The PM peak eastbound survey was generally less congested than the AM peak westbound, recording an average travel time of 23 minutes. Delays were spread across the entirety of the Eastern Freeway east of Chandler Highway.

Figure 6-35 – Travel time between Springvale Road and Hoddle Street westbound via the Eastern Freeway – AM peak

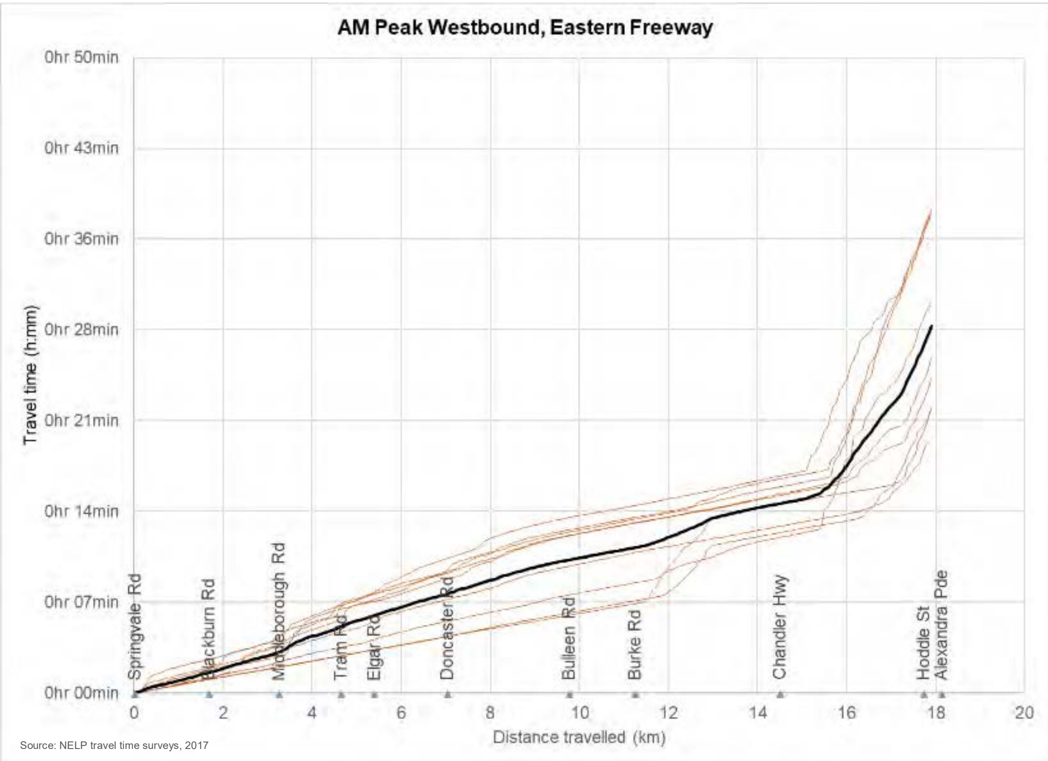


Figure 6-36 – Travel time between Springvale Road and Hoddle Street westbound via the Eastern Freeway – PM peak

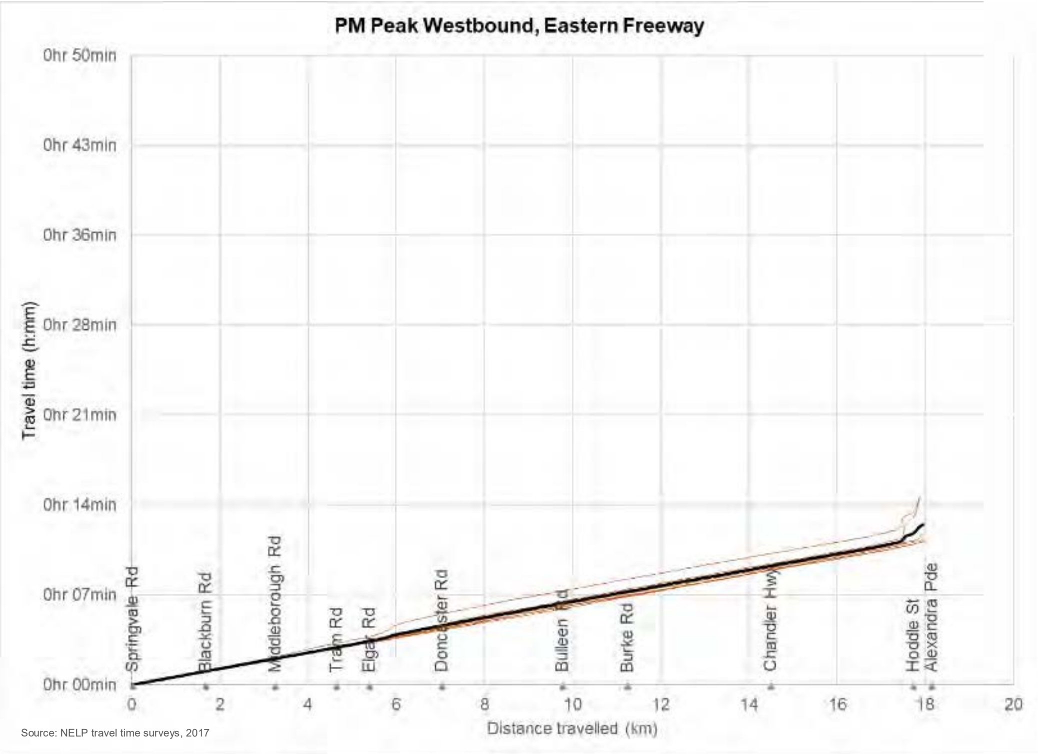


Figure 6-37 – Travel time between Hoddle Street and Springvale Road eastbound via the Eastern Freeway – AM peak

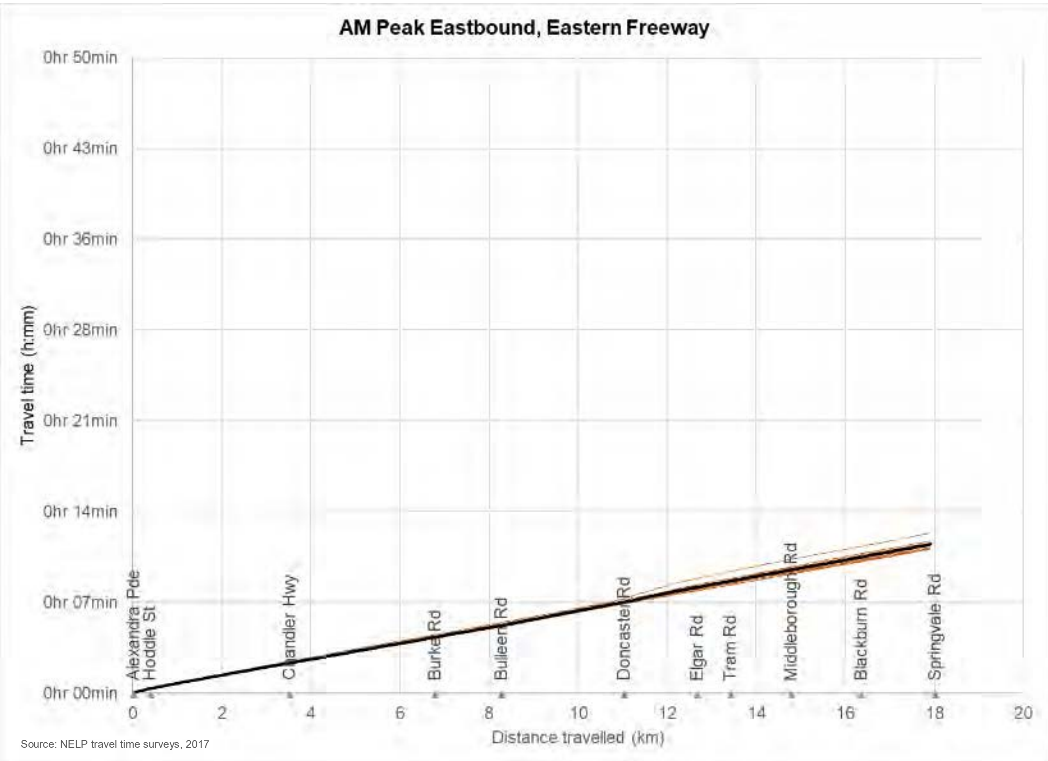
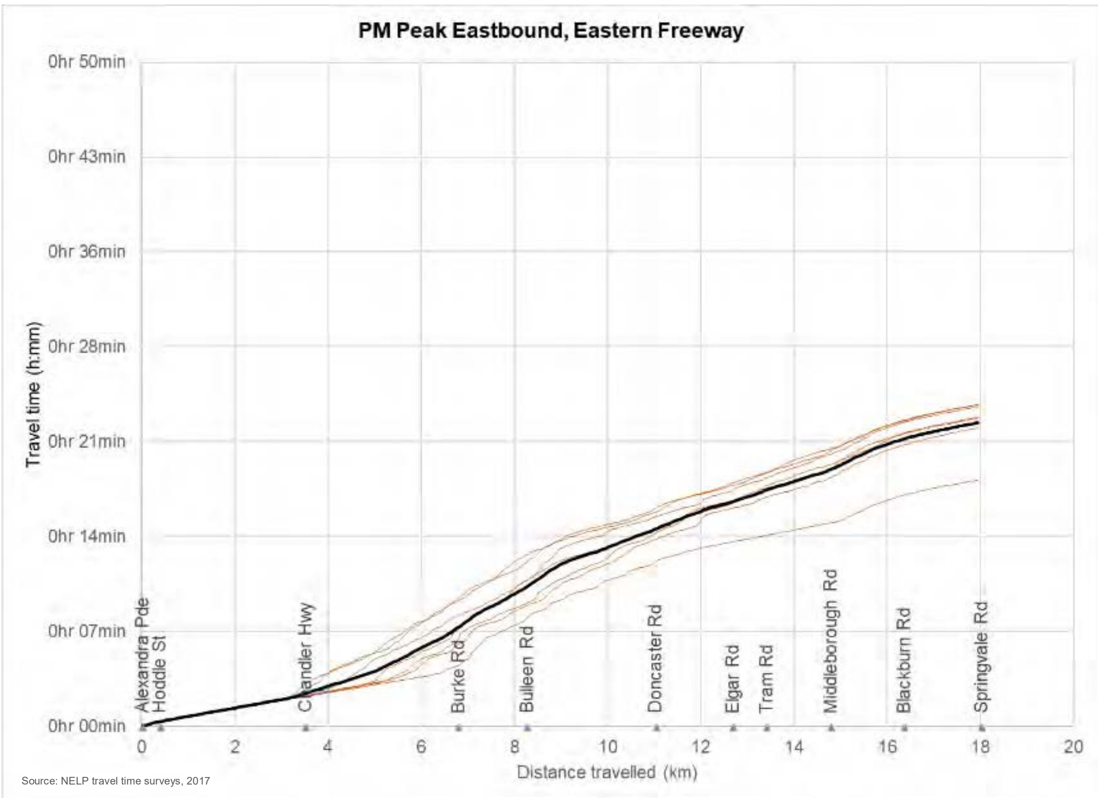


Figure 6-38 – Travel time between Hoddle Street and Springvale Road eastbound via the Eastern Freeway – PM peak



6.3 Transport network issues

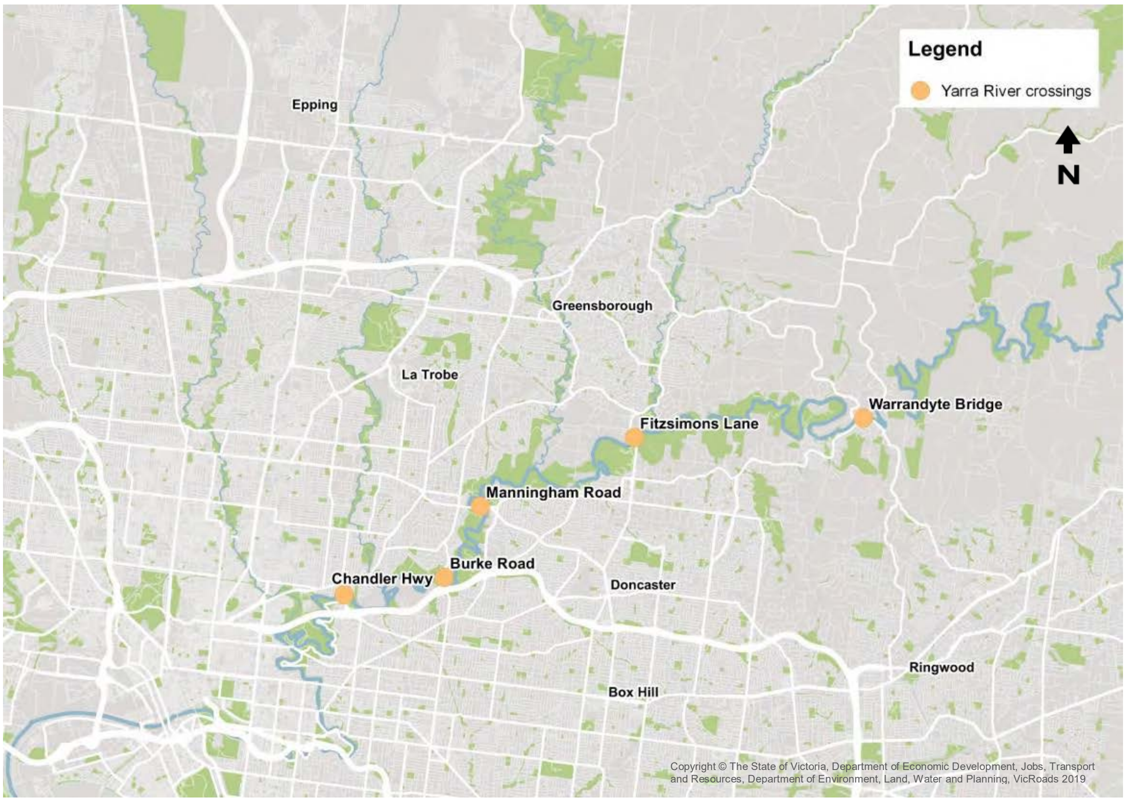
6.3.1 The Yarra River

The Yarra River cuts diagonally through the study area and its presence is a barrier to north-south movements throughout Melbourne's north-east. As there are only five river crossings in the study area, demand for these routes include:

- Local trips, which have both an origin and destination within the study area, typically by residents of the north-east
- Medium-length trips, which have either an origin or destination in the study area (such as travel between Watsonia and Ringwood)
- Longer cross-city or 'through' trips which do not have either an origin or destination in the study area (such as travel between Box Hill and South Morang).

A map of the river crossings is presented in Figure 6-39, with the five crossings at Chandler Highway, Burke Road, Manningham Road, Fitzsimons Lane and Warrandyte Road highlighted in orange.

Figure 6-39 – Yarra River crossing locations



The number of lanes and daily traffic volumes for each crossing is presented in Table 6-5. In total there are 18 traffic lanes crossing the Yarra River, with the busiest at the Manningham Road bridge. It carries up to 83,000 vehicles per day, or approximately 31 per cent of the total traffic crossing the Yarra River. Together with the neighbouring bridge at Fitzsimons Lane, the two arterials carry almost 60 per cent of the total demand across the river.

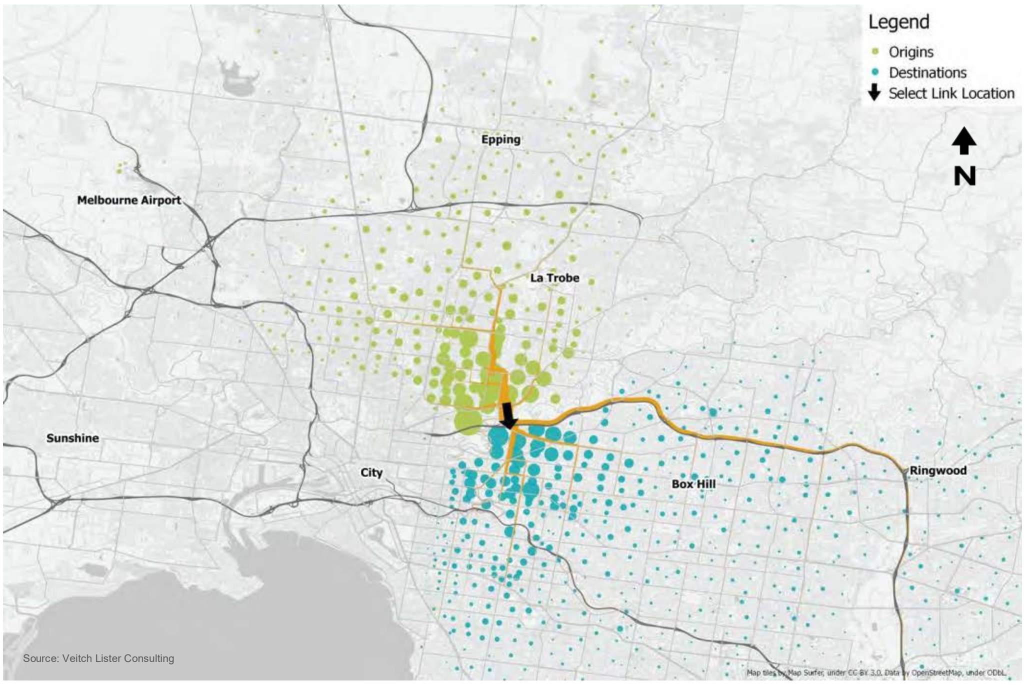
Table 6-5 – Yarra River crossing traffic volumes and number of lanes

Road	Number of lanes	Daily traffic volume and proportion
Chandler Highway	2	38,000–50,000 (19%)
Burke Road	4	35,000–45,000 (17%)
Manningham Road	6	64,000–83,000 (31%)
Fitzsimons Lane	4	53,000–68,000 (26%)
Warrandyte Bridge	2	16,000–21,000 (8%)
Total Yarra River crossing	**18**	**206,000–267,000 (100%)**

Further analysis was undertaken to identify the catchments of each crossing. Traffic origins and destinations for each Yarra River crossing in the southbound direction during the AM peak are presented in Figure 6-40 to Figure 6-44.

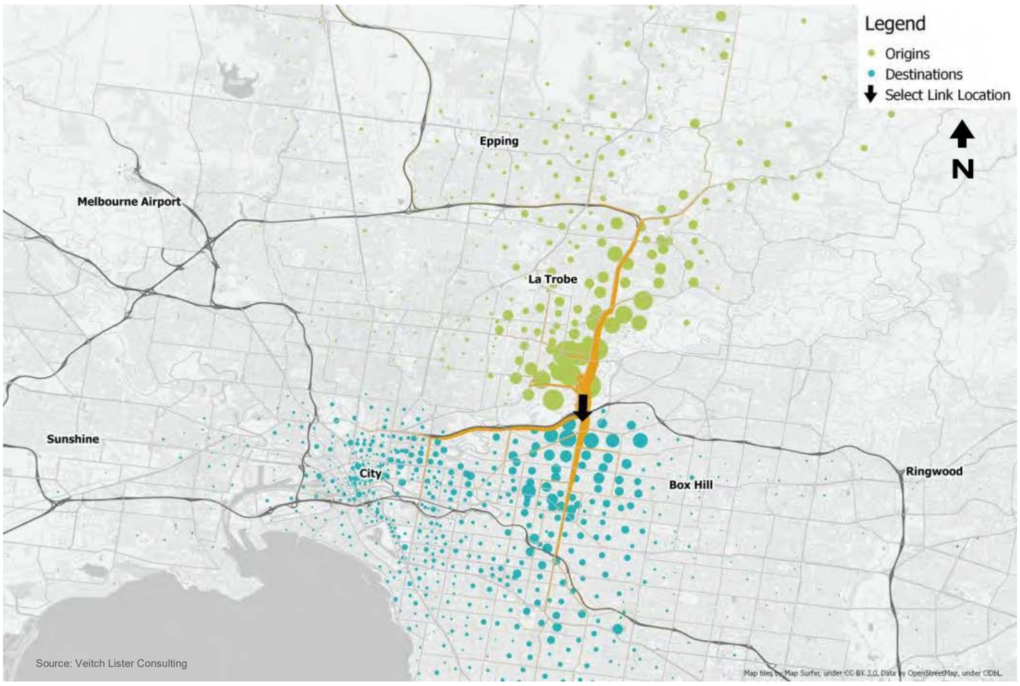
Trip origins and destinations for southbound traffic across Chandler Highway are presented in Figure 6-40. Users of the road generally originate from either side of Grange Road and Station Street, with destinations in Kew, Hawthorn and Balwyn. Traffic from the north-eastern side is fed primarily by Plenty Road, High Street and Bell Street. There is little demand for trips destined for the CBD and inner suburbs due to heavy inbound congestion on the Eastern Freeway approaching Hoddle Street. These trips are likely to alternatively use the arterial road network.

Figure 6-40 – Origin and destinations of southbound traffic using Chandler Highway in the AM peak



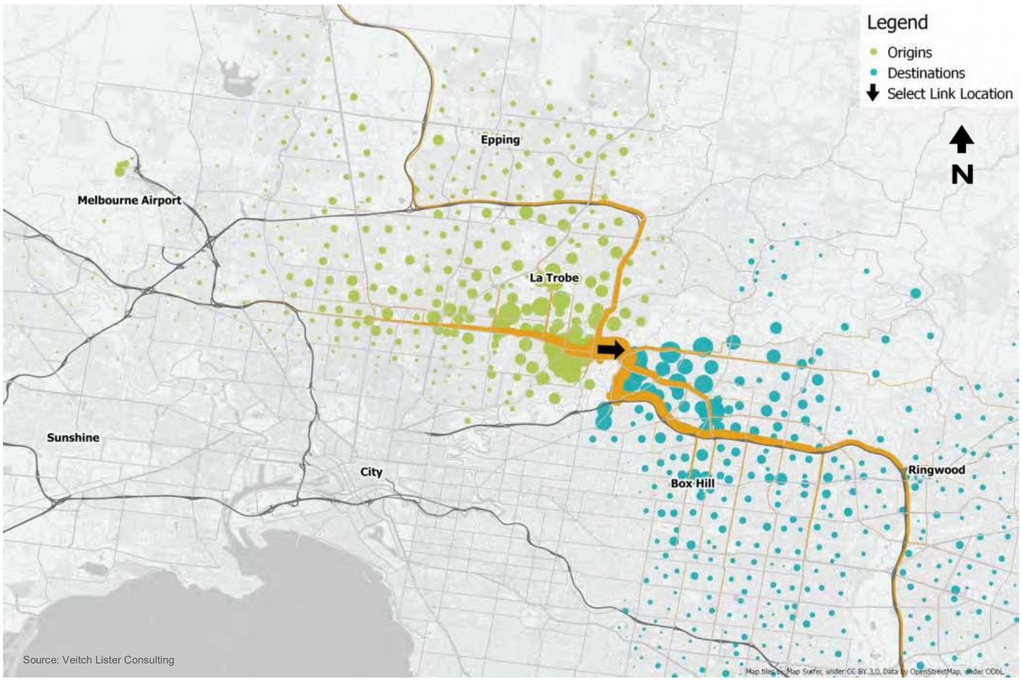
Burke Road bridge traffic is presented in Figure 6-41. This movement typically originates in a narrow band following Rosanna Road and Greensborough Road from the north and relies heavily on this corridor for access to Burke Road. There is a larger catchment of destinations for the CBD and inner suburbs via the Eastern Freeway as it is less competitive to complete these trips using the arterial road network.

Figure 6-41 – Origins and destinations of southbound traffic using Burke Road bridge in the AM peak



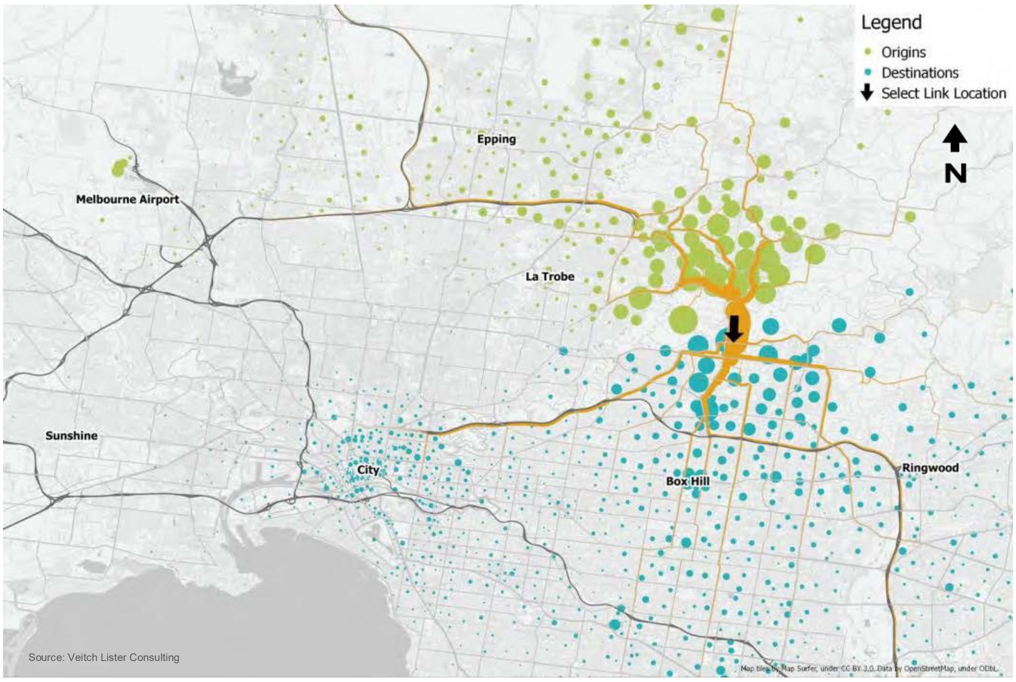
The Manningham Road bridge over the Yarra River has the widest spread of origins and destinations of the five river crossings, as shown in Figure 6-42. Origins in the north-east are widely dispersed from Bell Street to Greensborough Road, with a significant catchment of longer trips from the outer north beyond the M80 Ring Road. Destinations south of the Yarra River are also widely dispersed, with a concentration in the Doncaster and Templestowe areas. Traffic from the north-east mainly approaches from the Rosanna Road/Greensborough Road corridor, as well as Bell Street.

Figure 6-42 – Origins and destinations of southbound traffic using Manningham Road bridge in the AM peak



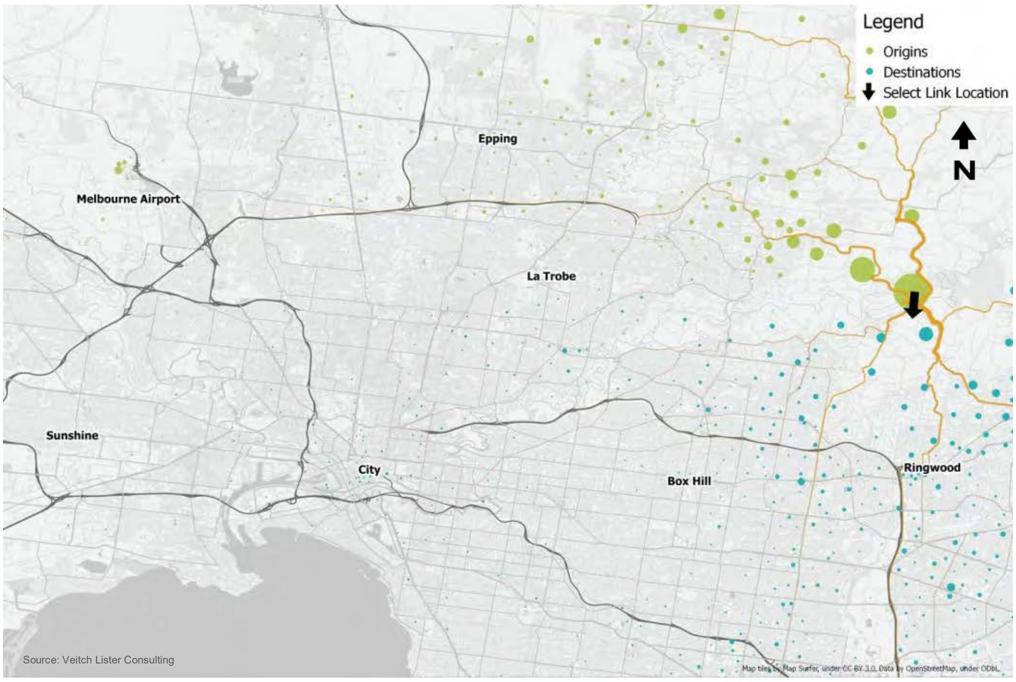
The Fitzsimons Lane bridge over the Yarra River has a relatively compact catchment area for origins in the north, with a large concentration around the Eltham area. Trip origins and destinations for the southbound movement are presented in Figure 6-43. Destinations in the south are widely dispersed, ranging from the CBD to east of EastLink. Main Road and Para Road are the primary feeder routes from the north-east.

Figure 6-43 – Origins and destinations of southbound traffic using Fitzsimons Lane bridge in the AM peak



Kangaroo Ground-Warrandyte Road over the Yarra River also has a very dispersed pattern of origins and destinations, as shown in Figure 6-44. With the next crossing eight kilometres west and 16 kilometres to the east, the bridge services a very large catchment area.

Figure 6-44 – Origins and destinations of southbound traffic using Warrandyte Bridge in the AM peak



In general, the charts indicate the Yarra River crossings carry a mix of local, medium and longer 'through' trips undertaking orbital movements across the north-east. These competing demands for limited road space increase congestion for residents, workers and businesses within the region.

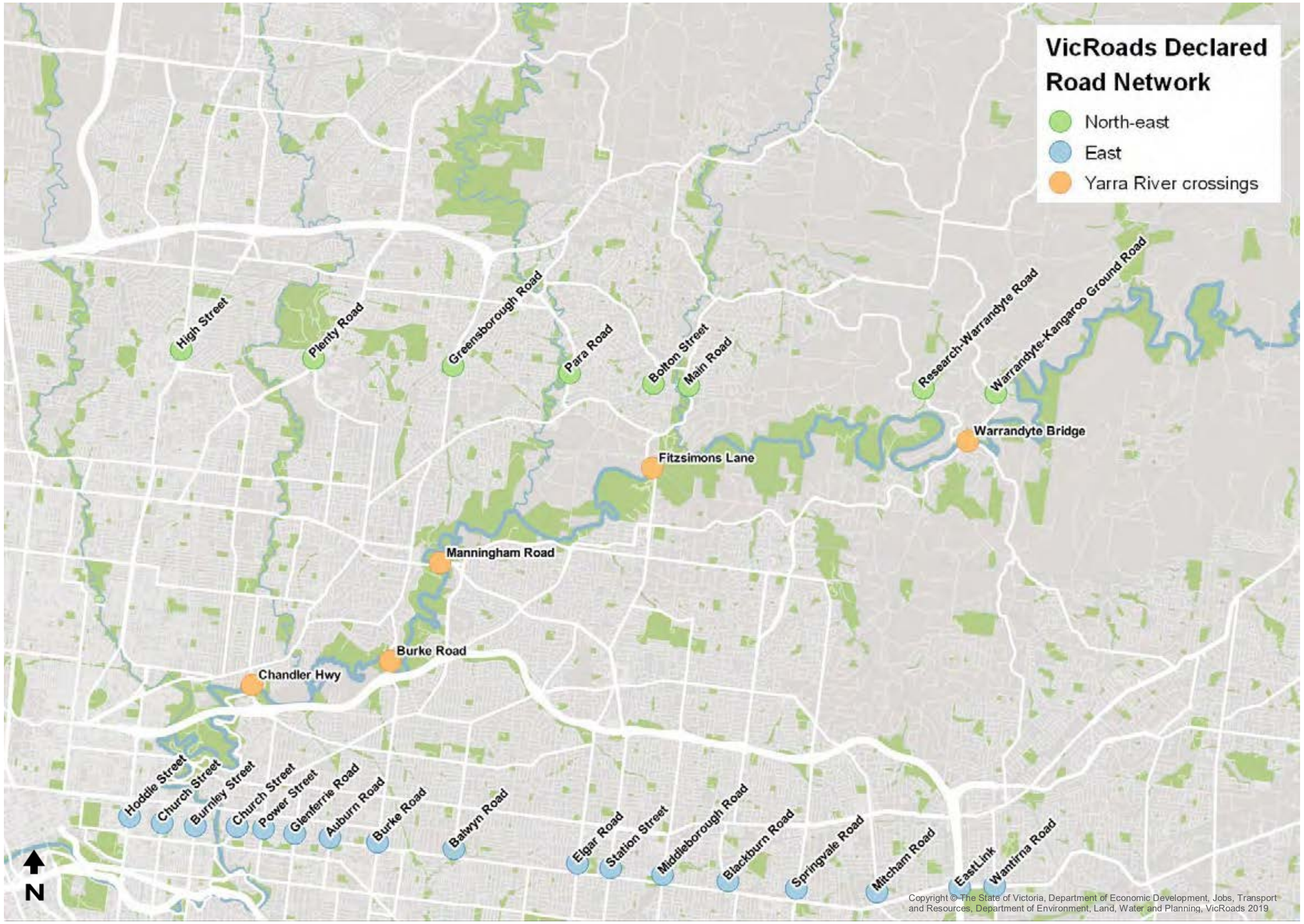
6.3.2 A sparse and congested arterial road network

The presence of the Yarra River and its surrounding parklands have contributed to the development of a sparse arterial road network in the north-east. The river originates from the Yarra Ranges to the east of Melbourne, and the north-east forms its foothills, featuring hills, valleys and native forests. These geographic features were historically unfavourable to urban development, particularly relative to the rest of Melbourne, which primarily comprised of flat, dry plains.

As a result, the north-east relies on a relatively sparse arterial road network, which lacks the grid-based resilience found in the eastern suburbs. Trips are heavily reliant on a limited number of arterial roads, such as Bell Street for east-west movements and Rosanna Road and Fitzsimons Lane for north-south movements.

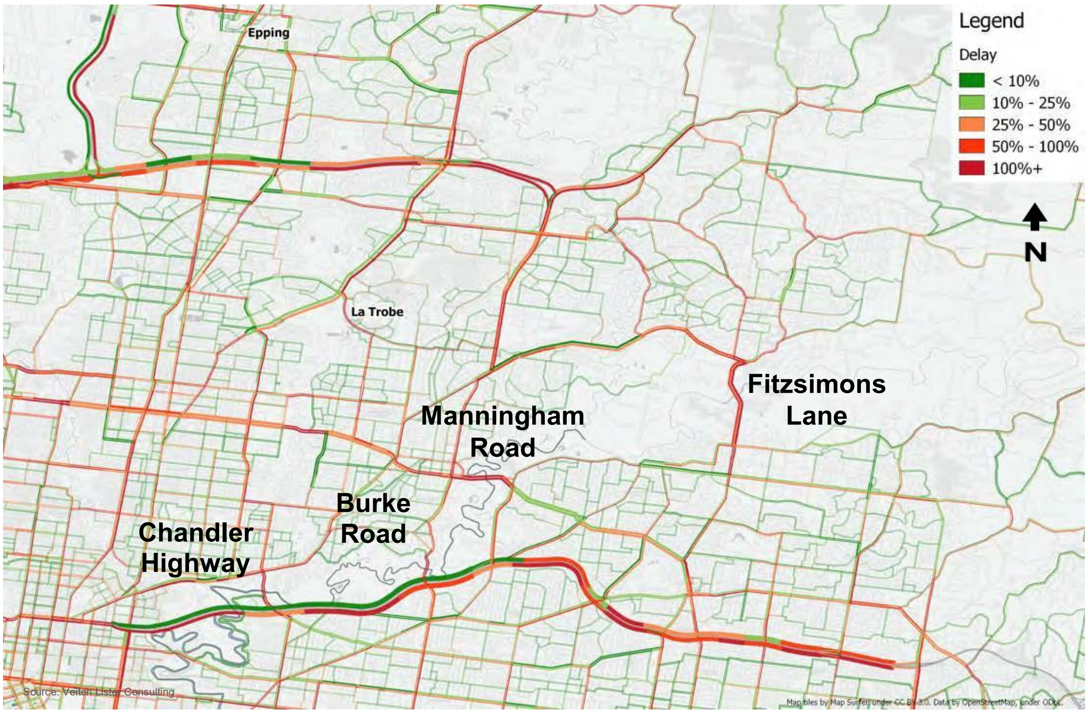
A comparison of the VicRoads declared road networks for the north-eastern and eastern suburbs is presented in Figure 6-45. There are eight north-south arterial roads in the north-east, represented by the green dots. The same span in the eastern suburbs (represented by the blue dots) is supported by 17 routes, providing greater choice and network resilience for residents in the east.

Figure 6-45–VicRoads declared road network east and north-east



Due to their broad catchments, the Yarra River crossings and their feeder routes are typically congested in peak periods. Modelled congestion delays incurred in the AM peak by link, relative to ‘no traffic’ conditions are presented in Figure 6-46. The darkest red indicates links where the peak hour travel times are more than double that under ‘no traffic’ conditions. All five Yarra River crossings fall within this category, as well as many of their feeder routes such as Bell Street and Main Road.

Figure 6-46 – Travel time delay during the AM peak relative to ‘no traffic’ conditions, 2016 model

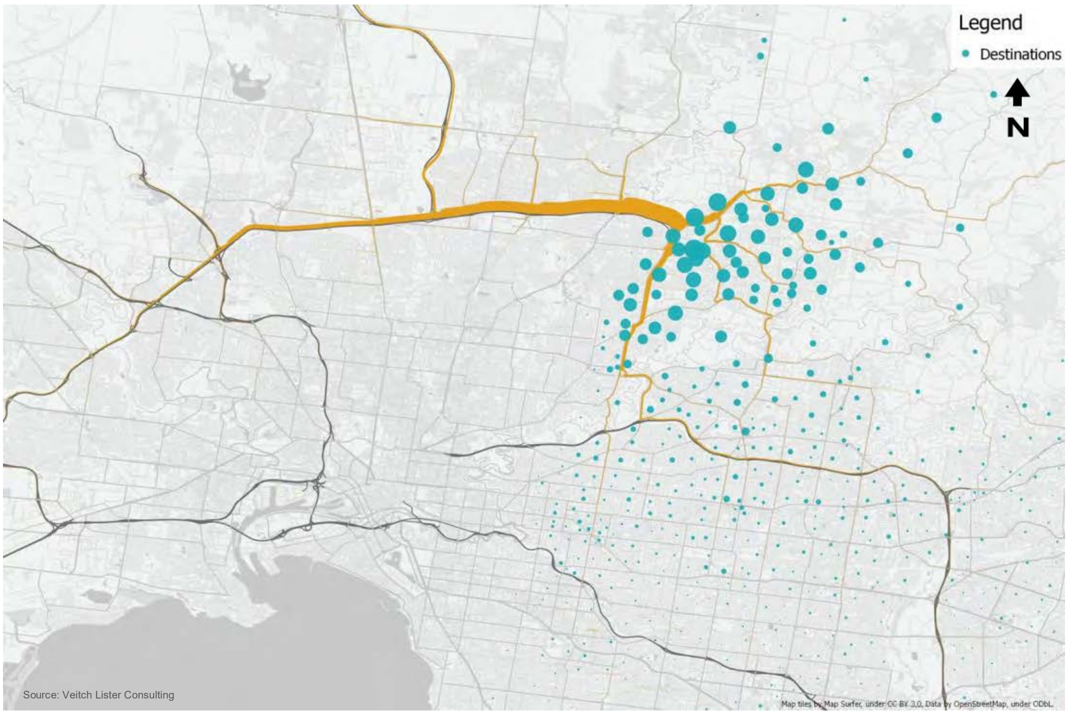


6.3.3 Over-reliance on the Rosanna Road corridor

Rosanna Road is one of the busiest north-south arterial roads in the study area, carrying up to 50,000 vehicles per day. It is a four-lane, two-way undivided road, with generally low-density residential dwellings adjoining. Along with Greensborough Road to the north and Bulleen Road to the south, the corridor has collectively been defined as one of the few GT1 (General Traffic category 1) routes through the north-east.

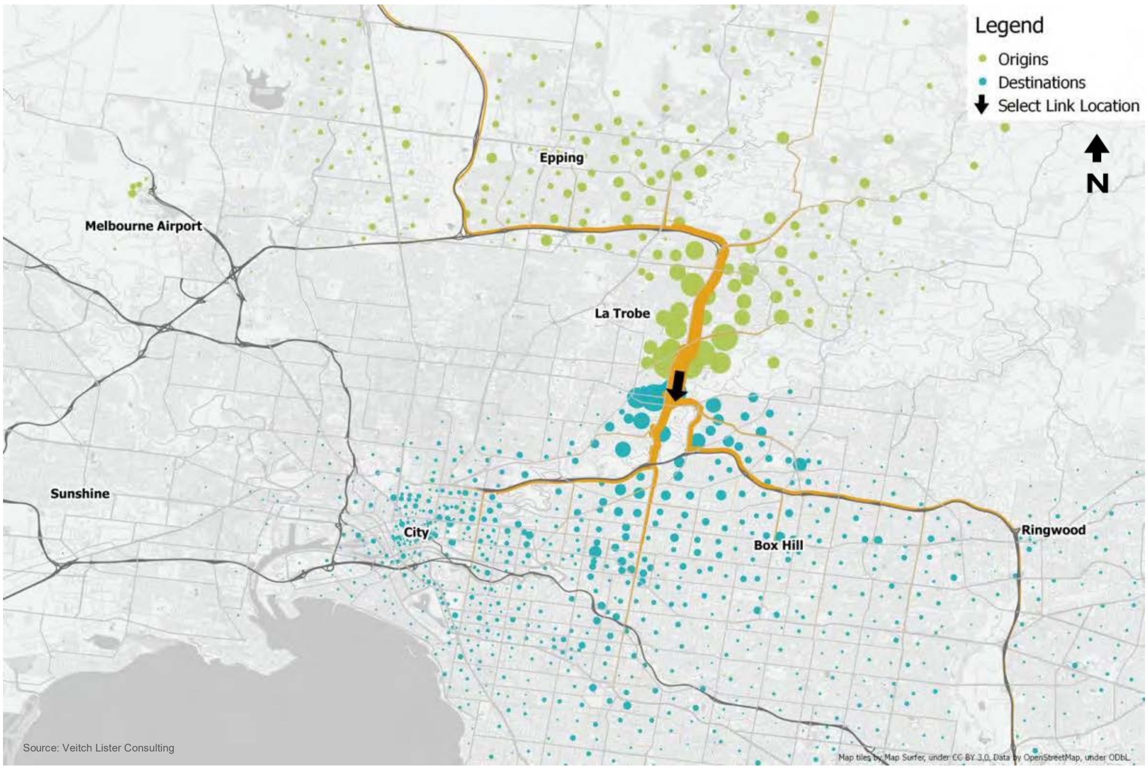
From the north the corridor is fed by the M80 Ring Road, which terminates at the junction of the Greensborough Bypass and Greensborough Road. The chart in Figure 6-47 depicts the paths and destinations of eastbound traffic on the M80 Ring Road in orange and blue respectively. From the freeway terminus traffic disperses onto the arterial road network via Greensborough Bypass to the east and Greensborough Road to the south, which generally filters south via Main Road, Fitzsimons Lane and Rosanna Road.

Figure 6-47 – Destinations of traffic travelling eastbound on the M80 Ring Road, between Plenty Road and Greensborough Road



Origins and destinations for traffic travelling southbound on Rosanna Road are presented in Figure 6-48. Trip origins are concentrated in the areas of Heidelberg, Yallambie and Watsonia which represent local traffic demand. There is also a wider catchment from the north, from areas such as Epping and South Morang which have accessed Rosanna Road from the M80 Ring Road and Greensborough Road. These longer, cross-city trips compete with local trips for capacity along this corridor. Destinations (shown in blue) are widespread across the eastern suburbs, indicating Rosanna Road's significant role in feeding Yarra River crossing movements via Manningham Road and Bulleen Road.

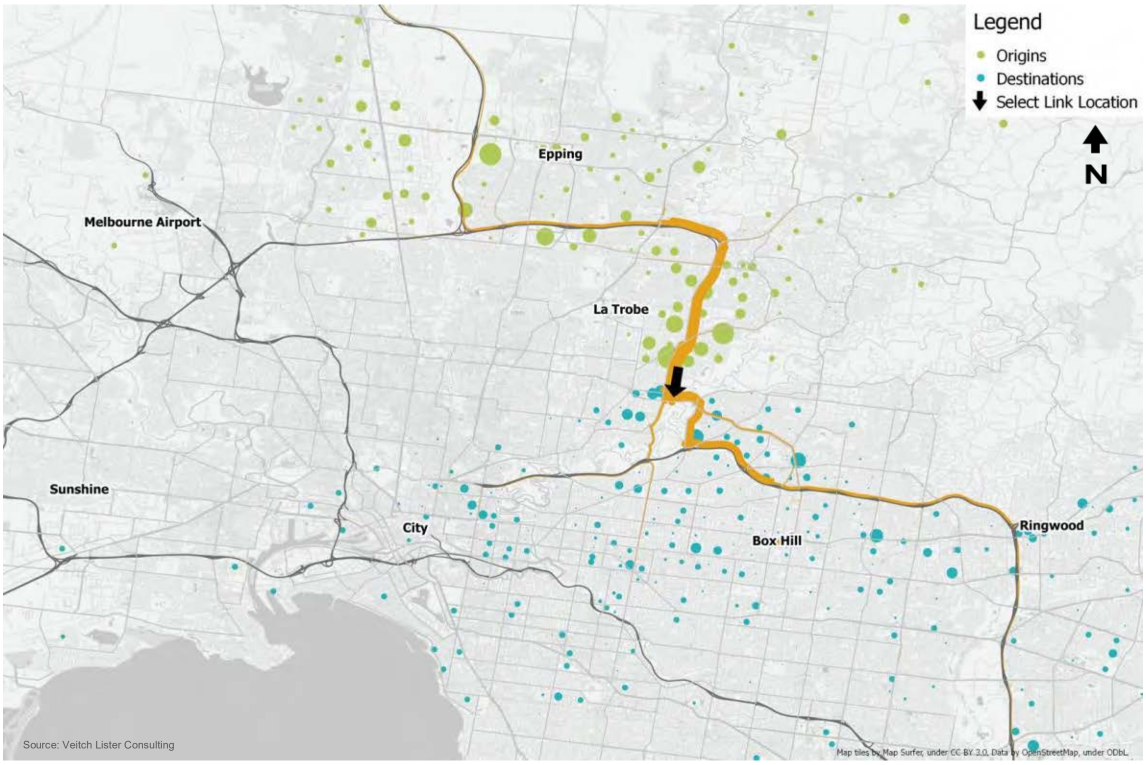
Figure 6-48 – Destinations of traffic travelling southbound on Rosanna Road



Freight trips are also reliant upon the corridor due to heavy vehicle restrictions and curfews in the north-east. The corridor is the only permitted over-dimensional (OD) vehicle route through the region, leaving few alternatives for these movements. As a result, the Bulleen Road – Rosanna Road – Greensborough Road corridor is the preferred route for freight traffic in the north-east, carrying between approximately 3,000 and 8,000 trucks per day across its length. The north-east freight network is discussed in further detail in Section 6.4.

Origins and destinations of trucks using the corridor are presented in Figure 6-49. The truck demand catchment is broader than that of total traffic, with a wide dispersal of origins and destinations across metropolitan Melbourne. Trucks using Rosanna Road at present are primarily travelling between the industrial precincts in the north (such as Epping, Somerton and Thomastown) to a broad expanse of destinations in the eastern and south-eastern suburbs.

Figure 6-49 – Origins and destinations of trucks travelling southbound on Rosanna Road



Further analysis of Rosanna Road was undertaken to determine the proportion of ‘local’ versus ‘non-local’ traffic’. As part of this a ‘local’ Rosanna Road catchment was defined, as shown in purple in Figure 6-50. The catchment was defined as suburbs in the north-east which would rely on the Rosanna Road corridor for local accessibility.

Figure 6-50 – Local Rosanna Road catchment

Using this definition, it was found that 57 per cent of traffic using Rosanna Road has an origin or destination within the local catchment. These trips are likely to be undertaken by nearby residents and employees using Rosanna Road to reach local destinations.

It therefore follows that 43 per cent of Rosanna Road traffic is ‘non-local’ and is being undertaken by trips with both an origin and destination outside the local catchment. Examples of these could be trips between Mill Park and Bulleen, or Epping and Doncaster.

A summary of statistics for the Rosanna Road corridor is presented in Table 6-6, for the AM peak, PM peak and daily periods. These include:

- Total traffic volumes, in vehicles, at Rosanna Road north of Dora Street
- Proportion of truck volumes, as a percentage, at Rosanna Road north of Dora Street
- Proportion of local trips, defined as the percentage of Rosanna Road traffic with an origin or destination in the local catchment area.

Table 6-6 – Statistics for the Rosanna Road corridor

Statistic	AM peak	PM peak	Daily
Northbound traffic volume (vehicles), Rosanna Road north of Dora Street	1,800–2,300	2,900–3,800	20,000–26,000
Southbound traffic volume (vehicles), Rosanna Road north of Dora Street	2,300–3,000	2,200–2,900	19,000–24,000
Proportion of trucks	9%	5%	7%
Proportion of local trips (daily)	N/A	N/A	57%

AM and PM peak: 2-hour periods, Daily: 24 hr period

6.3.4 The Eastern Freeway

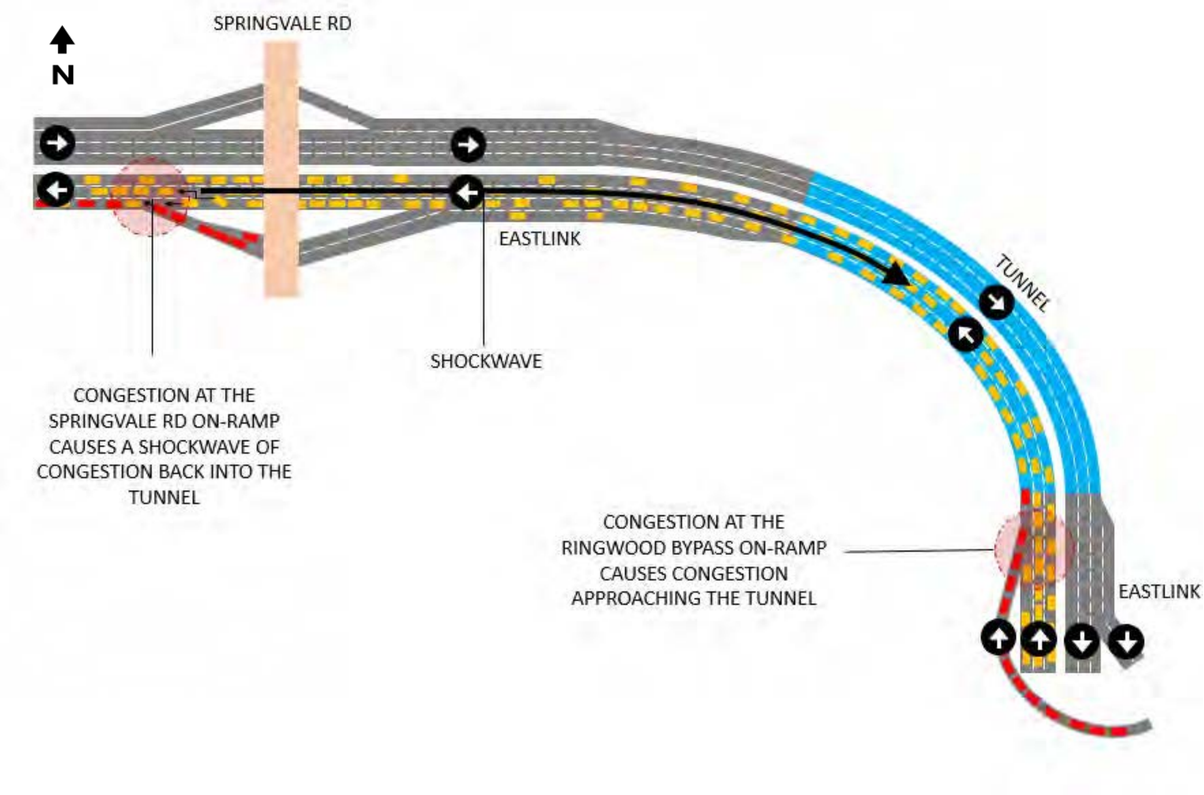
The Eastern Freeway, connecting Alexandra Parade and Hoddle Street in the inner city to EastLink in the eastern suburbs, is a vital radial transport corridor for the eastern suburbs. It is a high capacity freeway ranging from six to 10 lanes, with fully grade-separated interchanges and a posted speed limit of 100 km/hr. Some sections of the freeway also have dedicated peak period bus and taxi lanes.

The Eastern Freeway is a highly-utilised corridor, with peak hour congestion affecting many sections, especially at its western terminus at the Alexandra Parade–Hoddle Street freeway exit. Due to the freeway abruptly terminating at an arterial road at its western end, the section of the Eastern Freeway between Chandler Highway and Hoddle Street has the lowest average vehicle speed of all freeways in Melbourne.

Several factors contribute to flow breakdown along the Eastern Freeway:

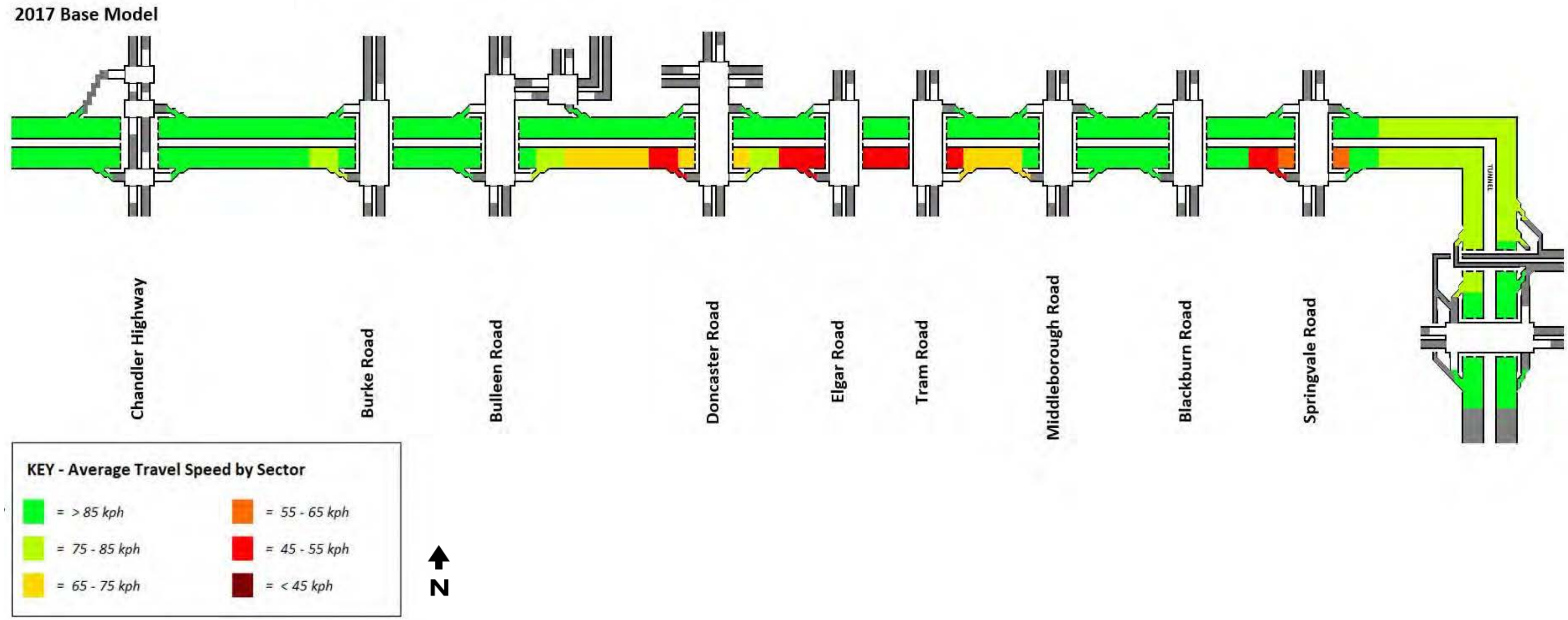
- **Merging and weaving at the freeway interchanges**: flow breakdown can occur when traffic on the freeway is forced to slow down to accommodate the large volumes of merging traffic. This typically occurs at the Springvale Road interchange in the inbound direction (1,800 vehicles per hour) and Thompsons Road in the outbound direction (1,500 vehicles per hour).
- **A lack of ramp-metering along the corridor**: the majority of the Eastern Freeway is not ramp-metered. Ramp-metering regulates the rate and spacing of traffic entering onto the freeway using traffic lights and is demonstrated to improve the overall performance (vehicle speeds and capacity) of a freeway network (VicRoads, 2013). Ramp meter gantries have been implemented on the West Gate Freeway and M80 Ring Road and are currently being installed on the Tullamarine Freeway and CityLink as part of the CityLink-Tulla Widening Works.
- **Closely-spaced interchanges**: There are five interchanges on the Eastern Freeway within a 5.5-kilometre length of road between Elgar Road and Springvale Road. The short distances between these interchanges leads to an intensity of lane changing activity across a relatively short section of road. As a result, there is a high degree of pressure placed on the left-most lanes of the freeway, as vehicles position themselves to exit the freeway in advance of their exits and, at the same time, traffic is merging onto the freeway.
- **A lack of mid-block capacity**: The number of traffic lanes on some sections of the Eastern Freeway also constrain the overall capacity with some sections of only three lanes.
  The sections of the freeway typically operating over theoretical capacity are all three-lane sections of the freeway: Station Street to Elgar Road, Elgar Road to Doncaster Road, and Doncaster Road to Bulleen Road in the PM peak and Springvale Road to Blackburn Road in the AM peak.
- **The EastLink tunnels**: Traffic flow near the EastLink tunnels often breaks down in peak periods, however, this is not due to a lack of capacity in the tunnel itself, but rather upstream and downstream bottlenecks, as presented in Figure 6-51. In the AM peak, the inbound Springvale Road on-ramp carries high traffic volumes which enters the freeway without the control of ramp signals. This uncontrolled entry causes flow breakdown on the Eastern Freeway, which then sends a congestion ‘shockwave’ back through the EastLink tunnels.
  This is exacerbated by unmetered traffic entering from the Ringwood Bypass onto EastLink before the tunnel. This high-volume movement is very close to the tunnel portal and when combined with the congestion caused by the Springvale Road entry ramp, average speeds in the tunnel drop significantly.

Figure 6-51 – AM peak congestion in the EastLink tunnels



The significant demand for travel on the Eastern Freeway during peak periods means there is often severe congestion and delays. Surveyed travel speeds for the Eastern Freeway inbound in the AM peak is presented in Figure 6-52. While the average speeds on the freeway throughout the day are often close to the signposted speed of 100 km/hr, during peak periods speeds can drop to around 50 km/hr in some sections.

Figure 6-52 – Observed AM peak speeds on the Eastern Freeway, 2017



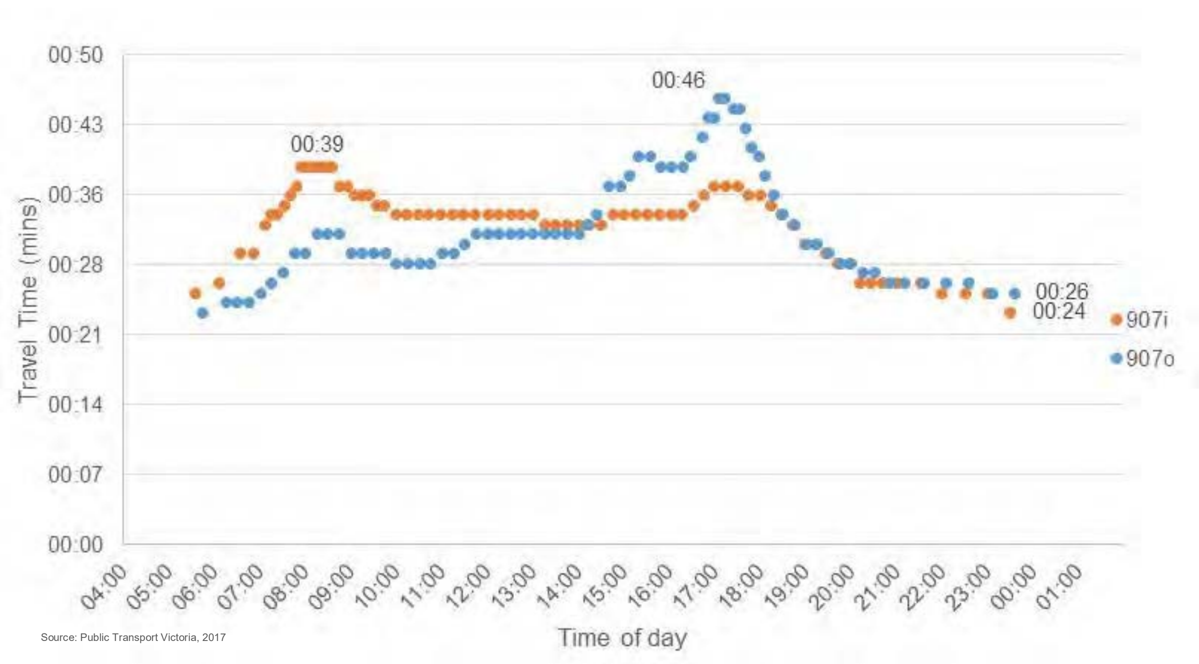
Source: NELP travel time surveys, 2017

6.3.5 DART services

DART services have higher patronage compared with other metropolitan buses, with approximately 18,000 daily boardings across the four routes (905, 906, 907 and 908). Despite their popularity, the DART services experience several issues which affect their patronage and quality of service:

- **Doncaster Park and Ride**: is often at capacity by 7:00 am on weekdays, requiring passengers to park in adjacent streets, sometimes up to one kilometre away.
- **Service frequency and capacity**: DART buses operate at capacity during the peak periods, with extensive over-crowding of services leading to the formation of long queues at the Doncaster Park and Ride facility. This is despite the fact that peak service frequencies are generally high. In peak periods the routes operate at approximately six-minute headways, and approximately every 15 to 30 minutes during the rest of the day.
- **On-road congestion**: The 12-kilometre trip from the Doncaster Park and Ride to Hoddle Street takes approximately 12 minutes in peak periods. However, the 4.6-kilometre trip from Hoddle Street to the terminus at King Street takes 22 minutes. This highlights the delays that are experienced due to the congestion along Hoddle Street and Victoria Parade. The 907 citybound service is approximately 60 per cent slower in the AM peak compared with off-peak periods, while the eastbound service is 75 per cent slower. As presented in Figure 6-53, PM peak travel times are slower than the AM peak travel times.

Figure 6-53 – Doncaster to city travel times from Doncaster Park and Ride



Note: 907i – citybound/westbound services. 907o – eastbound services

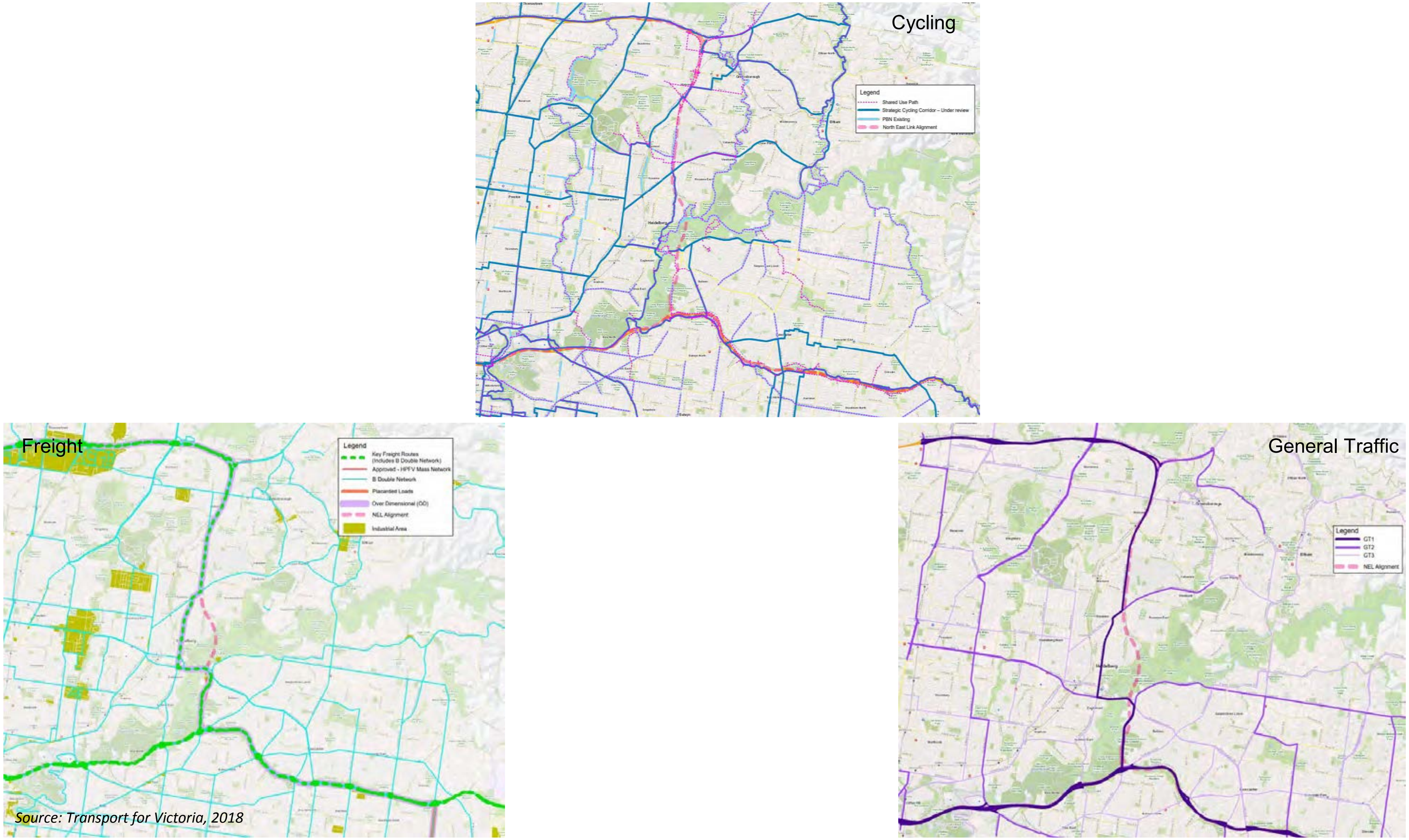
6.3.6 Conflicts between active travel and traffic

As private vehicle travel dominates throughout the north-east, pedestrians and cyclists often encounter barriers in the form of congested roadways. These roadways often represent barriers to active transport because they have been planned to prioritise traffic movements. This can come at the expense of pedestrians and cyclists in the form of high traffic volumes, a large proportion of heavy vehicles, high sign-posted speeds as well as reduced footpath quality and bicycle lane coverage.

This conflict is illustrated by a comparison of the Cycling, General Traffic and Freight classifications from the Movement and Place Framework, as presented in Figure 6-54. The Movement and Place Framework assesses each mode of transport and assigns a classification to each road for each mode. The higher the classification, the more priority that mode should be given on that road. However, there can be locations where two modes are given a high priority on the same road.

An example of this in the north-east is the Greensborough Road – Rosanna Road – Bulleen Road corridor, where a high General Traffic and Freight classification is at conflict with the Cycling classifications along the same corridor. Due to the high volume of trucks and general traffic using the road each day Rosanna Road forms a barrier to walking and cycling access to activity centres such as Heidelberg, Watsonia and Greensborough.

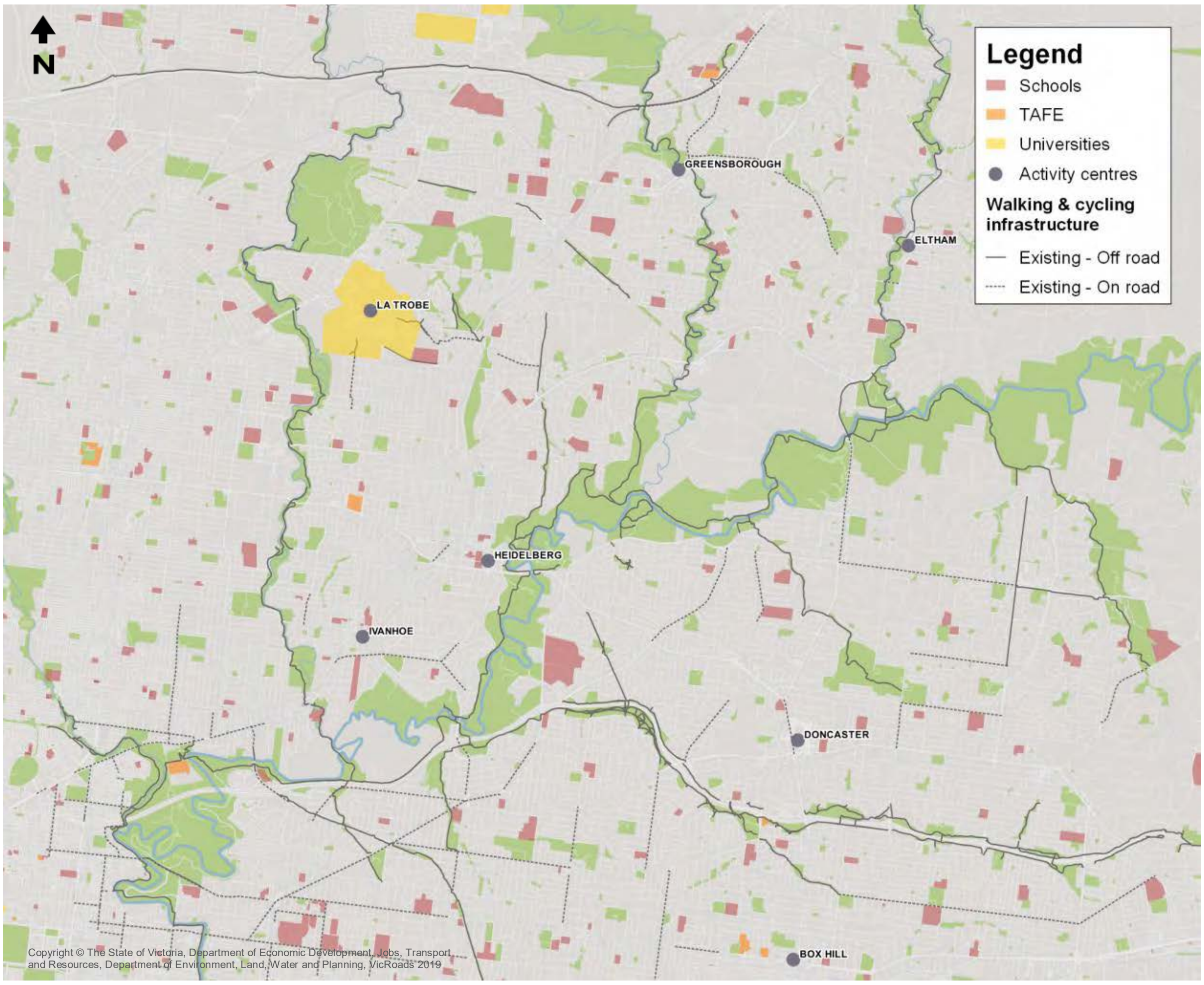
Figure 6-54 – Comparison of General Traffic, Freight and Cycling categories – Movement and Place Framework



A further challenge within the north-east is the discontinuous nature of safe active transport corridors. While access within residential neighbourhoods is generally safe for students, many walking or cycling trips to school in the north-east require travelling along high-volume or high-speed roads.

It is apparent from Figure 6-55 that many schools are not directly served by the designated cycling network. While some of these schools are located within the more sparsely populated areas in the north-east quadrant of the study area, many others sit within gaps in the existing cycling network within the inner suburbs.

Figure 6-55 – Distribution of schools along the cycling network in the north-east



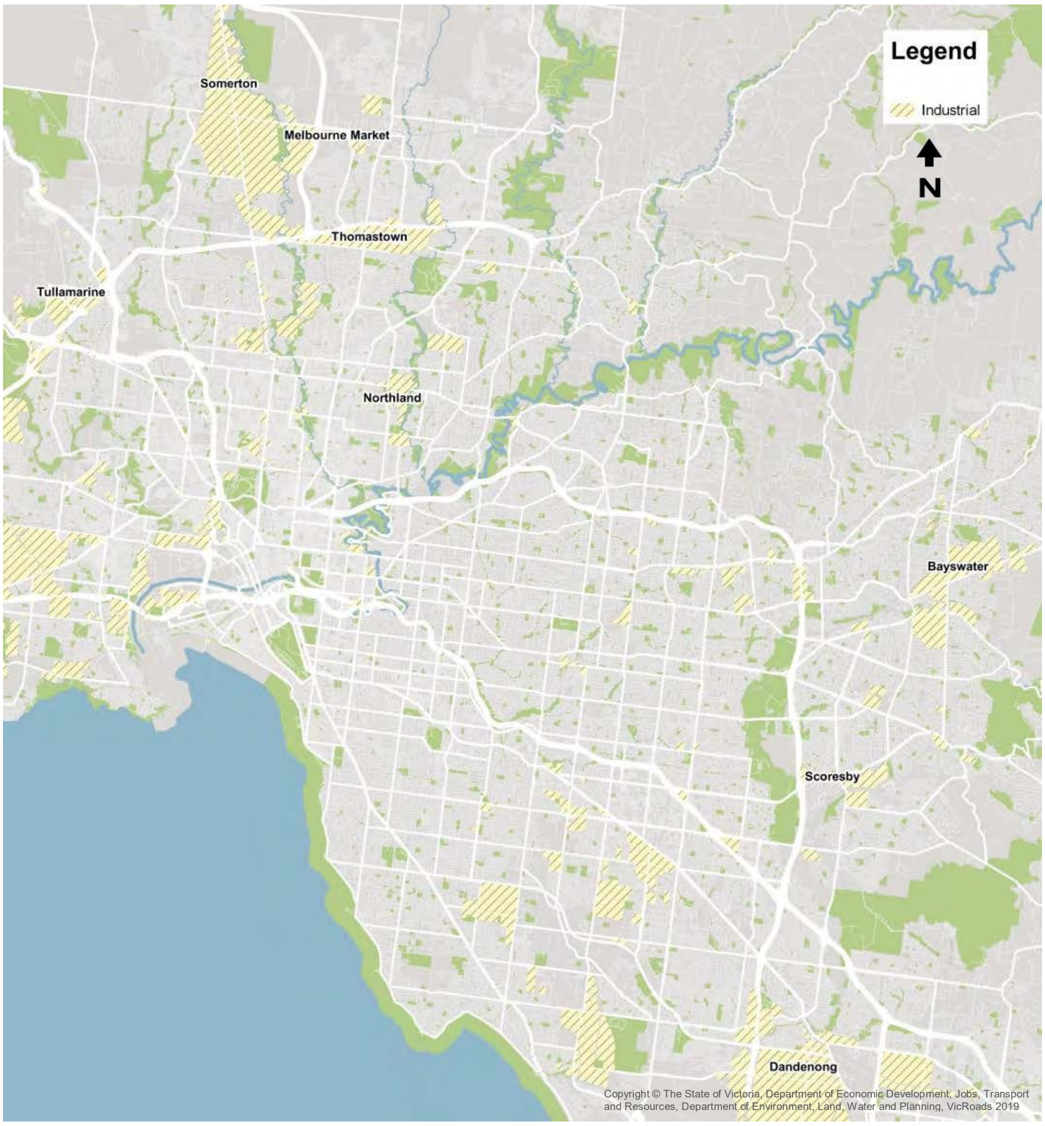
6.4 Freight network

6.4.1 Industrial precincts and land use

Freight demand through the study area is underpinned by a concentration of industrial precincts in the south-east and north, which generates movements through the north-east. Local demand is also generated by retail centres and industrial hubs such as Northland and Heidelberg West.

Major industrial and employment precincts relevant to the north-east are presented in Figure 6-56, and include Somerton, Epping, Melbourne Market, Thomastown, Northland, Bayswater and Dandenong.

Figure 6-56 – Major relevant industrial precincts



Aerial photography for 2009 and 2016 indicates that industrial development in the north has intensified over this period. The Somerton and Tullamarine precincts have undergone substantial expansion while new developments have commenced in Epping and the Melbourne Market. This change in development is presented in Figure 6-57.

Traffic volumes from VicRoads indicate that commercial vehicle traffic in the Sydney Road area is approaching similar levels to the M80 Ring Road. Truck volumes along Somerton Road and Cooper Street near the Melbourne Market have also increased since commencement of the market's operations. The site generates approximately 2,700 vehicle entries per day (or 5,400 total trips) of which the majority are commercial operators (Melbourne Market Authority, 2016).

Figure 6-57 – Aerial view of the northern precincts 2009 (left) and 2016 (right)

Heidelberg West Industrial Estate

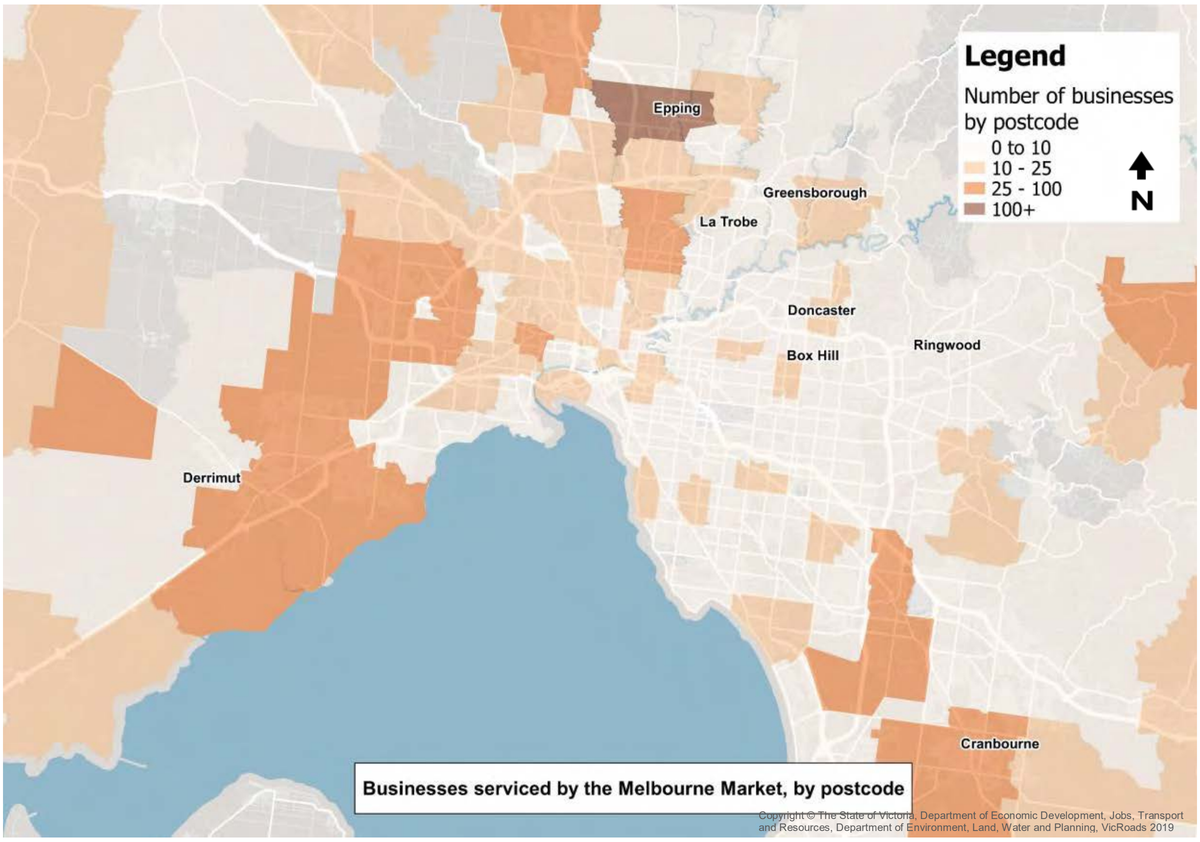
Located within the proposed La Trobe NEIC precinct, the Heidelberg West Industrial Estate is one of the largest manufacturing hubs in the north-east. This site houses over 600 businesses, primarily from the manufacturing (40 per cent), construction (24 per cent) and wholesale (14 per cent) industries (Victorian Planning Authority, 2016) which traditionally rely on freight distribution to support their operations.

A survey conducted in the estate indicated that approximately 34 per cent of businesses sourced the majority of their supplies from the northern suburbs, with a further 14 per cent and 4 per cent from the south-eastern and western suburbs respectively. Approximately 10 per cent of businesses sourced their supplies interstate, and 21 per cent from overseas. A high reliance on interstate and overseas suppliers will lead to strong freight demand between the precinct and distribution hubs, airports and ports.

The Melbourne Market

The Melbourne Wholesale Fruit Vegetable & Flower Market commenced operations at its new Epping location in 2015. The 70-hectare site is adjacent to the Hume Freeway, providing access to metropolitan Melbourne's freeway system, as well as direct connectivity to regional Victoria. Over 4,000 businesses rely on the market, with a concentration in Melbourne's western, northern and south-eastern suburbs as shown in Figure 6-58. Approximately 2,700 vehicles enter the market per day (Melbourne Market Authority, 2016), most of which are commercial vehicles and trucks.

Figure 6-58 – Distribution of business serviced by the Melbourne Market, by postcode



Source: Melbourne Market, 2017

6.4.2 The north-east freight network

Freight in Melbourne's north-east is primarily distributed via heavy vehicles using the local road network.

The VicRoads B-Double network map, showing approved routes in green through the north-east, is presented in Figure 6-59. Orange routes indicate time of day restrictions for commercial vehicles, while red routes are restricted and require an application for exemption. The Yarra River crossings at Burke Road, Manningham Road and Warrandyte Bridge all have either partial or full restrictions in place. Other restricted arterial roads (subject to truck curfews) in the north-east also include Bulleen Road, Rosanna Road, Greensborough Road and Lower Plenty Road.

VicRoads also specify a Higher Mass Limits (HML) network for Class 2 and 3 heavy vehicles, which has been presented in Figure 6-60. Similar levels of restrictions in the north-eastern suburbs apply, as per the B-Double network.

High Productivity Freight Vehicles (HPFVs) allow operators to distribute higher volume and mass loads using larger, safer and more productive trucks on specified routes. The VicRoads approved HPFV network is presented in Figure 6-61. The road network within the north-east is not generally suited to HPFVs, with weight limits along the Eastern Freeway and curfews along arterial roads.

Separately, the VicRoads Over Dimensional (OD) route network is presented in Figure 6-62. The Greensborough Road – Rosanna Road – Bulleen Road corridor has been defined as an approved OD route through the north-east, allowing access to the south-east via the Eastern Freeway, Springvale Road and EastLink.

Figure 6-59 – Victoria's gazetted B-Double network

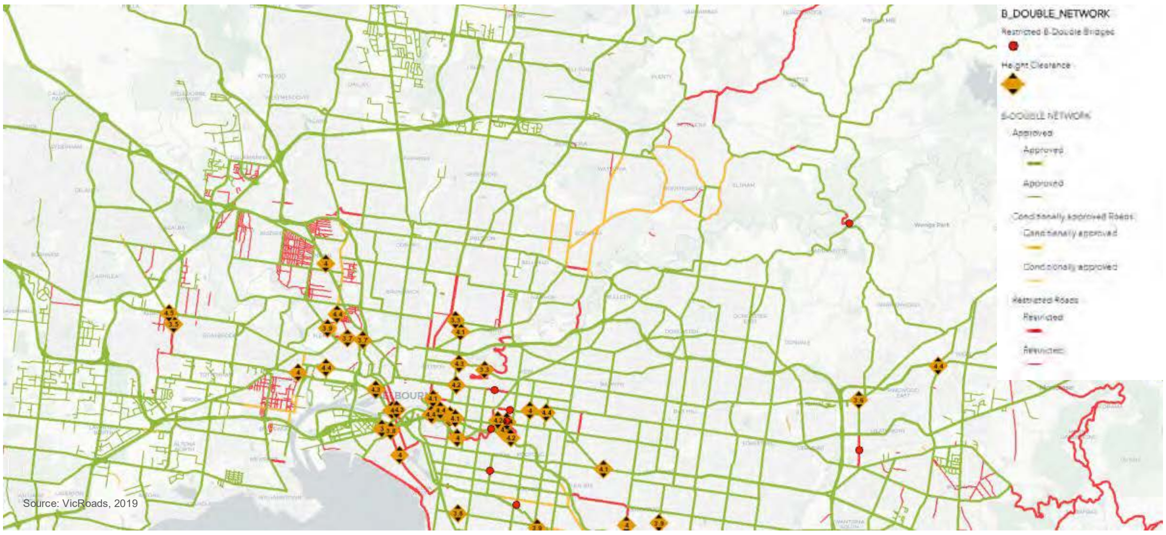


Figure 6-60 – Melbourne Higher Mass Limits network

Figure 6-61 – Melbourne HPFV network

Figure 6-62 – VicRoads OD vehicle network

Truck curfews are currently enforced across several arterials in the north-east to reduce truck traffic through the area at night. The curfews initially restricted vehicles in excess of 4.5 tonnes from access to the area at night; however, adjustments have now been made to limit trucks in excess of 16.5 tonnes from the area between the hours of 10:00 pm and 6:00 am. The map in Figure 6-63 indicates the roads where restrictions apply.

Figure 6-63 – Current north-eastern suburban truck curfew locations

The curfews restrict access across the following roads:

- Greensborough Bypass – Rosanna Road (Grimshaw Street to Banksia Street)
- Lower Plenty Road (Greensborough Road to Waiora Road)
- Waiora Road (Kingsbury Drive to Bell Street)
- Waterdale Road (Kingsbury Drive to Bell Street)
- Lower Plenty Road – Main Road (Wattletree Road to Greensborough Road)
- Para Road (Grimshaw Street – Lower Plenty Road)
- St. Helena Road – Karingal Drive
- Bolton Street
- Ryans Road–Wattletree Road.

The curfews restrict the use of Fitzsimons Lane across the Yarra River and require a longer route to access river crossings at Banksia Street and Burke Road. Trucks making local deliveries within the curfew area are exempt from the restrictions.

6.4.3 Freight demand and volumes

The concentration of industrial precincts in the south-east and north generate freight movements through the north-eastern transport corridors. Freight demand is also generated within the study area itself by local retail and shopping centres, business parks and industrial precincts.

In the south-east, engineering and industrial precincts in the Dandenong region supply products and services to rural industries such as mining and agriculture. Access to the Hume Highway in the north provides a key link to regional Victoria for these markets. Similarly, automotive-based manufacturers in the eastern, south-eastern and northern industrial precincts require provision of efficient distribution of goods and services between these nodes.

Total and heavy vehicle kilometres travelled across metropolitan Melbourne and the north-east are presented in Table 6-7. Heavy vehicle kilometres travelled account for approximately 7 per cent of all vehicle kilometres travelled across the study area.

Table 6-7 – Heavy vs total vehicle kilometres travelled, 2016 model

Metric	Metropolitan Melbourne	North-east
Total vehicle kilometres travelled (km)	123,577,000	22,342,000
Heavy vehicle kilometres travelled	10,205,000	1,502,000
Proportion of heavy vehicle kilometres travelled vs Total	8%	7%

The proportions of heavy vehicle kilometres travelled undertaken on freeways and non-freeways is also provided in Table 6-8. The north-east has a higher proportion of truck travel on the arterial road network (70 per cent) than metropolitan Melbourne on average.

Table 6-8 – Heavy vehicle kilometres travelled, with freeway and non-freeway proportions, 2016 model

Metric	Metropolitan Melbourne	North-east
Heavy vehicle kilometres travelled	10,205,000	1,502,000
Freeway proportion	43%	30%
Non-freeway proportion	57%	70%

A visualisation of existing year truck volumes in the study area is presented in Figure 6-64 to Figure 6-66. Note that EastLink has not been included in the traffic volume assessment as this data is commercially sensitive. The EastLink tunnels have been assessed for performance through microsimulation modelling in the 2036 'no project' and 2036 'with project' scenarios, as outlined in Section 8.3 and 9.3 respectively.

Key observations are summarised below:

- The Eastern Freeway is the primary feeder route of freight demand from the eastern and south-eastern suburbs, facilitated by its connectivity with EastLink. Freight demand from this corridor accesses the northern suburbs via the north-eastern arterial road network.
- Most heavy vehicles travelling westbound on the Eastern Freeway use the exit ramp on Bulleen Road, followed by the exit at Chandler Highway. Some trucks also exit the freeway at Station Street and travel north via Manningham Road.
- The Bulleen Road – Rosanna Road – Greensborough Road corridor is the preferred route for trucks crossing the Yarra River, carrying between approximately 3,000 and 8,000 trucks per day across its length.
- The Fitzsimons Lane crossing at the Yarra River carries approximately 3,400 to 4,400 trucks per day. This is generated by several feeder routes including Williamsons Road, Reynolds Road, Foote Street, Main Road and Bolton Street.
- Other significant truck volumes are observed along roads such as Springvale Road in the east (5,500 to 7,000 trucks per day) and High Street in the north (2,900 to 3,800).

Figure 6-64 – Total average weekday truck volumes (AWDT), 2017 – study area north

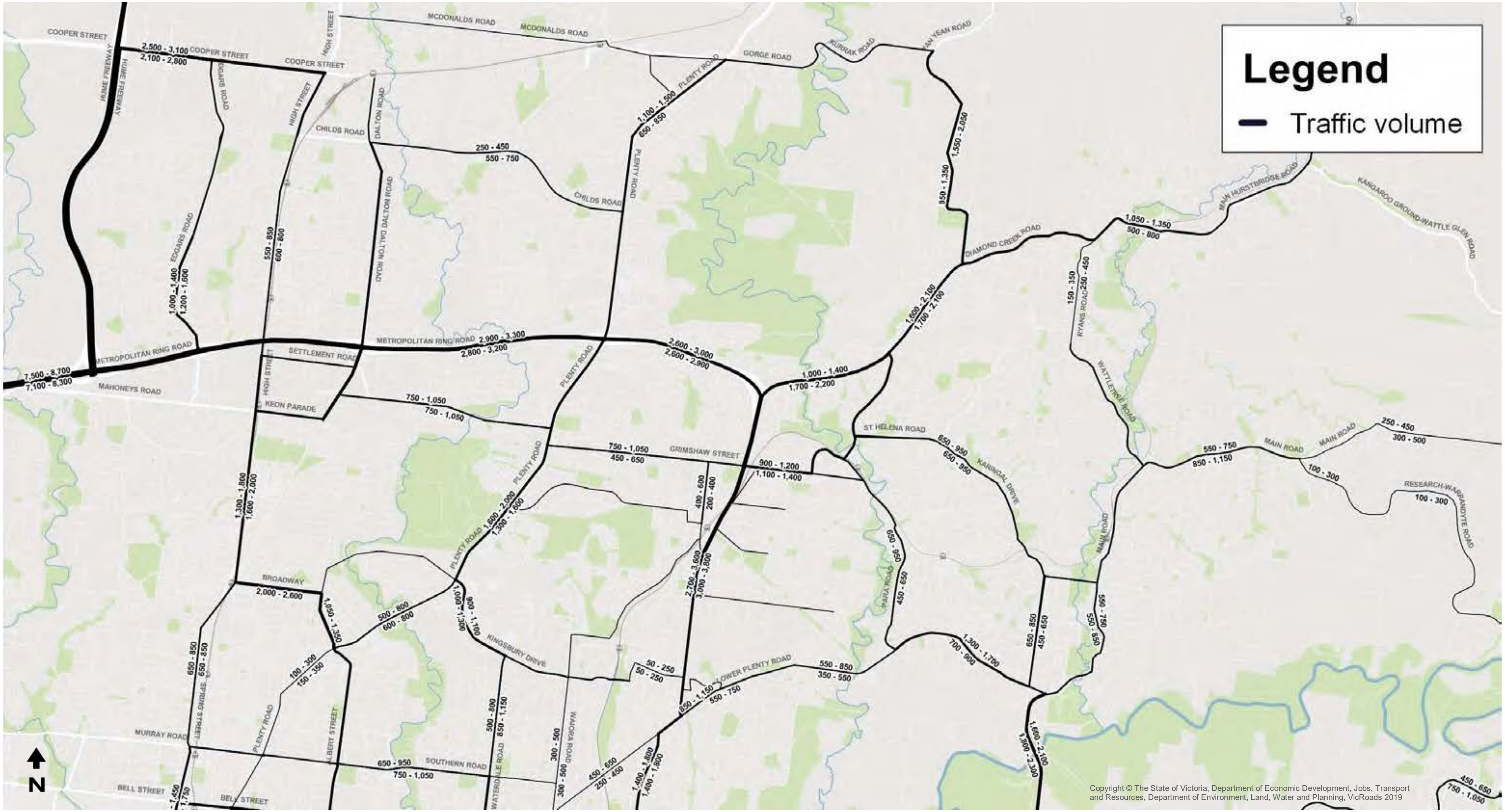


Figure 6-65 – Total average weekday truck volumes (AWDT), 2017 – study area south

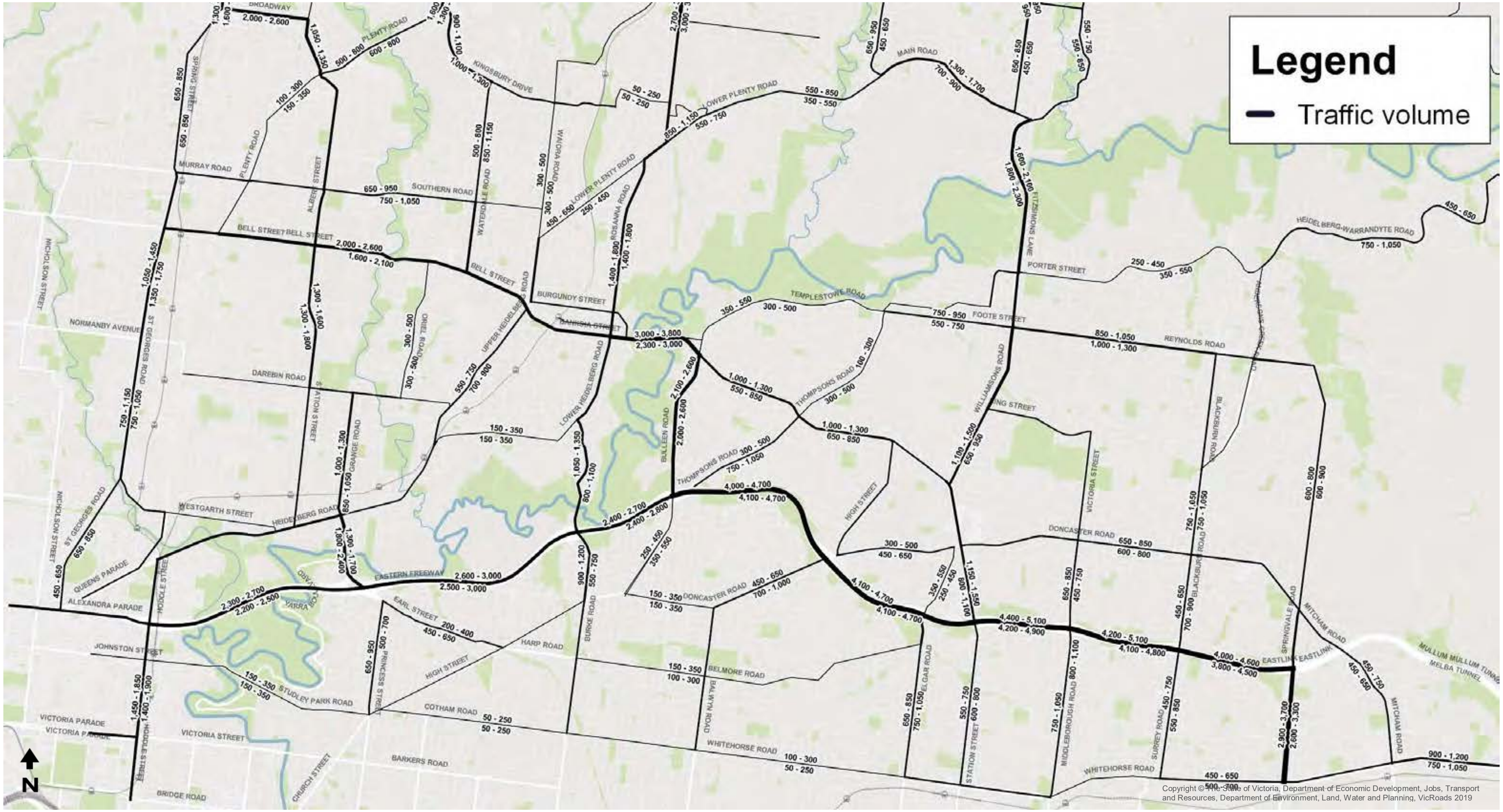
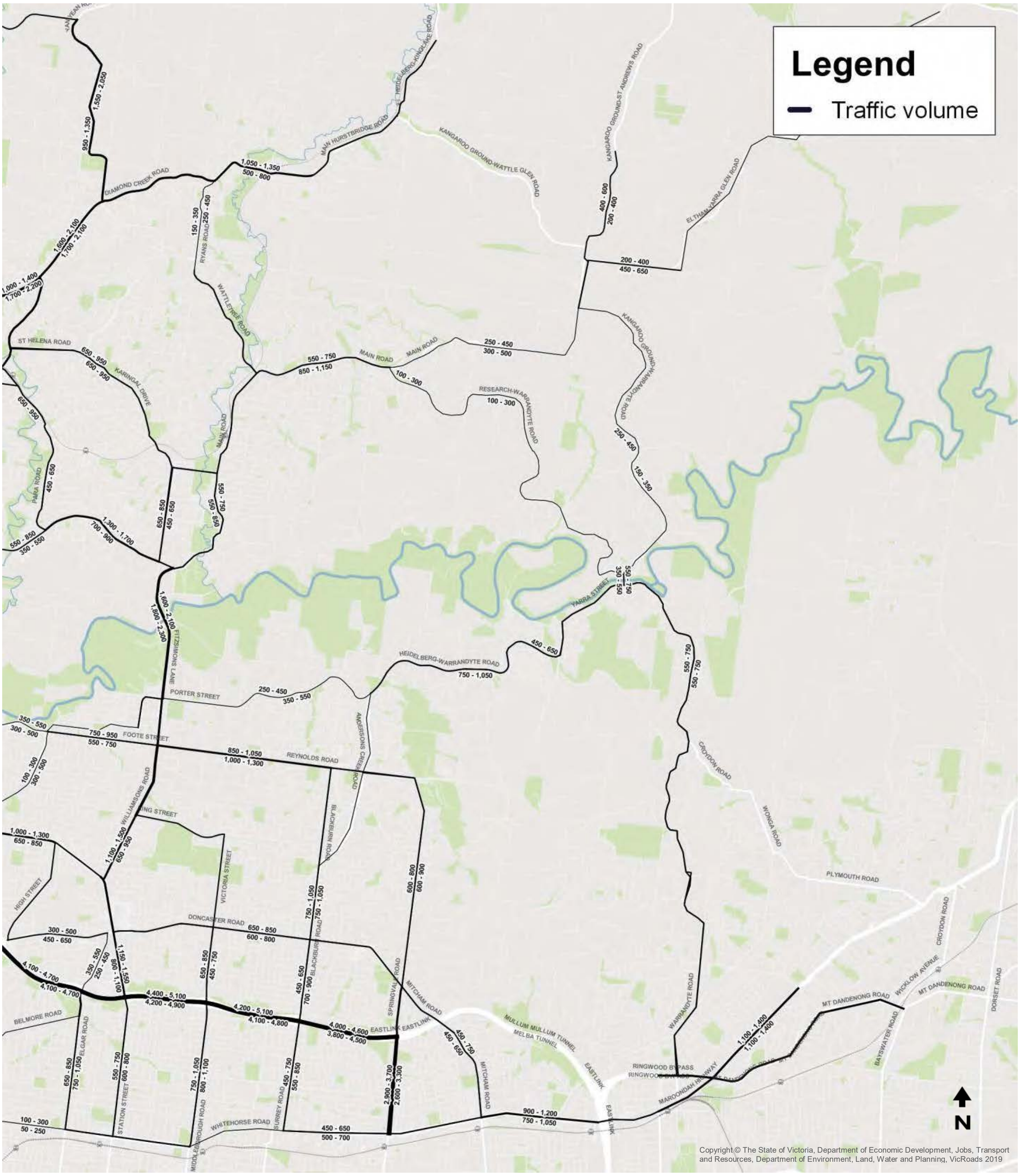


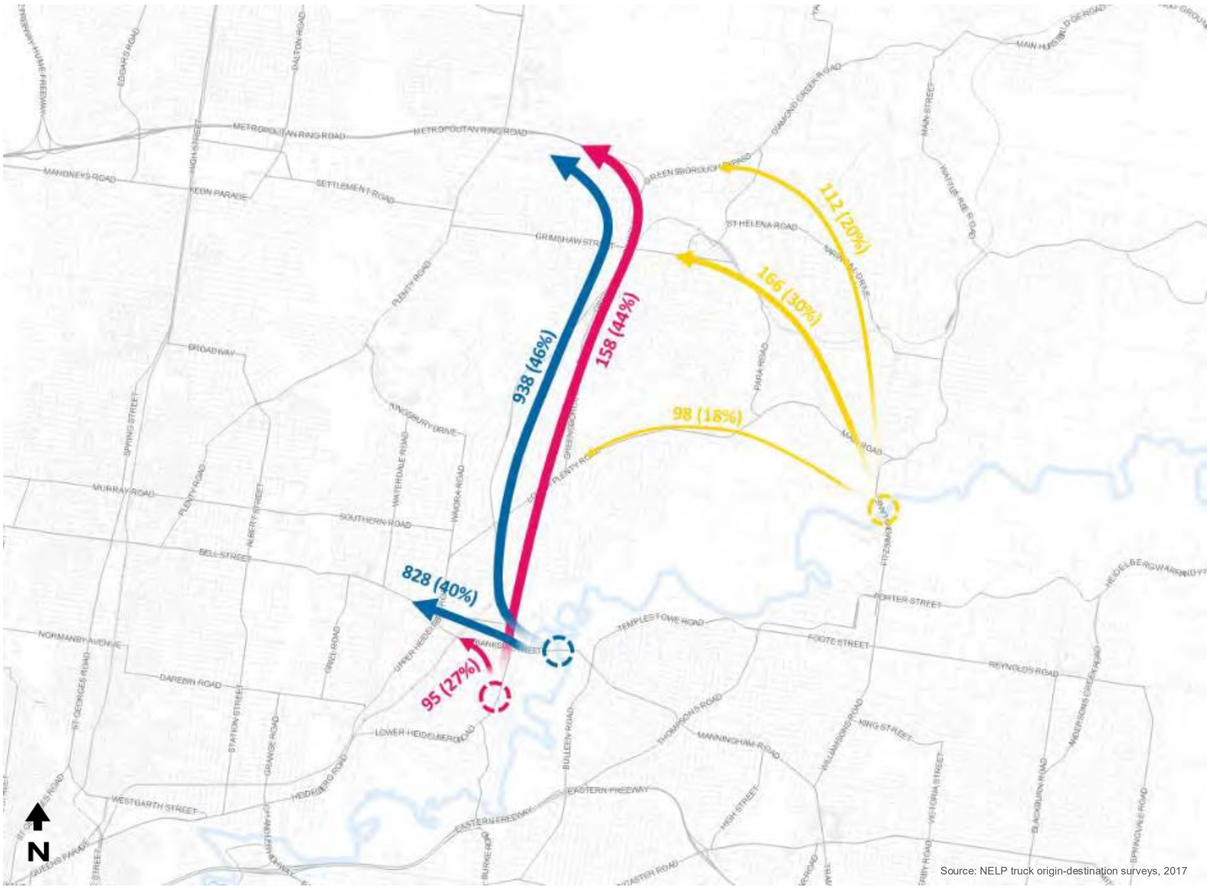
Figure 6-66 – Total average weekday truck volumes (AWDT), 2017 – study area east



Truck origin and destination surveys have been undertaken to assess the movement of heavy vehicles on the arterial road network north of the Eastern Freeway. The major movement for trucks crossing the Yarra River is a ‘through’ movement in a north-south direction, heading towards the M80 Ring Road as presented in Figure 6-67. However, for heavy vehicles crossing the Yarra River at Banksia Street, a high proportion (40 per cent) continues westbound towards Bell Street.

Note that truck numbers presented only account for ‘through’ trips; that is, trips that are recorded to exit the surveyed area. Any heavy vehicles that are not recorded exiting the surveyed area are assumed to have destinations within the north-east (‘local’ trips). For example, of the recorded heavy vehicles crossing the Yarra River at Banksia Street (the blue arrows) 86 per cent are recorded to continue through to either Bell Street or the M80 Ring Road. The remaining 14 per cent are therefore assumed to be local trips with a destination inside the north-east.

Figure 6-67 – Main truck movements across the Yarra River

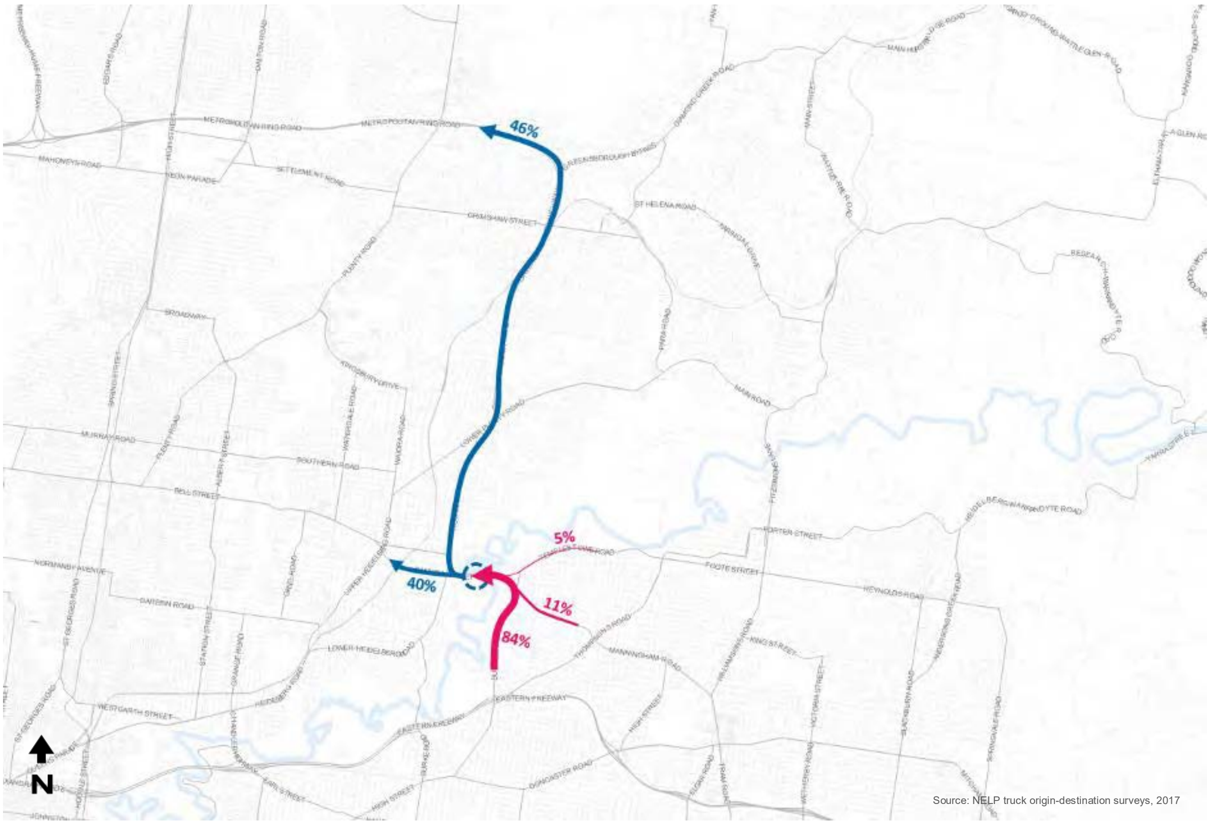


The origin-destination truck surveys reveal that Bulleen Road route is the preferred route. Over a 24-hour period, trucks were three times as likely to use Bulleen Road than Fitzsimons Lane to travel between the Yarra River and the M80 Ring Road. Although Burke Road also provides a point of access over the Yarra River, freight traffic is limited due to B-Double restrictions on the bridge, as well as the lack of east-facing ramps.

Despite the reliance of truck traffic on the Bulleen Road and Fitzsimons Lane routes, both feature primarily residential land uses along their corridors.

For heavy vehicles heading west on Banksia Street, 40 per cent of trucks continue west on towards Bell Street, while 46 per cent travel north to the M80 Ring Road as presented in Figure 6-68.
The majority of this freight originates from Bulleen Road (84 per cent), with only 11 per cent from Manningham Road and 5 per cent from Templestowe Road.

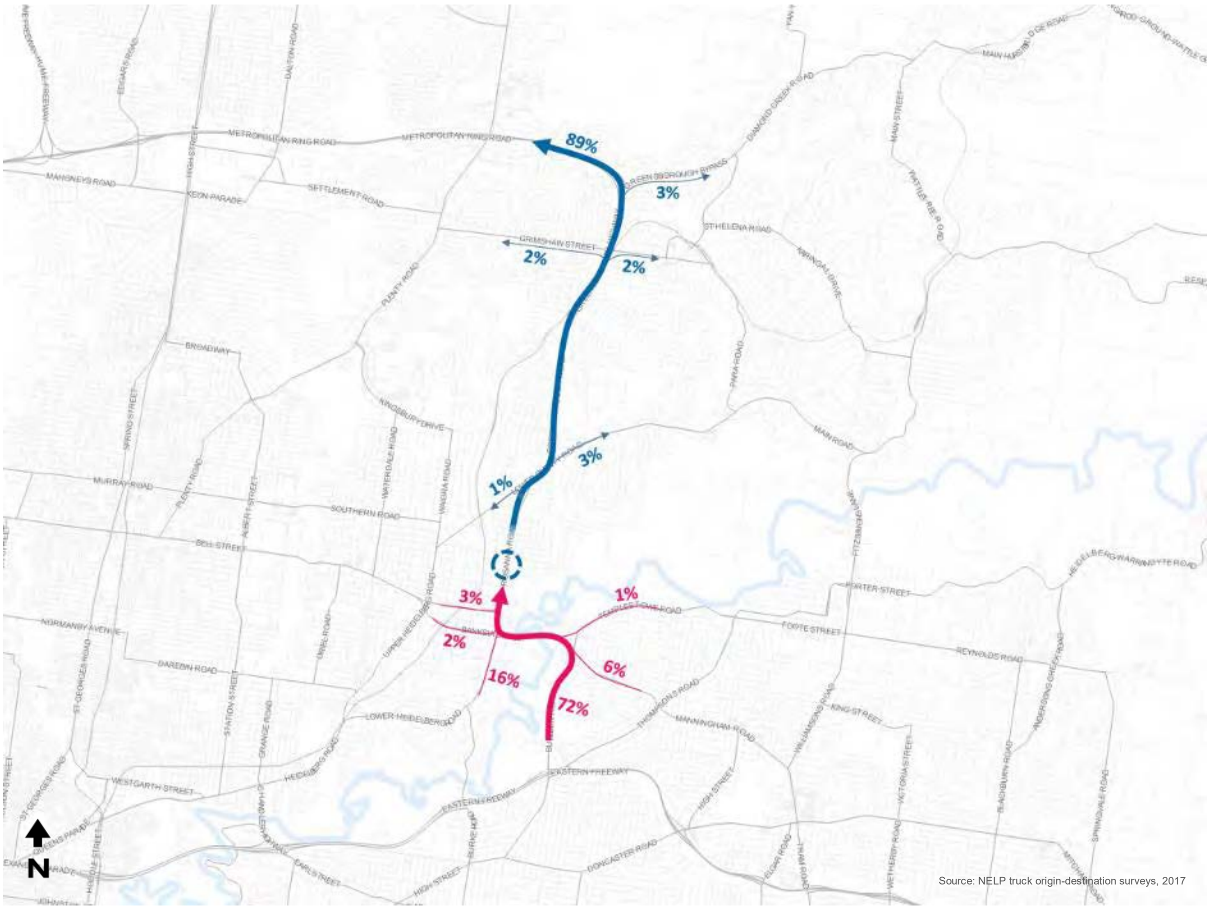
Figure 6-68 – Origins and destinations of trucks across Banksia Street at the Yarra River



Once freight reaches Rosanna Road, the overwhelming majority (89 per cent) travel onwards to the M80 Ring Road, as presented in Figure 6-69. Similar to Banksia Street, a high proportion (72 per cent) originates from Bulleen Road, while Burke Road (16 per cent) and Manningham Road (6 per cent) are less utilised.

This means the majority of freight on Rosanna Road is 'through' traffic – trucks that are travelling between the Eastern Freeway and M80 Ring Road and have no local origin or destination.

Figure 6-69 – Origins and destinations of trucks on Rosanna Road

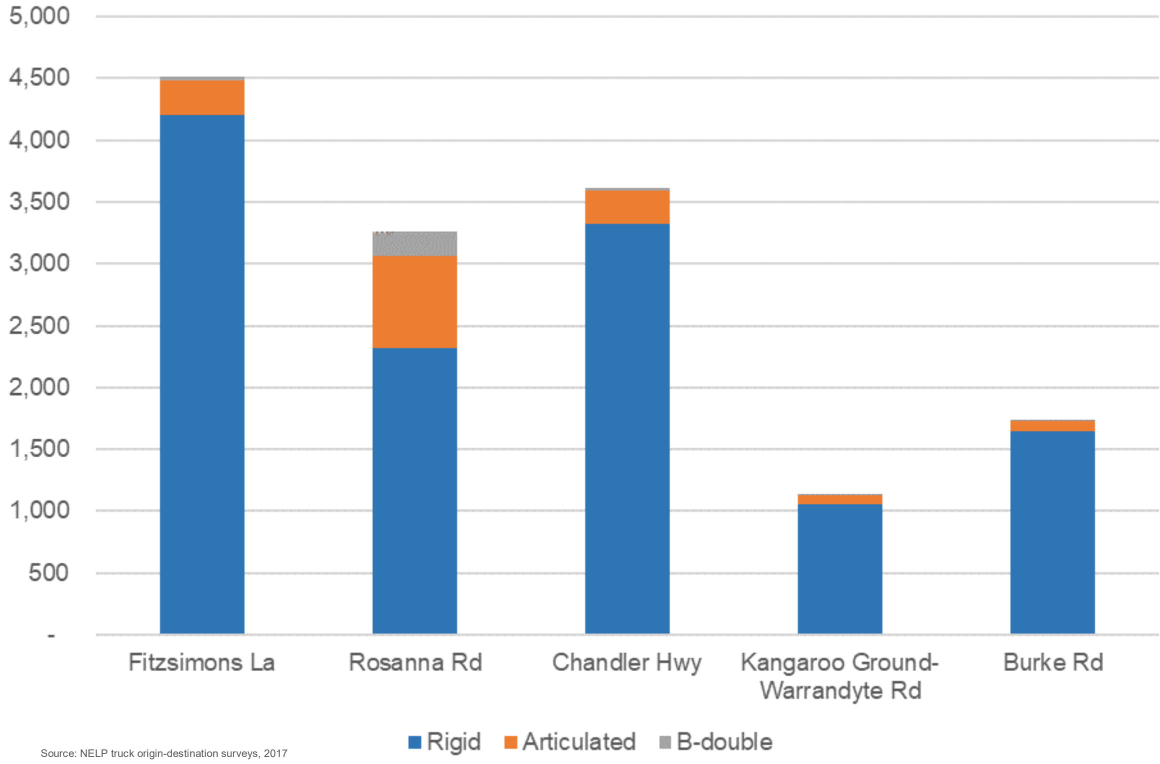


The topography and connectivity of the road network in the north-east region influences the type of freight vehicles that use different roads. A summary of the types of trucks using key roads in the north-east is provided in Figure 6-70.

While Fitzsimons Lane carries a large amount of freight vehicles each day, the bulk of these are smaller rigid trucks and not articulated trucks. This is due to the steep roads that connect to Fitzsimons Lane, particularly north of the Yarra River, which make this route unsuitable for larger vehicles.

Rosanna Road has less trucks per day than Fitzsimons Lane however it carries significantly more articulated or B-Double trucks due to its connectivity to the freeway network and more suitable grades for larger vehicles. Rosanna Road typically carries three times as many articulated trucks when compared with other key north-south roads within the north-east region.

Figure 6-70 – Truck types at key locations



Source: NELP truck origin-destination surveys, 2017

6.4.4 Placarded loads in the north-east

Australia uses a system of classification and labelling for the transportation of dangerous goods (HAZMAT), which can include explosives, gases and flammable liquids. Placarded loads are typically transported using trucks due to the volume and weight of loads requiring distribution.

A significant percentage of placarded loads in Melbourne are fuel tankers, which are based in the Yarraville and Newport precincts. Distribution from this area to the north and east tends to be on separate direct routes along the M80 Ring Road or the Eastern Freeway to access their destinations via arterial roads.

Current Victorian laws ban placarded loads from both the CityLink and EastLink tunnels. Trucks with dangerous goods are therefore required to seek alternative routes between EastLink and the Eastern Freeway, typically using Canterbury Road or Maroondah Highway and Springvale Road.

Surveys were performed in May 2017 to assess the percentage of placarded vehicles using key arterial routes between 10:00 am and 2:00 pm in the north-east. This was based on the results of the ATC surveys which showed that this period corresponded with peak heavy vehicle movements across the study area. The results of the surveys are presented in Table 6-9.

Table 6-9 – Placarded vehicle numbers 10:00 am–2:00 pm

Road	Total observed truck volume	Number of placarded vehicles	Percentage placarded vehicles
Fitzsimons Lane at Yarra River	518	3	0.5%
Plenty Road at Darebin Creek	266	4	1.5%
Lower Plenty Road at Rosanna Road	1,092	14	1.3%
Total	**1,876**	**21**	**1.1%**

Across the three routes, just over 1 per cent of total trucks were recorded as being placarded vehicles. This is a low proportion of overall truck demand, which is primarily due to the lack of fuel terminals in the north-east.

6.5 Walking and cycling network

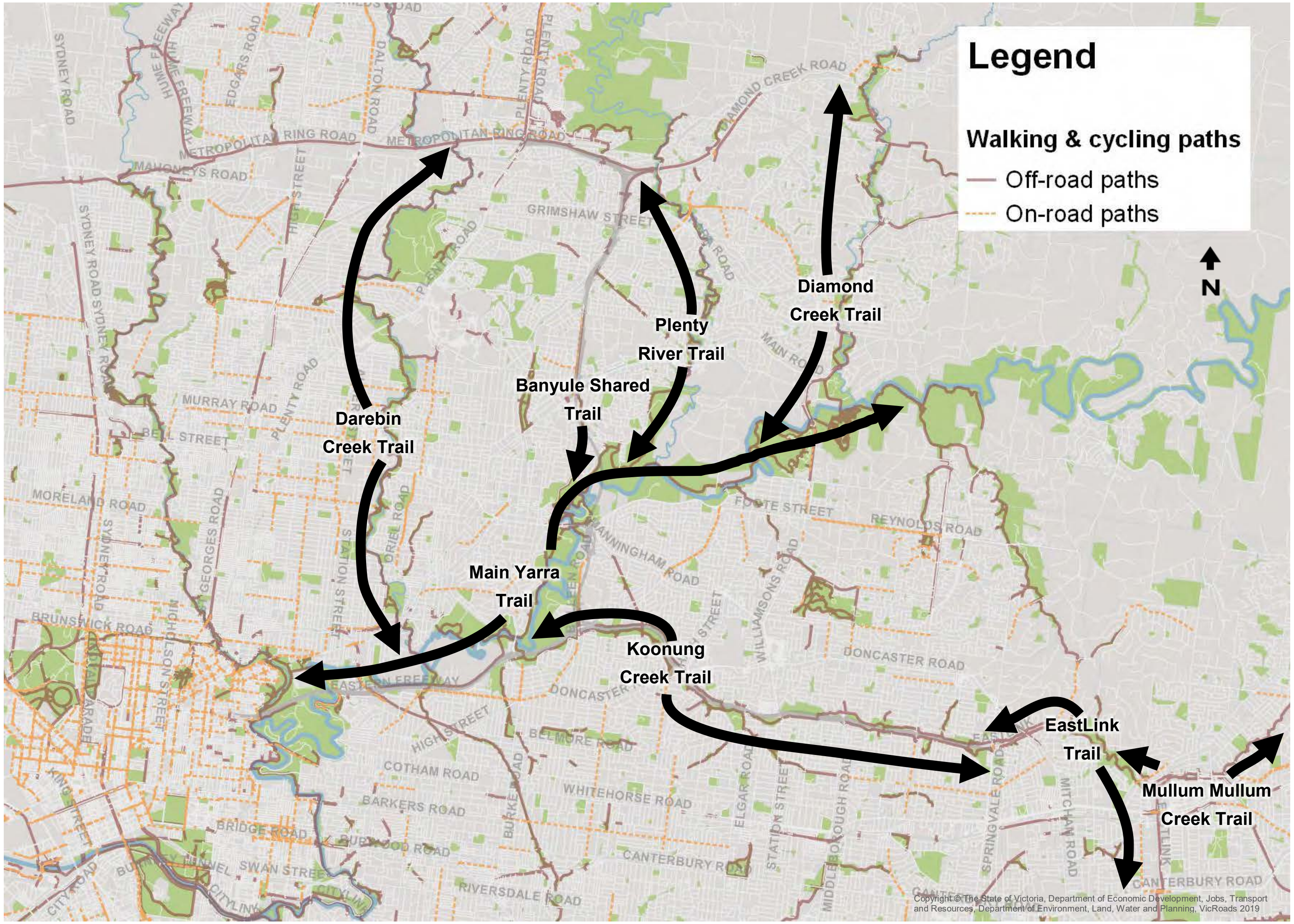
6.5.1 Walking and cycling network overview

The north-east has an existing network of shared use paths throughout, often running parallel to creeks, rivers and freeways. An overview of walking and cycling infrastructure within the study area is presented in Figure 6-71, along with the key linkages across the network.

A summary of the key paths across the network include:

- **The Main Yarra Trail** is a shared use path that commences in Templestowe at the Mullum Mullum Creek and follows the Yarra River through the north-eastern suburbs. It connects to many other feeder trails in the study area and provides connectivity to the inner suburbs and CBD via a network of on-road cycling paths.
- **Plenty River Trail** is a shared use path following the Plenty River through Greensborough and Lower Plenty. It provides a connection from Greensborough Bypass to the Main Yarra Trail.
- **Banyule Shared Trail/River Gum Walk** is a north-south, shared use path connecting Lower Plenty Road to the Main Yarra Trail in Heidelberg.
- **Diamond Creek Trail** is a 12-kilometre-long shared use path linking Diamond Creek with the Main Yarra Trail. It starts at Nillumbik Park and joins the Main Yarra Trail in Candlebark Park.
- **Darebin Creek Trail** is a shared use path that runs from the M80 Ring Road in Bundoora to the Main Yarra Trail near Alphington.
- **Koonung Creek Trail** is a shared use path running along the Eastern Freeway from Springvale Road to Burke Road, providing a link from the EastLink trail to the Main Yarra Trail.
- **EastLink trail** is a 28-kilometre-long shared use path that follows the EastLink tollway from Ringwood to Dandenong.
- **Mullum Mullum Creek Trail** spans the Yarra River in Templestowe to the EastLink trail in Donvale. A separate section of the trail also spans from Donvale to Croydon.

Figure 6-71 – Key north-east shared use paths



Bicycle infrastructure planning in Victoria is guided by Strategic Cycling Corridors (SCCs), which have been developed as an initiative of Plan Melbourne. SCCs are the cycling equivalent of arterial roads, and their principal aim is to improve access to NEICs and MACs. They have been developed as a subset of the broader Principal Bicycle Network (PBN) strategy, which focuses on cycling accessibility for local destinations.

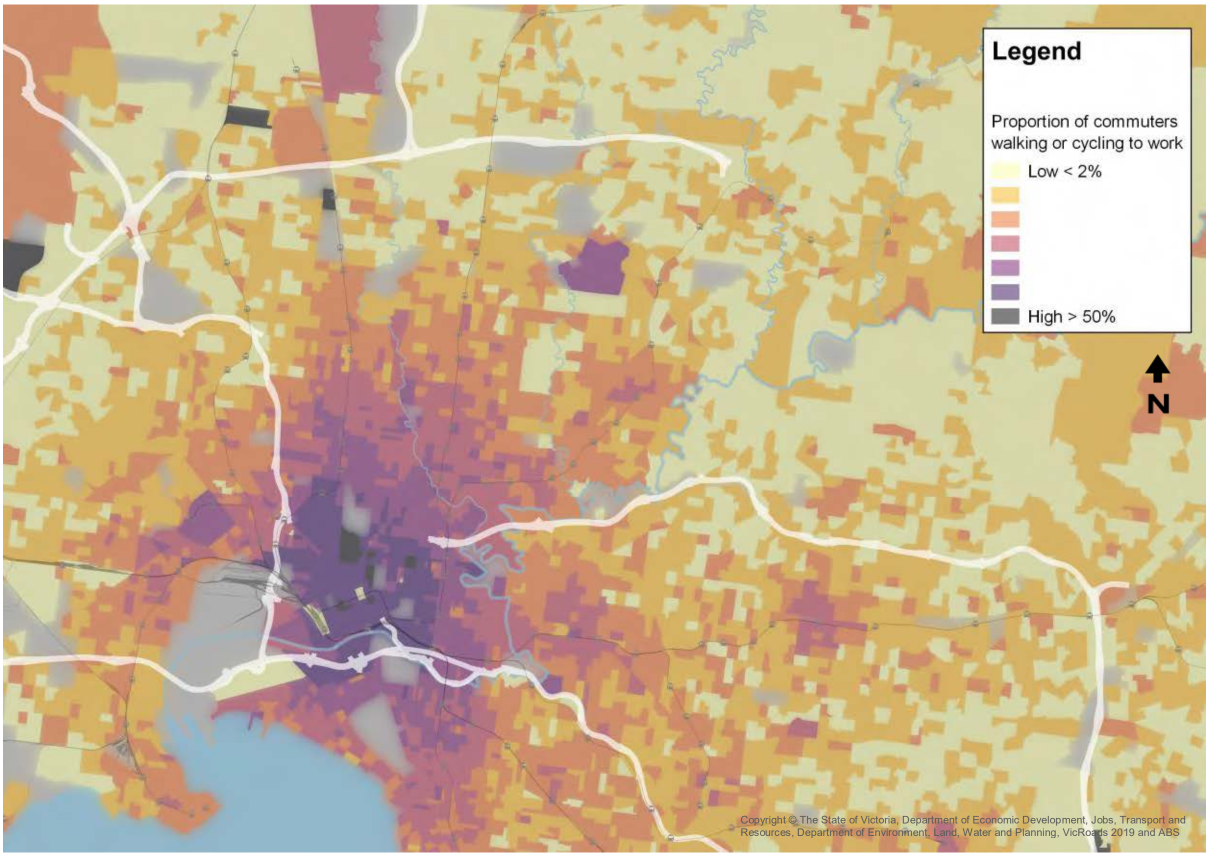
The current extent of the SCCs and PBN, along with key activity centres in the north-east, are presented in Figure 6-72. In general, the existing cycling network is dis-jointed, and provides limited connectivity between activity centres. There are few on-road paths, especially those providing east-west connectivity. The strongest element of the existing network are its creek and river trails which, while they provide low-stress, off-road connections, can be indirect and unsuitable as commuting corridors.

Figure 6-72 – Existing cycling infrastructure in the study area (only existing PBN and SCC routes)

6.5.2 Pedestrian and cycling volumes

ABS Journey to Work data is presented in Figure 6-73 and shows the proportion of residents who walk or cycle to work. Active transport as a commuting mode is most concentrated in the inner suburbs of Melbourne, where it can account for 30 to 40 per cent of all work trips. The proportion of people cycling and walking to work is relatively low in the north-east, at 1.6 per cent and 0.4 per cent respectively. This is lower than the metropolitan Melbourne average of 2.6 per cent and 2.7 per cent respectively. This can be attributed to a low population and employment density, the dominance of single-use land use and limited walking and cycling accessibility.

Figure 6-73 – Proportion of residents (by SA2 statistical area) that walk or cycle to work



Weekday bicycle volumes along cycling corridors servicing the CBD are compared in Figure 6-74. The busiest corridors along Gardiners Creek Trail and St Kilda Road facilitate over 2,000 cycling trips per day between the south-east and the inner suburbs. The Main Yarra Trail near Punt Road also services large cycling volumes, between approximately 1,000 to 2,000 trips per day. Volumes along the Main Yarra Trail at Chandler Highway however are significantly lower, at under 600 trips per day. This reflects the lower-quality bicycle infrastructure in this area, as well as the limited connectivity to feeder routes and activity centres.

Figure 6-74–Average weekday bicycle volumes along key cycling corridors, 2010 to 2012

Cyclist and pedestrian counts were also collected by NELP within the project study area. Surveys were conducted over both the AM and PM peaks, with weekday peak hour results presented in Table 6-10 for each site. The data represents the number of pedestrian and cyclist movements recorded at each site over the AM and PM peak hours. Three sites surveyed both on-road and off-road cycling volumes: Elder Street/Greensborough Road, Rosanna Road/Banyule Road and Rosanna Road/Station Road.

The collected sites were concentrated around paths and crossings of North East Link as well as the Eastern Freeway. A map of the site numbers is presented in Figure 6-75.

The majority of surveys were conducted on Thursday 22 February 2018, Thursday 29 November and Thursday 6 December 2018, while one site (Main Yarra Trail under Banksia Street) was collected on Tuesday 22 May 2018. Cycling volumes are subject to seasonality, with higher volumes typically recorded in summer and the warmer months of spring and autumn. As the majority of surveys were conducted in February, November and December the resultant volumes are likely to be higher than average across the year.

The busiest site for pedestrian volumes was the Watsonia railway station overpass which provides direct access to the platforms. Over 1,000 pedestrians were recorded using this overpass across the AM and PM peak hours. The intersection at Elder Street and Greensborough Bypass recorded the second-highest pedestrian counts, at over 600 across the AM and PM peak periods. Pedestrians recorded at this site are likely to be accessing Watsonia railway station, and therefore also recorded at the station overpass.

Cycling volumes were generally higher at inner-city sites, such as the Main Yarra Trail, Merri Creek crossings and the Fairfield Park pipe bridge. The Elder Street/Greensborough Road intersection recorded higher cycling volumes than nearby sites, which may reflect demand to access the station and the Watsonia Road shopping precinct.

Table 6-10 –AM and PM peak hour walking and cycling movements recorded by site

Site No.	Site name	Site location	AM peak hour		PM peak hour	
			Pedestrians	Cyclists	Pedestrians	Cyclists
1	Banyule Shared Trail/River Gum Walk	At Banyule Road	17	6	13	24
2	Belford Road and Kilby Road	At intersection	13	1	19	3
3	Elder St and Greensborough Road	At intersection	374	50 (off-road) 8 (on-road)	243	18 (off-road) 5 (on-road)
4	Eram Road pedestrian bridge and Koonung Creek Trail	At intersection (south of Eastern Freeway)	17	58	21	56
5	Erskine Road and Greensborough Road	At intersection	16	7	9	1
6	Estelle Street bridge	Over Eastern Freeway	29	23	18	11
7	Fairfield Park pipe bridge	At bridge	21	85	15	72
8	Greensborough Road and Yallambie Road	At intersection	6	6	4	8
9	Greensborough Road and Drysdale Street	At intersection	5	11	1	15
10	Grimshaw Street and Greensborough Road	At intersection	34	5	18	6
11	Heyington Avenue pedestrian bridge and Koonung Creek Trail	At intersection (south of Eastern Freeway)	59	53	41	71
12	Koonung Creek Trail	Between Estelle Street bridge and Bulleen Road (north of Eastern Freeway)	20	9	8	6
13	Koonung Creek Trail	At the Musca Street Reserve Eastern Freeway underpass	6	89	11	83
14	Koonung Creek Trail	Between Bulleen Road and Highview Road (south of Eastern Freeway)	7	80	7	61
15	Lower Plenty Road and Greensborough Road	At intersection	17	42	15	34
16	Lower Plenty Road and St James Road	At intersection	13	0	10	0
17	Macorna Street Overpass	At overpass	10	7	14	10
18	Main Yarra Trail	Under Banksia Street	4	32	N/A	N/A
19	Main Yarra Trail and Eastern Freeway Kilby Road underpass/Darebin Link Path	At intersection	10	145	15	122
20	Main Yarra Trail	West of Burke Road at Yarra River	7	71	8	64

Site No.	Site name	Site location	AM peak hour		PM peak hour	
			Pedestrians	Cyclists	Pedestrians	Cyclists
21	Main Yarra Trail and Belford Road	At intersection	10	139	9	86
22	Merri Creek bridge	North of Eastern Freeway	48	43	17	38
23	Merri Creek bridge	South of Eastern Freeway	76	163	13	138
24	Nell Street overpass	At overpass	12	20	9	6
25	Plenty Road	North of M80 Ring Road	36	77	N/A	N/A
26	Rosanna Road and Banyule Road	At intersection	58	1 (off-road) 2 (on-road)	26	3 (off-road) 0 (on-road)
27	Rosanna Road and Station Road	At intersection	20	4 (off-road) 1 (on-road)	12	1 (off-road) 1 (on-road)
28	Watsonia Station overpass	At overpass	634	3	385	3
29	Yando Street underpass	At underpass	3	1	6	1
30	Yarra Street and Rosanna Road	At intersection	43	0	48	0
31	Yarra Street and Mount Street	At intersection	819	1	125	0

Figure 6-75 – Pedestrian and cyclist survey locations

6.5.3 Local accessibility

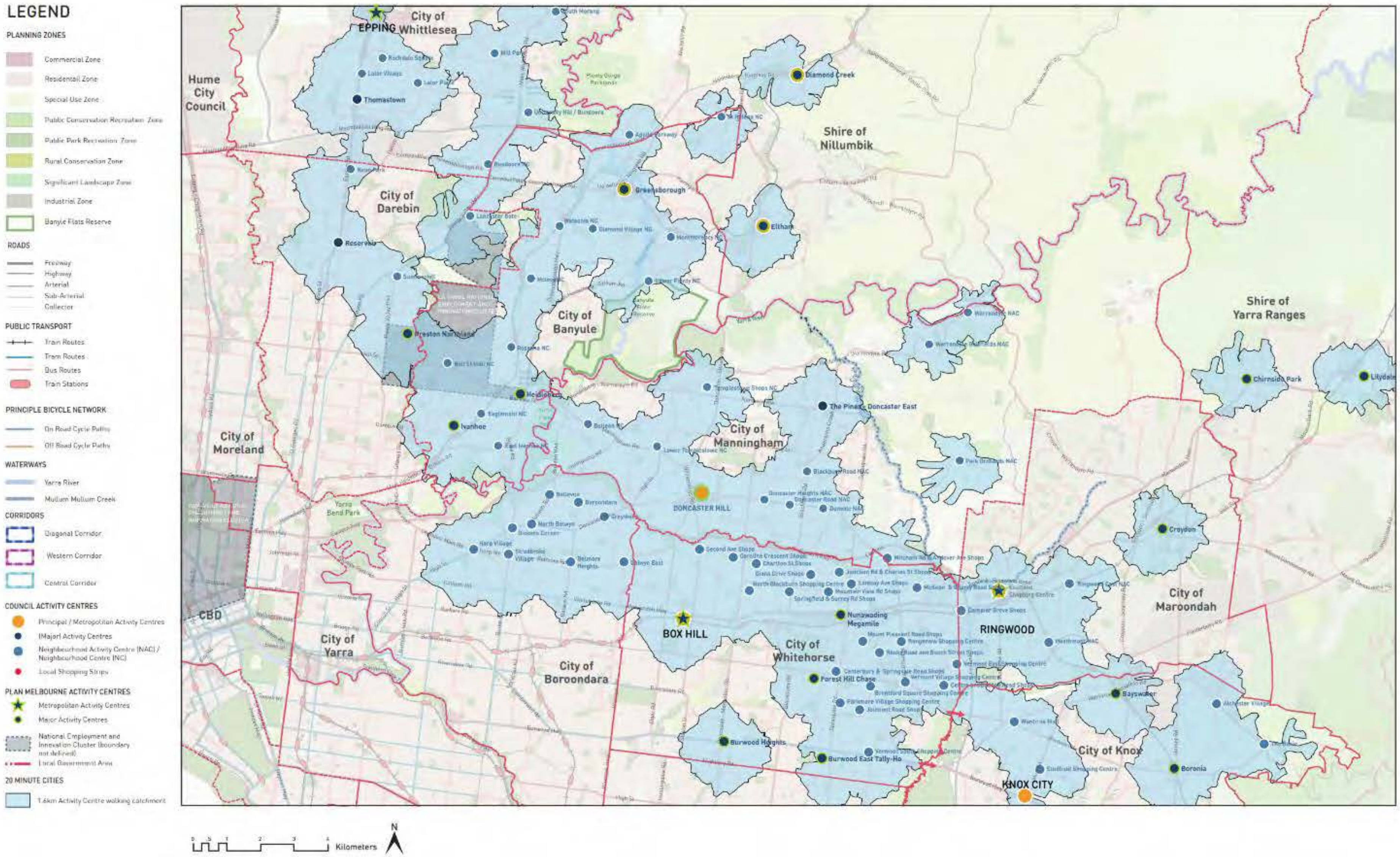
The 20-minute neighbourhood concept supports the practice of 'living locally' whereby people can meet most of their daily needs within a 20-minute walk, bicycle ride or public transport trip. As a key concept of Plan Melbourne, the initiative is centred around accessibility to local services, shops, recreation and education.

An analysis of the 1.6 kilometres walking catchment around activity centres in Melbourne's north-east is presented in Figure 6-76. It should be noted the map only indicates the physical extents accessible within a 20-minute walk and does not account for the amenity or quality of the catchment.

In general, the 20-minute neighbourhood concept is more readily matched to the southern and western portions of the study area than to the outer north-east. This is due to their more compact nature and grid-structured streets and paths. Neighbourhoods in the northern and eastern reaches of the study area are restricted by sparser development patterns, a wider dispersal of neighbourhood centres and topographical qualities that increase the difficulty of walking and cycling for a large proportion of the population. Major activity centres throughout the study area exhibit various degrees of connectivity with the cycling network, although few that are located north of the Eastern Freeway are connected via commuter-quality cycling facilities.

Despite this, the spatial coverage of the 1.6-kilometre catchments demonstrates the potential for 20-minute neighbourhoods to be realised across the north-eastern region of Melbourne.

Figure 6-76 – 20-minute neighbourhood catchments

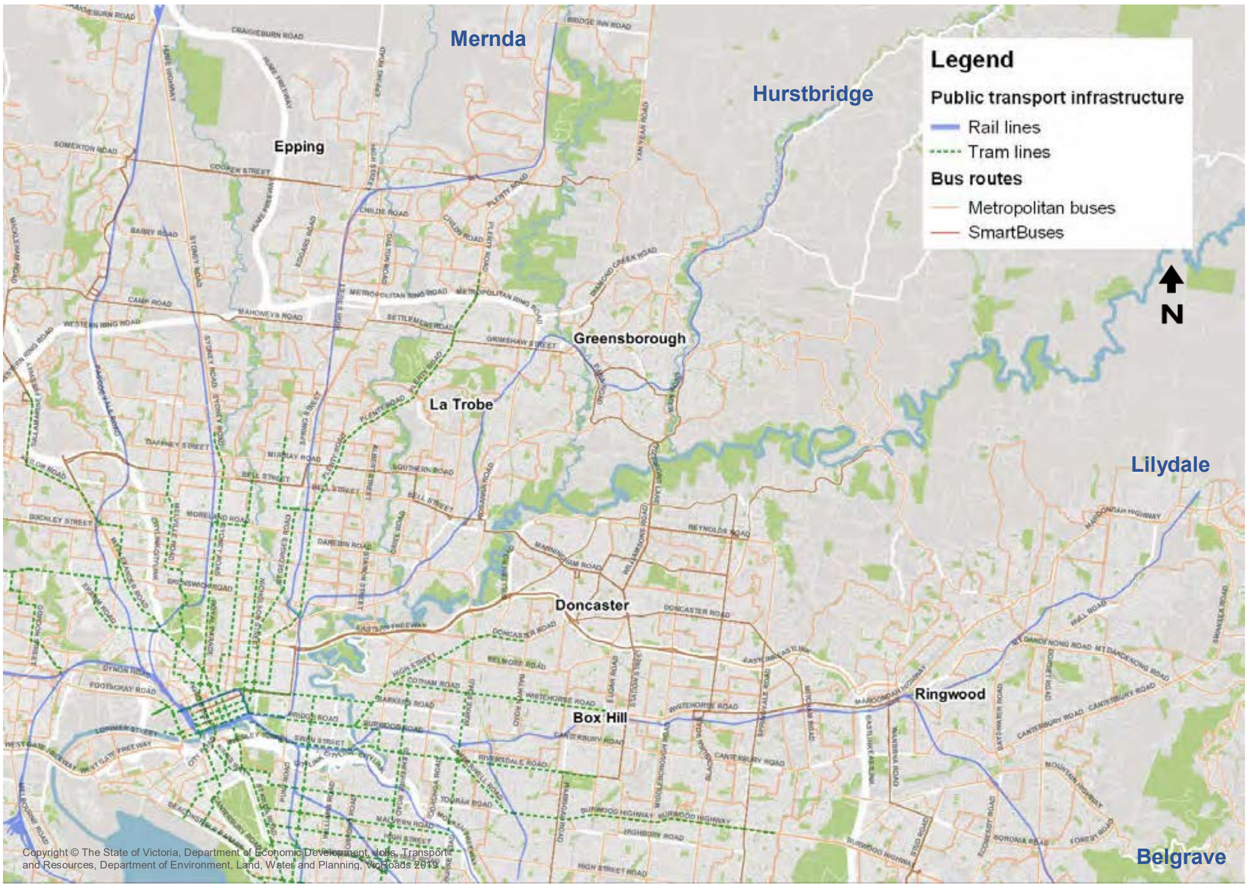


6.6 Existing public transport network

Train, tram and bus routes servicing the north-east are presented in Figure 6-77. The north-east has access to multiple public transport modes, including trains and trams for radial movements and bus services for orbital movements. Despite this, the north-east has a lower share of public transport usage than metropolitan Melbourne on average, at 14 per cent and 19 per cent respectively.

The following sections discuss the status and patronage levels of the metropolitan train, tram and bus networks.

Figure 6-77 – Public transport routes



6.6.1 Trains

The Hurstbridge and Mernda rail lines cover much of the north-eastern suburbs, while the Lilydale and Belgrave lines service the eastern suburbs. A service gap exists between the Hurstbridge and Lilydale lines, which is supplemented by DART bus services.

The rail service frequencies are summarised in Table 6-11. Rail services to terminus stations run every 6 to 20 minutes in peak periods, and generally run every 10 to 20 minutes in off-peak periods.

Table 6-11 – Summary of train service frequencies (weekday, from terminus stations)

Rail line	Peak period service frequency	Off-peak period service frequency
Hurstbridge	Every 20 minutes Every 7 minutes from Greensborough	Every 20 minutes
Mernda	Every 6 minutes	Every 20 minutes
Lilydale and Belgrave	Every 5 – 10 mins between Ringwood and the CBD Every 10 – 20 minutes east of Ringwood	Every 10 mins between Ringwood and the CBD Every 20 minutes east of Ringwood

Weekday boardings by line from the 2016 model are presented in Table 6-12. Note that the Mernda rail line extension was completed in 2018, and therefore the modelled 2016 boardings along this corridor reflect the South Morang line. The Hurstbridge and South Morang lines have similar levels of patronage at just under 30,000 boardings per weekday. The Lilydale/Belgrave corridor has much higher patronage at approximately 80,000 passengers per day, reflective of the higher population density in the eastern suburbs. AM peak boardings are higher than other times of the day, due to the tidal nature of public transport demand to the CBD.

Table 6-12 – Rail boardings by line, 2016

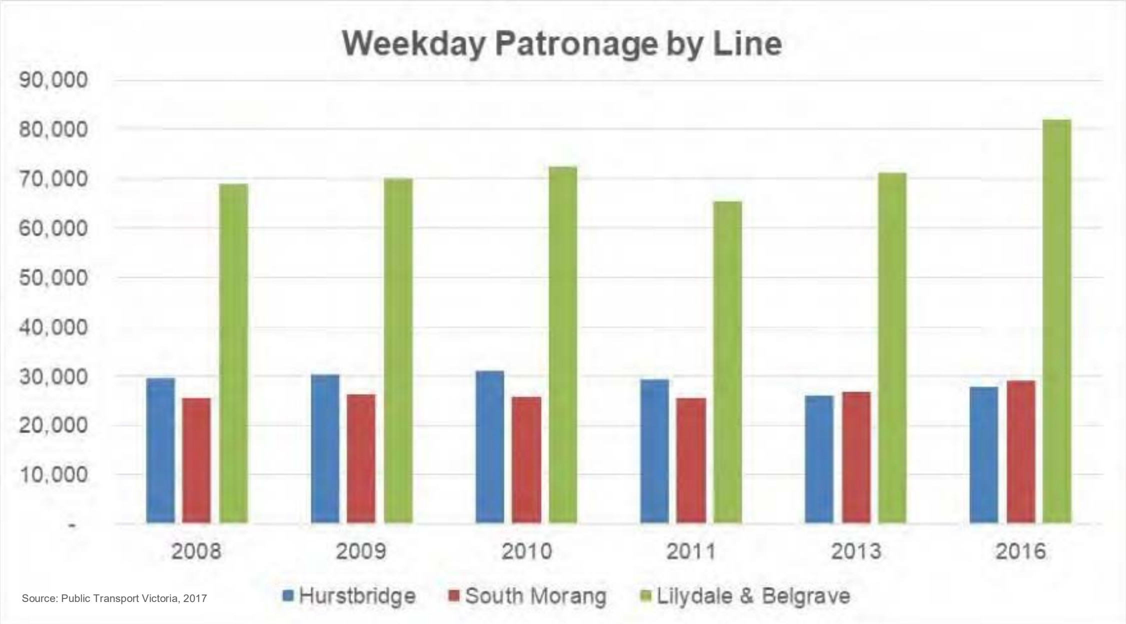
Rail line	AM peak	Inter-peak	PM peak	Evening off-peak	Total weekday
Hurstbridge	12,600	6,200	4,400	4,600	27,800
South Morang*	11,200	7,800	4,600	5,600	29,100
Lilydale and Belgrave	29,400	20,600	18,200	13,700	81,900

Source: PTV. Hurstbridge line includes boardings between Hurstbridge and Westgarth. South Morang line includes boardings between South Morang and Rush all. Lilydale & Belgrave lines including boardings between Lilydale/Belgrave and Hawthorn.

**Boardings reflect 2016 conditions, prior to the completion of the Mernda rail line extension (completed 2018).*

Observed historical weekday patronage by line is presented in Figure 6-78. Patronage on the South Morang and Lilydale/Belgrave rail lines grew by 14 per cent and 19 per cent respectively from 2008 to 2016, while patronage on the Hurstbridge rail line decreased a small amount over the same period.

Figure 6-78 – Historical weekday patronage by line, 2008 to 2016 (observed)*



**Note the Mernda rail line extension was completed in 2018, and patronage data was not available at the time of preparing this assessment. The data for this corridor reflects the Epping/South Morang line.*

6.6.2 Trams

Tram lines are clustered in the western edge of the study area as they proceed radially from the CBD. Tram route 86 to Bundoora RMIT, route 48 to North Balwyn and 109 to Box Hill are the key routes that operate within the study area.

A summary of the tram service frequencies can be found in Table 6-13. In general, tram services operate every 6 to 10 minutes in peak periods, and every 10 to 20 minutes in off-peak periods.

Table 6-13 – Summary of tram service frequencies (weekday)

Rail line	Peak period service frequency	Off-peak period service frequency
11 – West Preston – Victoria Harbour Docklands	Every 6 mins	Every 10 – 20 minutes
48 – North Balwyn – Victoria Harbour Docklands	Every 6 – 10 minutes	Every 10 – 20 minutes
86 – Bundoora RMIT – Waterfront City Docklands	Every 6 – 10 minutes	Every 10 – 20 minutes
109 – Box Hill – Port Melbourne	Every 6 mins	Every 10 – 20 minutes

Source: PTV

6.6.3 SmartBus and DART buses

SmartBus is a high frequency service providing a cross-city and orbital service around Melbourne. Key aspects of SmartBus are extended timetables, real time information at bus stops and priority at signalised intersections.

All SmartBus routes travel through the study area. The DART bus routes (905, 906, 907 and 908) are of particular significance to this assessment as the Doncaster, Templestowe and Warrandyte areas are heavily reliant on these services. A map of the SmartBus routes are presented in Figure 6-79, while a map of the DART routes is shown in Figure 6-80.

A number of bus services in the east operate via the Doncaster Park and Ride facility, located on Doncaster Road. It provides 400 car parking spaces and is serviced by 10 different bus routes including the 907 and 908 DART services. Typical travel time to the CBD is approximately 40 minutes, with the greatest delays occurring along Hoddle Street and Victoria Parade.

Figure 6-79 – SmartBus routes

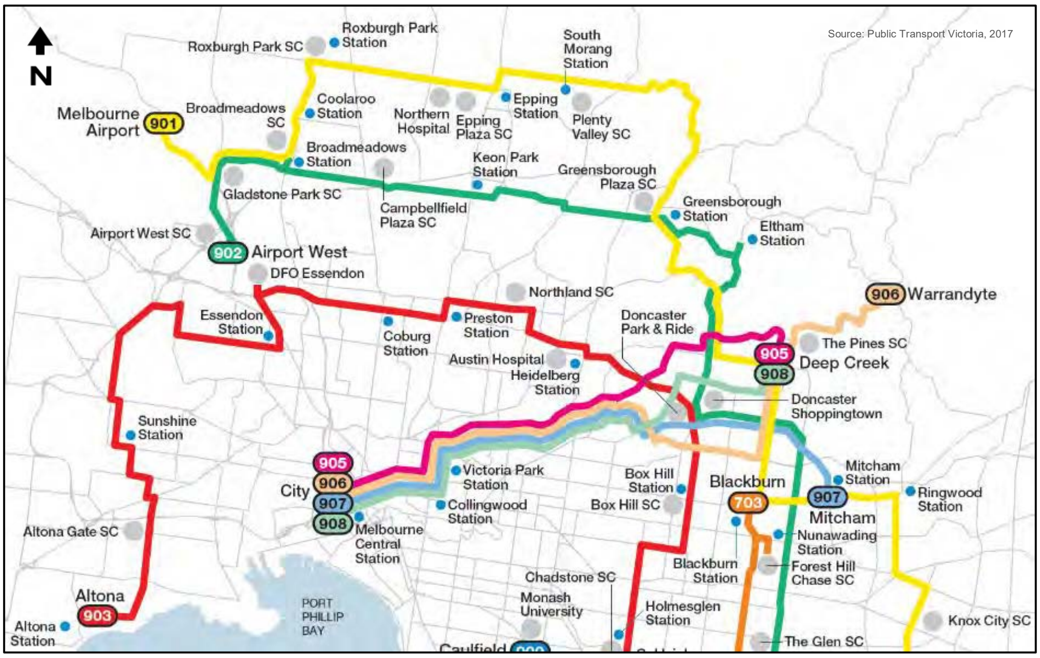


Figure 6-80 – DART bus routes

SmartBus and DART service frequencies and daily patronage are summarised in Table 6-14.

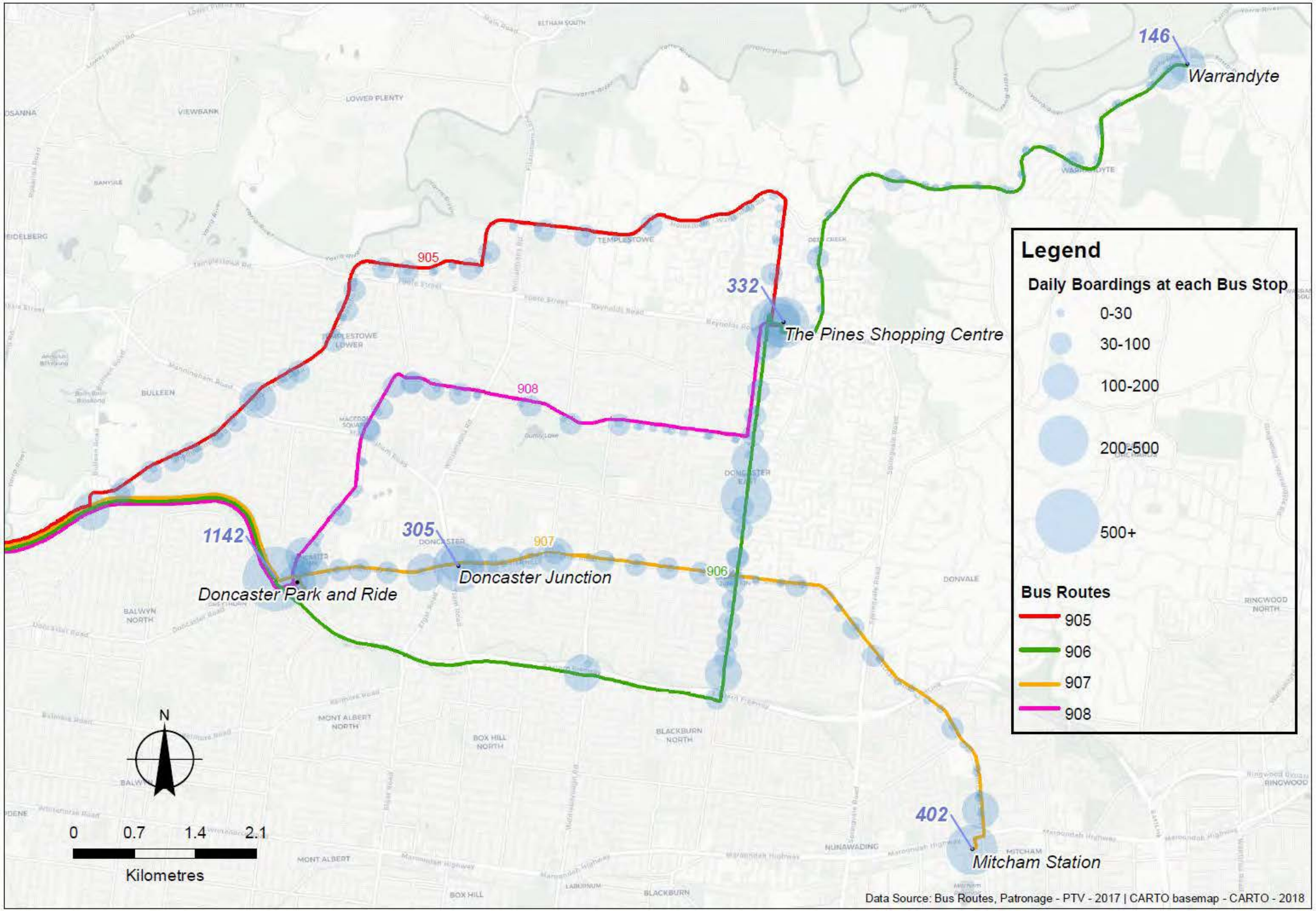
Table 6-14 – Summary of SmartBus service frequencies (weekday)

SmartBus route	Peak period service frequency	Off-peak period service frequency	Daily patronage
703 – Middle Brighton – Blackburn	Every 10 to 15 minutes	Every 10 to 15 minutes	8,000
901 – Frankston – Melbourne Airport	Every 10 to 14 minutes	Every 15 minutes	14,000
902 – Chelsea – Airport West	Every 15 minutes	Every 15 minutes	14,000
903 – Altona – Mordialloc	Every 8 to 12 minutes	Every 15 minutes	18,000
905 – City The Pines SC	Every 6 to 10 minutes	Every 15 minutes	4,000
906 – City – Warrandyte	Every 5 to 10 minutes	Every 15 minutes	5,000
907 – City – Mitcham	Every 6 to 10 minutes	Every 15 minutes	6,000
908 – City – The Pines SC	Every 6 to 15 minutes	Every 15 minutes	3,000

Source: PTV (2016)

Daily patronage numbers at individual stops on the DART network within Manningham are presented in Figure 6-81. It shows that key locations for DART bus boardings in this area are at the Doncaster Park and Ride, Doncaster Junction and The Pines Shopping Centre.

Figure 6-81 – Daily DART boardings (within Manningham)



6.6.4 Metropolitan bus network

Metropolitan bus (non-SmartBus) routes have the largest coverage in the north-east and consist of radial, orbital and cross-town services. Over 100 routes operate across the north-east, which cater for approximately 97,000 boardings per average weekday. An overview of the metropolitan bus networks is provided in Figure 6-82 and Figure 6-83.

Figure 6-82 – Overview of metropolitan bus network, north

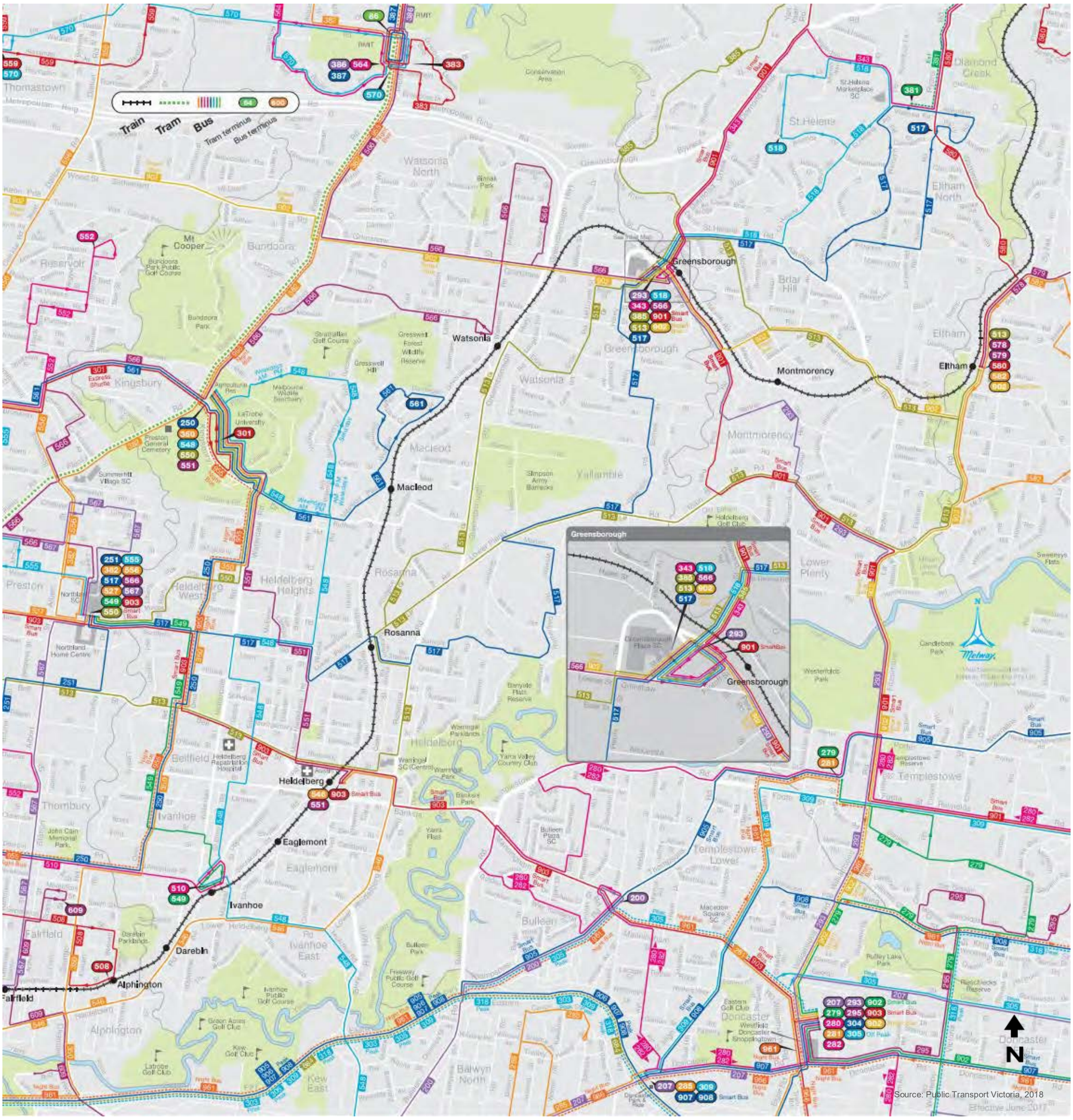
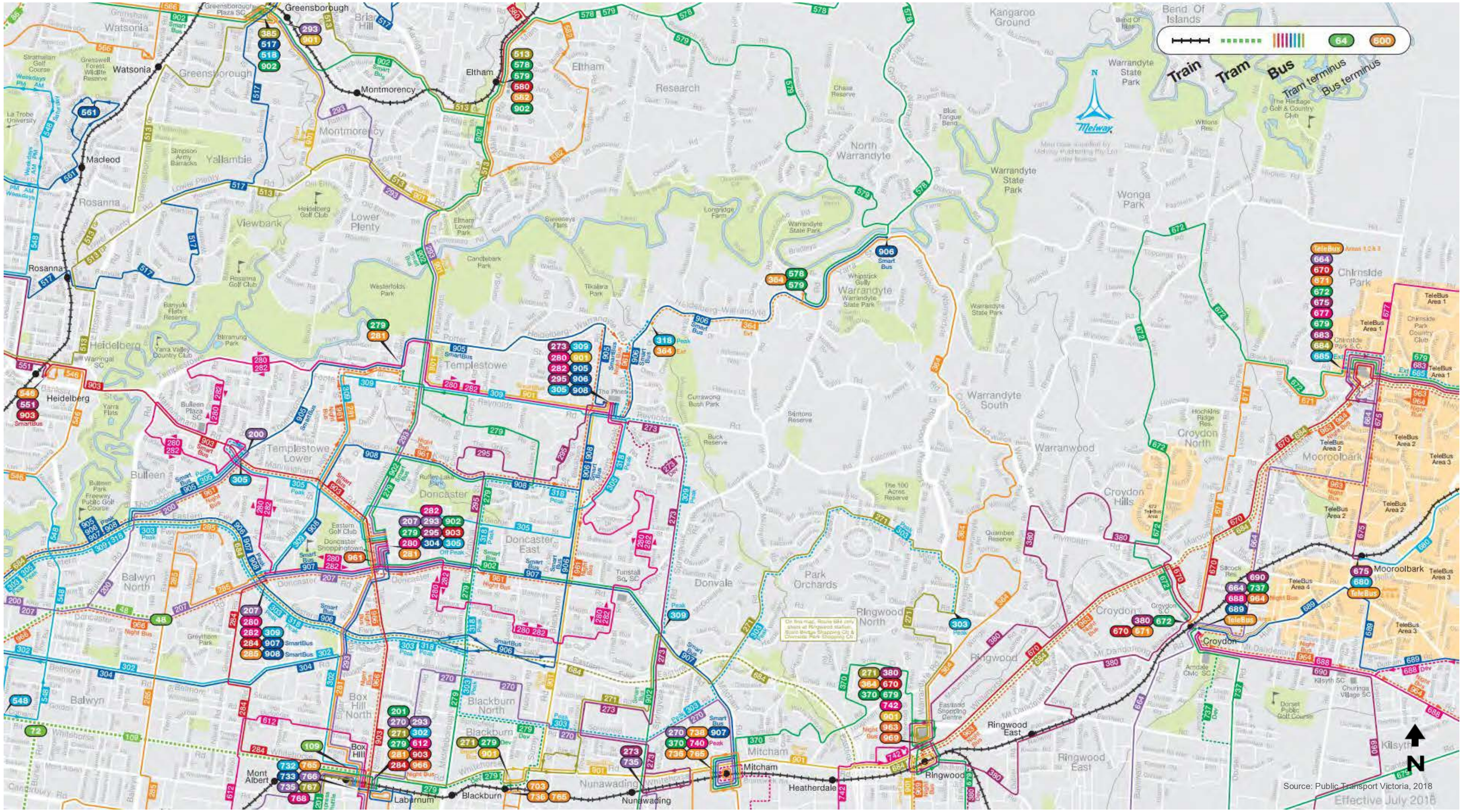


Figure 6-83 – Overview of metropolitan bus network, east



A summary of the weekday patronage on a selection of key bus routes (not including SmartBus) through the north-east is presented in Table 6-15.

Table 6-15 – Weekday patronage on select key metropolitan bus routes in the north-east

Route number	Route description	Daily patronage
200	Bulleen – City (Queen Street)	3,100
207	Doncaster SC – City (Queen Street)	3,500
250	La Trobe University – City (Queen Street)	2,500
270	Box Hill – Mitcham	1,600
281	Templestowe – Deakin University	1,400
284	Doncaster Park and Ride – Box Hill	250
293	Box Hill – Greensborough	1,100
302	Box Hill – City (Lonsdale Street)	2,800
508	Alphington – Moonee Ponds	3,200
513	Eltham – Glenroy via Lower Plenty	4,900
548	La Trobe University – Kew	1,500
550	La Trobe University – Northland SC	300
551	La Trobe University – Heidelberg	750
561	La Trobe University – Northland SC	2,600
609	Hawthorn – Fairfield	50

6.7 Crash history

6.7.1 Total reported crashes, 2012 to 2016

An assessment of reported crashes in the study area over the five-year period from 2012 to 2016 are presented in Table 6-16. Annual crashes have remained relatively constant over this period, with yearly fluctuations being within approximately 5 per cent. The exception to this is 2014 where crash numbers increased by approximately 8 per cent, however following this subsequently plateaued. The total change in the number of crashes from 2012 to 2016 is less than 1 per cent.

Table 6-16 – Reported crashes recorded within study area 2012 to 2016

Year	Fatal	Serious injury	Other injury	Total
2012	24	615	1,621	**2,260**
2013	11	598	1,573	**2,182**
2014	11	585	1,767	**2,363**
2015	13	551	1,823	**2,387**
2016	20	530	1,777	**2,327**
Total	**79**	**2,879**	**8,561**	**11,519**

6.7.2 Transport modes involved in crashes

The proportion of transport modes involved in crashes across the study area are presented in Table 6-17. The percentages reflect all participants involved in crashes across the study area, disaggregated by transport mode. The data shows that passenger vehicles account for the bulk of crashes in the study area, at approximately 78 per cent. Cyclists and pedestrians account for approximately 14 per cent of study area crashes.

The table also shows that heavy vehicles are only represented in approximately 1 per cent of crashes. Heavy vehicle kilometres travelled account for approximately 7 per cent of total travel in the north-east (as presented in Section 6.4.3) indicating that heavy vehicles are underrepresented in crashes within the study area.

Table 6-17 – Transport modes involved in crashes

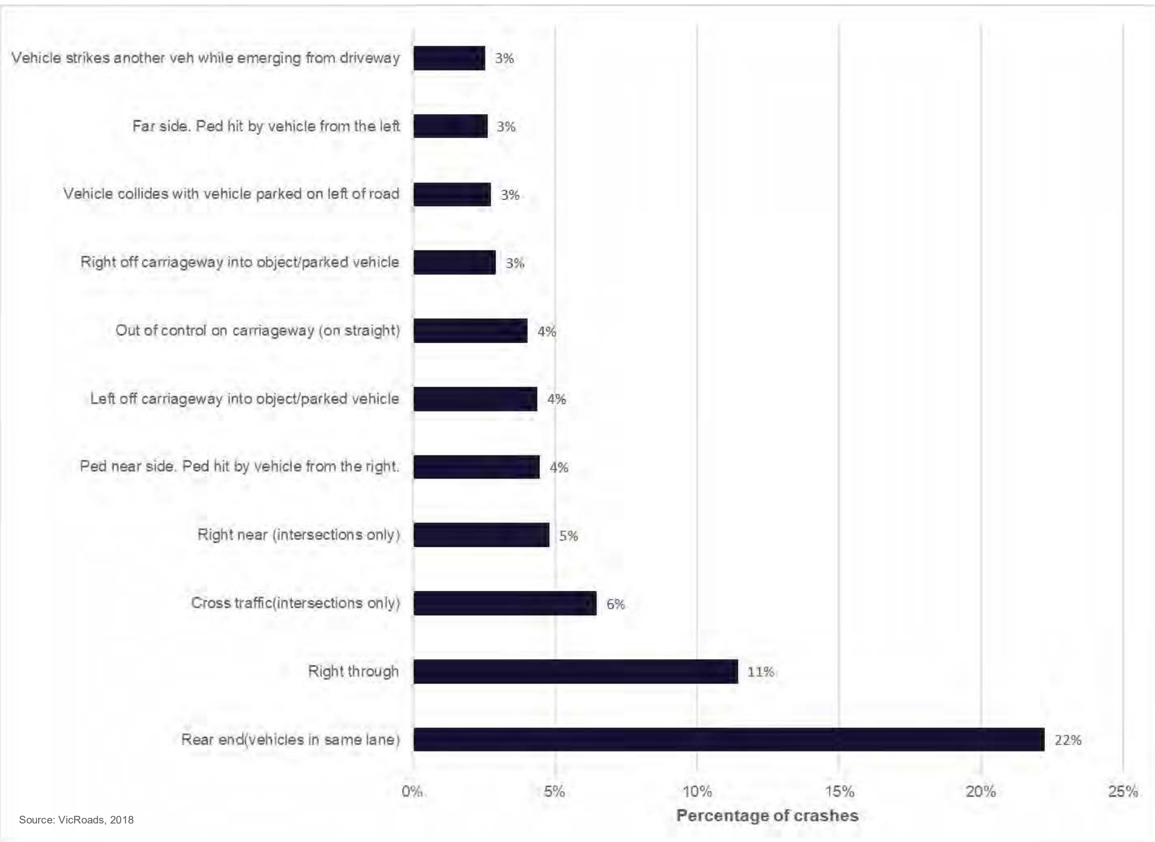
Transport mode	Proportion of crashes
Passenger vehicles	78%
Motorcycles	6%
Heavy vehicles	1%
Public vehicles (bus/tram)	1%
Cyclists	8%
Pedestrians	6%

6.7.3 Types of crashes

The most common type of accidents that occurred between two vehicles was a rear-end collision between vehicles in the same lane. This type of common collision suggests a high level of congestion on roads, with suddenly stopping traffic resulting in this type of collision.

Vehicles turning right at an intersection and colliding with opposing through vehicles was the second most frequent movement in the recorded crashes. These right through crashes are also likely due to congestion, resulting in frustrated drivers picking inadequate gaps in the traffic. The 10 most frequent accident movements have been classified and presented in Figure 6-84.

Figure 6-84 – Top reported crash types 2012 to 2016 within the north-east



6.8 Crash hotspots

A series of crash density charts have been prepared to assist in the identification of ‘crash hotspots’. The charts depict the concentration of historical crashes within the study area, and are weighted by the total number of vehicles involved in each incident (ie if three cars were involved in a single crash, the density charts count all three vehicles).

6.8.1 All vehicles

The all vehicle hotspot analysis is presented in Figure 6-85. It shows a significant hotspot in the south-western corner of the study area which is at the edge of the inner city. This hotspot is likely due to the greater density of transport activity in this area, along with higher overall congestion levels.

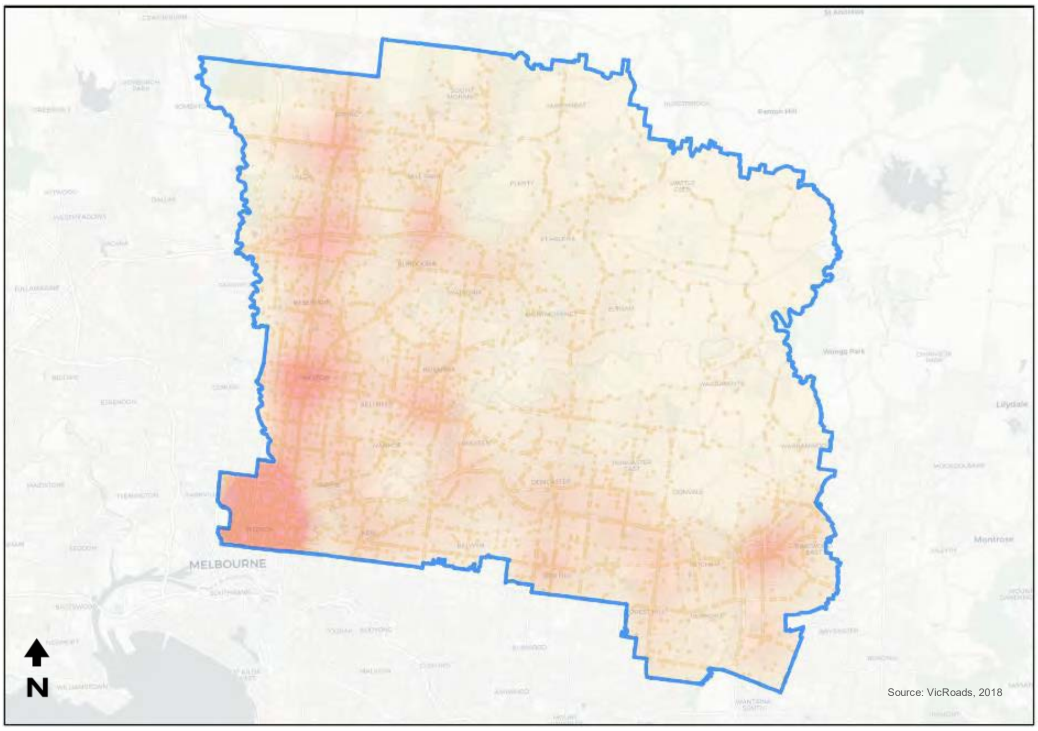
Other hotspot locations include:

- M80 Ring Road and Plenty Road
- Bell Street in Preston
- Sydney Road between the M80 Ring Road and Epping
- Whitehorse Road in Box Hill
- Maroondah Highway in Ringwood.

The hotspots in Box Hill and Ringwood can be mainly attributed to the activity centres and the congestion that occurs in this area. These locations generally have a greater number of intersections and turning movements at both intersections and mid-blocks.

The hotspot along the M80 Ring Road and Plenty Road can be attributed to the high levels of congestion that occur at this interchange, particularly in the PM peak period. Collisions with pedestrians represented almost 20 per cent of the crashes in these areas.

Figure 6-85 – Hotspots of all reported vehicle crashes 2012 to 2016



6.8.2 Heavy vehicle crash hotspots

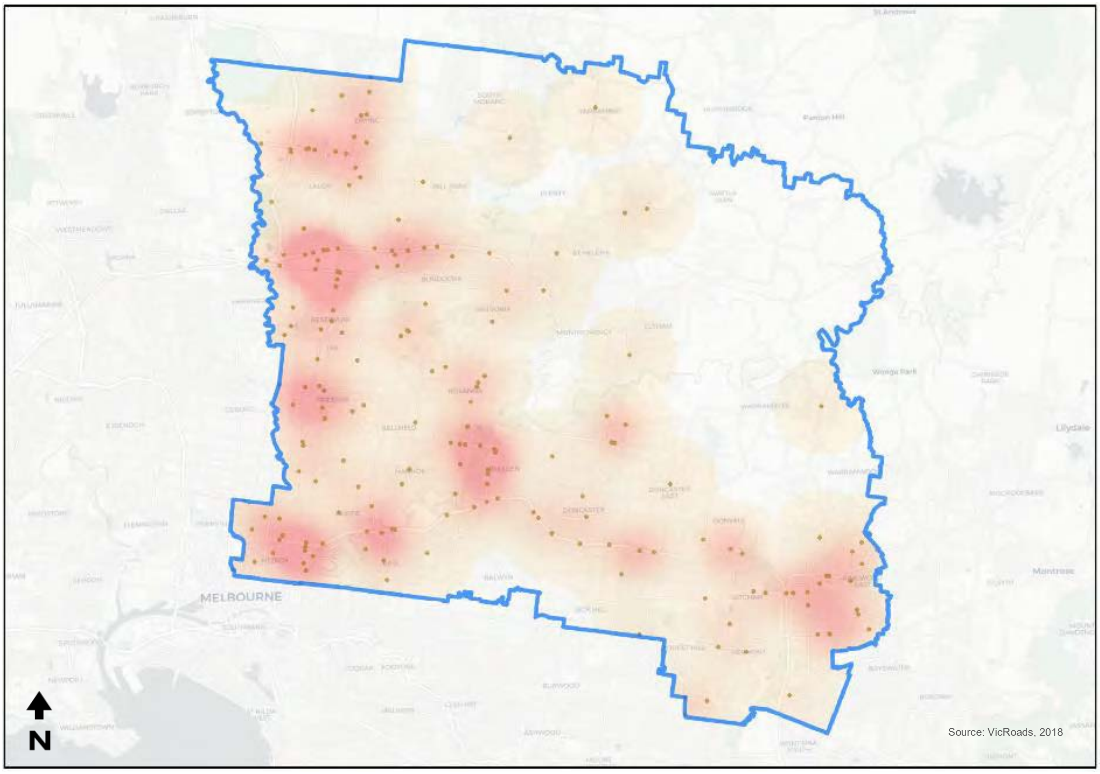
The heavy vehicle hotspots are presented in Figure 6-86 and generally align to locations of high heavy vehicle volumes. The following locations are the key hotspots in the study area:

- M80 Ring Road, Edgars Road and Mahoney's Road
- Hoddle Street and Alexandra Parade
- Bulleen Road, Banksia Street and Manningham Road.

Due to the low number of crashes involving heavy vehicles (approximately 2 per cent of all crashes), trends between hot spot locations varied. Freeway locations often resulted in crashes involving multiple vehicles due to their high volume and high speed of vehicles, while arterial locations were typically between two vehicles.

The most common cause of crashes involving heavy vehicles were rear end collisions, and were typically between a heavy vehicle and a passenger vehicle. The next most common cause of crashes was due to lane changing. These crashes can be attributed to congestion, with flow breakdown causing rear end collisions and heavy traffic causing lane changing and side swipe incidents.

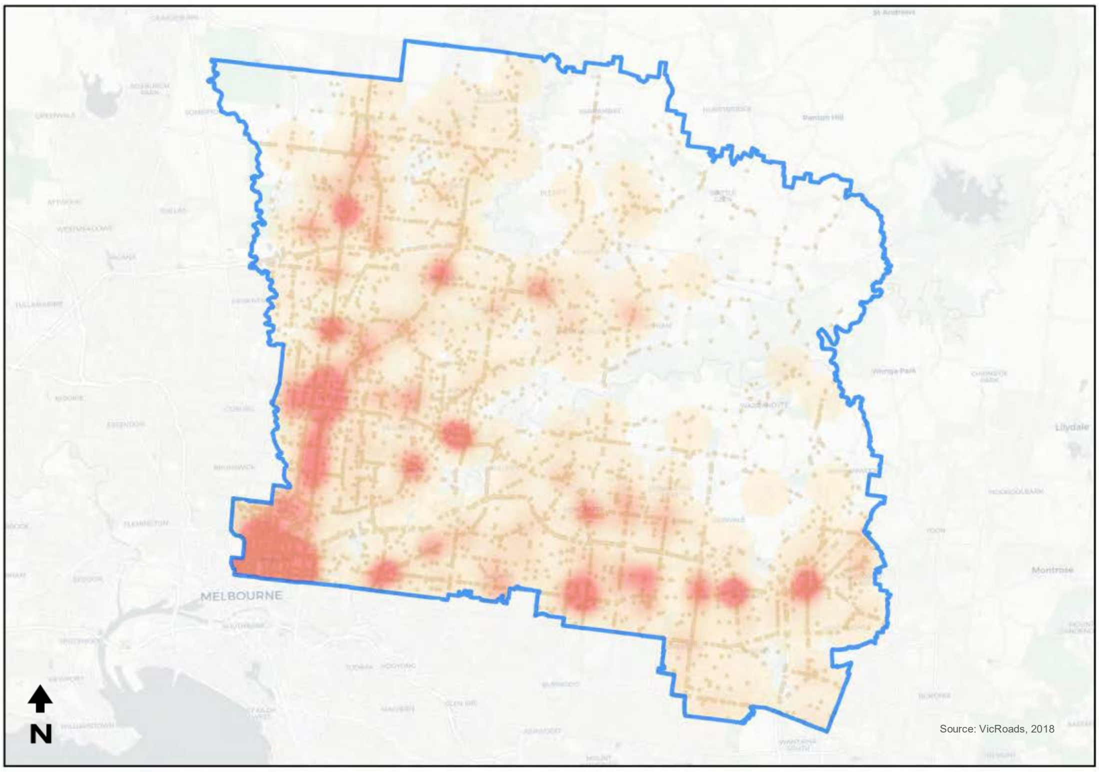
Figure 6-86 – Hotspots of reported crashes involving heavy vehicles 2012 to 2016



6.8.3 Pedestrian and cyclist crash hotspots

Pedestrian crash hotspots are presented in Figure 6-87. These crashes tend to be concentrated within the inner city and near activity hubs such as Heidelberg, Box Hill, Ringwood and Preston. These areas generally attract a relatively high number of walking trips due to the presence of shopping precincts, train stations and local employment hubs. Areas further to the north-east had a lower concentration of crashes involving pedestrians due to the generally sparser population and lower propensity for active travel.

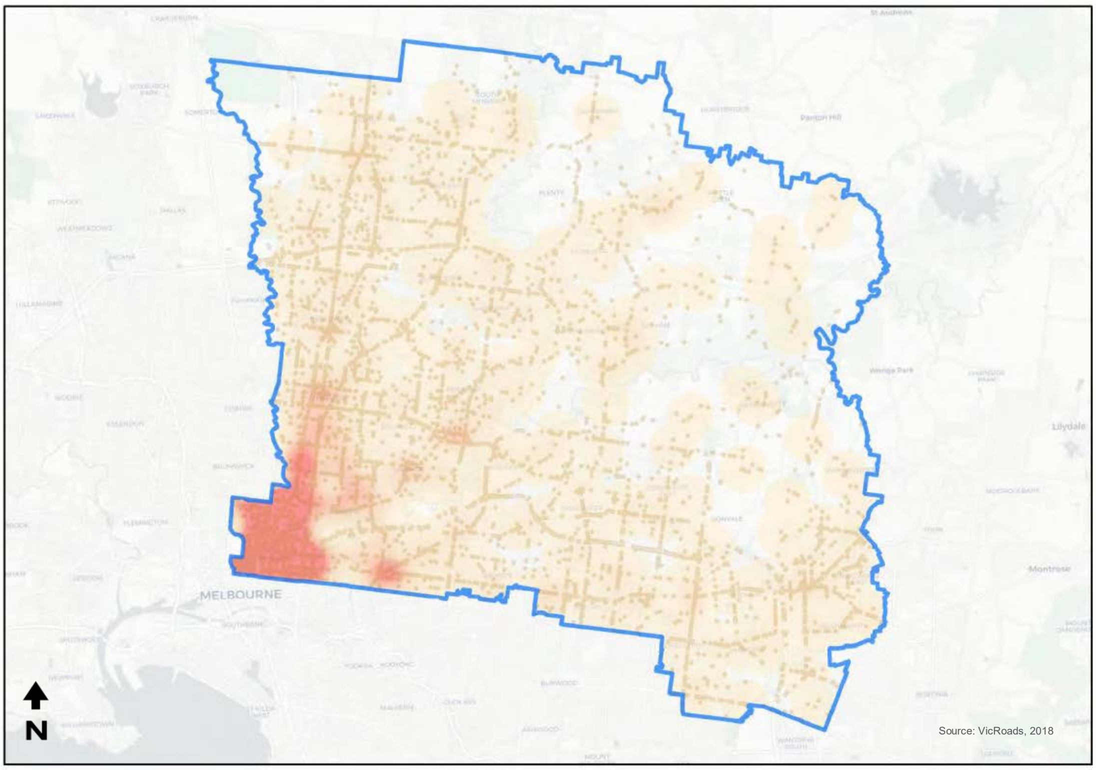
Figure 6-87 – Hot spots of reported crashes involving pedestrians, 2012 to 2016



Cyclist crash hotspots are presented in Figure 6-88. These crashes are concentrated at the western edge of the study area closer to the CBD and inner suburbs. This precinct within the study area aligns with established cycling facilities and a higher overall density of bicycle trips. Areas further north and east had lower cyclist crashes due to the lower utilisation of bicycles in these areas.

Crashes involving cyclists generally occurred during daylight hours however they also resulted in low severity or no injury. These crashes most typically occurred as a cyclist was attempting to cross a roadway rather than a rear end collision. This is mainly attributed to cyclists preferring not to travel on-road in the north-east due to the high speed nature of the road network, high levels of congestion and a lack of on-road bicycle facilities.

Figure 6-88 – Hot spots of reported crashes involving cyclists, 2012 to 2016



7 Risk assessment

A risk assessment of project activities was performed in accordance with the methodology described in Section 4.4. The risk assessment has been used as a screening tool to prioritise the focus of the impact assessments and development of EPRs. The risk pathways link project activities (causes) to their potential effects on the environmental assets, values or uses that are considered in more detail in the impact assessment. Risks were assessed for the construction and operation phases of the project.

The identified risks and associated risk ratings are listed in Table 7-1. The likelihood and consequence ratings determined during the risk assessment process and the adopted EPRs are presented in Appendix C – Risk assessment.

There are no planned events within the traffic and transport impact assessment.

Table 7-1 – Initial medium and high-risk pathways

Risk ID	Threat	Rating
Risk TR01	Traffic movements associated with construction site clearance and establishment impedes the safe and efficient movement of local traffic, including public transport movements and cyclists and pedestrians.	Medium
Risk TR02	Traffic movements associated with construction activity impedes the safe and efficient movement of freeway traffic, including the disruption associated with the potential closure of traffic lanes.	High
Risk TR03	Normal traffic flows on the freeway are impeded by narrowing of traffic lanes to accommodate construction activity and by driver behaviour around construction activity within the freeway.	Medium
Risk TR04	Public transport impeded by traffic movements associated with construction of surface roads and other civil infrastructure works, including potential temporary closures of bus routes and rail lines, and incidental damage to public transport infrastructure.	High
Risk TR06	Traffic movements associated with construction activity impede freight accessibility and increase travel times for freight traffic generally.	Medium
Risk TR09	Traffic movements associated with construction activity on the freeways generate additional traffic and congestion of the surrounding road network through road users seeking diversions around the freeways.	Medium
Risk TR10	Traffic associated with the construction of the ramp connections to the Eastern Freeway impedes the safe and efficient movement of traffic, including public transport movements, on the Eastern Freeway through temporary lane closures.	Medium
Risk TR12	Construction traffic associated with the removal of spoil generated by tunnelling or trenching activities impedes the safe and efficient movement of traffic and public transport movements on arterial and local roads in the vicinity of the work zones.	High
Risk TR16	Public transport services are adversely affected by delays or loss of travel time reliability due to additional traffic through key intersections, due to altered local traffic patterns or temporary closures due to maintenance activity.	Medium

8 2036 'no project' scenario

8.1 Metropolitan area forecast changes

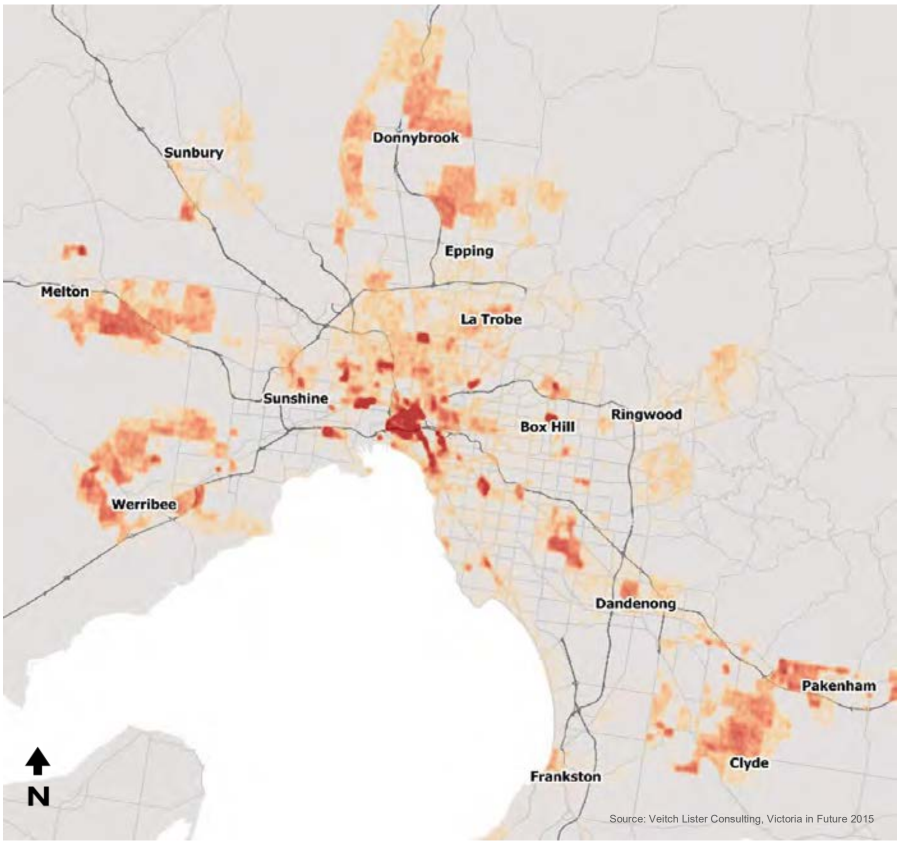
This chapter assesses the transport network performance in 2036 without North East Link. It examines the anticipated changes in travel behaviour due to forecast population and employment growth, as well as future road and public transport network upgrades. The network performance assessment focuses on forecast trip behaviour, travel times, and traffic volumes.

8.1.1 Land use and population

Land use forecasts for 2036 have been sourced from Victoria in Future (VIF) 2015 prepared and published by the Victorian Department of Environment, Land, Water and Planning (DELWP). The forecasts provide detailed information about the growth and distribution of population, households, educational enrolments and employment into the future, and are provided at five-year intervals from 2016.

Total population across metropolitan Melbourne is forecast to increase by 38 per cent from 2016 to 2036. A heatmap of the forecast population growth over this period is shown in Figure 8-1.

Figure 8-1 – Forecast population growth, 2016 to 2036 (Victoria in Future, 2015)



In general, the bulk of the projected population growth is anticipated to occur in the outer growth areas, as well as the Melbourne CBD. Nine of the top 10 suburbs for population growth are located in outer suburbs, as presented in Table 8-1.

Table 8-1 – Top 10 suburbs for forecast population growth, 2016 to 2036 (Victoria in Future, 2015)

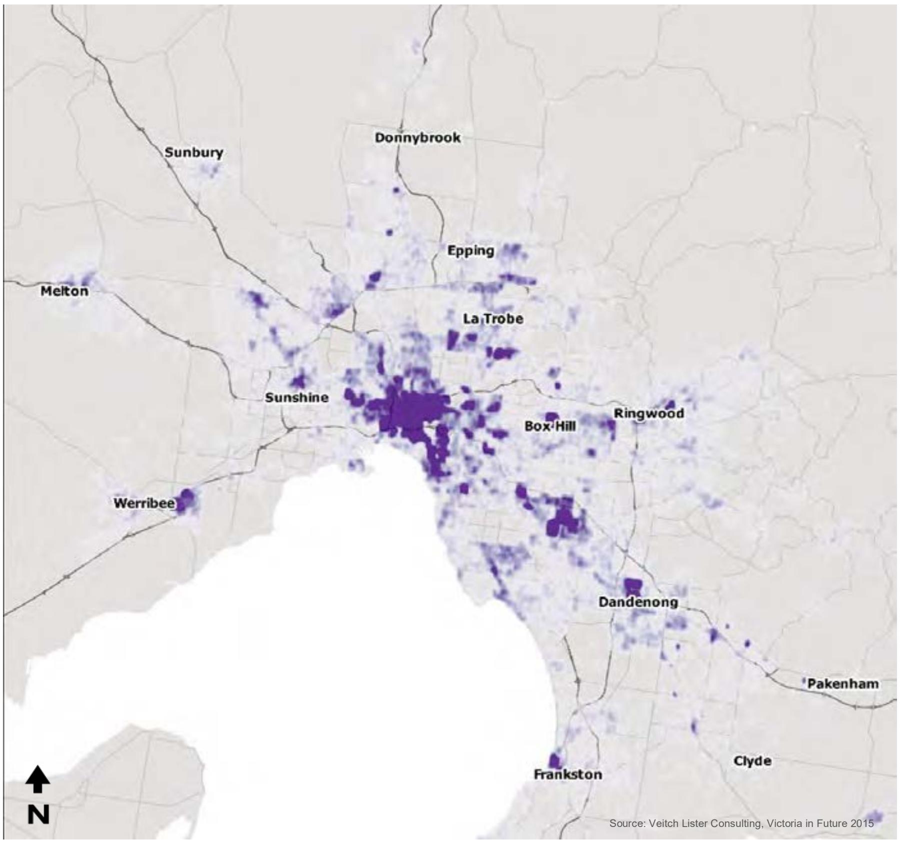
Rank	Suburb	Location	Change in population by 2036
1	Beveridge	Outer north	+85,000
2	Clyde	Outer south-east	+78,000
3	Laverton North	Outer west	+65,000
4	Wyndham Vale	Outer west	+59,000
5	Melbourne	Inner	+48,000
6	Mickleham	Outer north	+46,000
7	Melton South	Outer west	+41,000
8	Rockbank	Outer west	+40,000
9	Mount Cottrell	Outer west	+36,000

Source: Victoria in Future, 2015

Total projected employment growth from 2016 to 2036 is presented in Figure 8-2. Overall employment across metropolitan Melbourne is forecast to increase 43 per cent from 2016 to 2036.

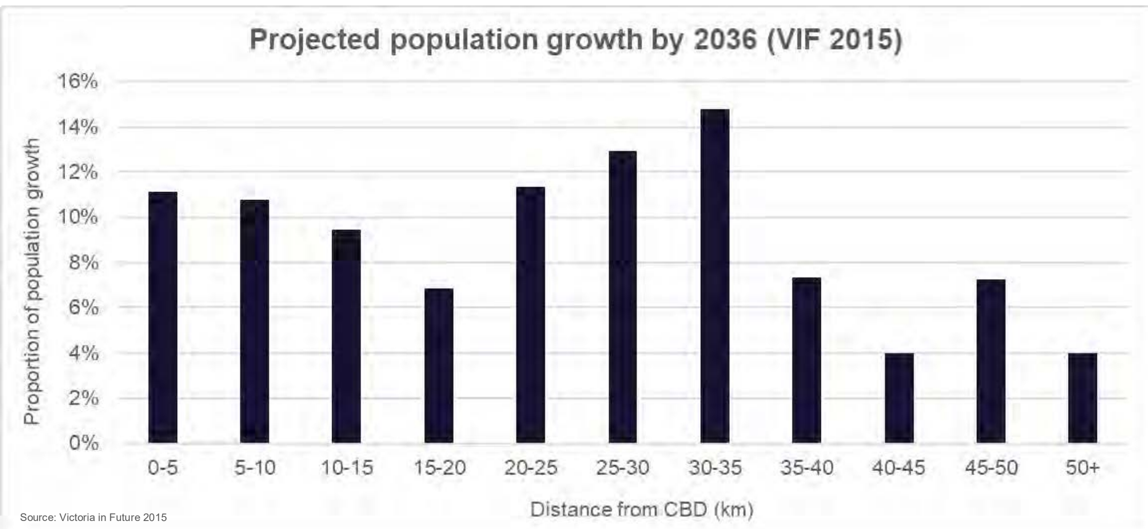
Compared with population growth, which is projected to grow strongly across Melbourne's fringe, employment growth is anticipated to be concentrated in the CBD and inner areas. Some growth is also clustered around the NEICs of La Trobe, Sunshine and Monash, as well as the MACs of Box Hill and Dandenong. Notably, employment growth is projected to be marginal in the outer growth areas, where the majority of population growth is forecast. This disconnect between population growth and jobs would place additional pressure on the transport system.

Figure 8-2 – Forecast employment growth, 2016 to 2036 (Victoria in Future, 2015)



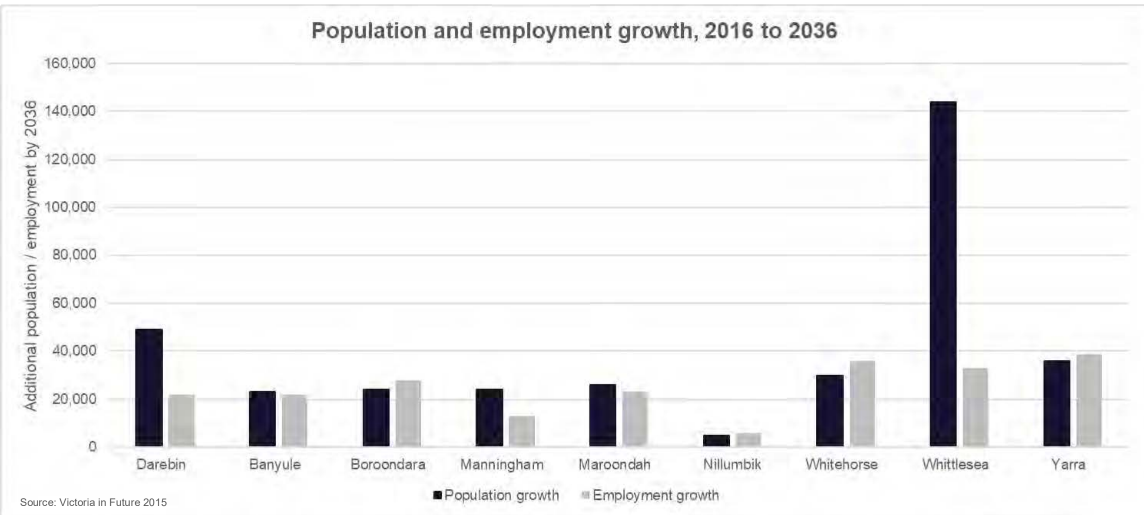
The chart in Figure 8-3 presents the proportion of population growth by travel time to the CBD by car in the morning peak. It shows that almost 50 per cent of population growth is forecast to occur in areas with a travel time of 70 to 100 minutes to the CBD. Only 15 per cent of population growth would occur in areas with a travel time of less than 30 minutes.

Figure 8-3 – Forecast population growth by travel time to the CBD



Population and employment growth for the LGAs in the north-east are presented in Figure 8-4. The outer northern LGA of Whittlesea is projected to have the largest overall increase in population, at over 140,000 additional residents by 2036. This reflects the multiple growth areas within its municipal boundaries, including Doreen, Wollert and Mernda. Forecast employment growth across the north-eastern LGAs is typically similar to population growth (in absolute terms), with the exception of Whittlesea and Darebin.

Figure 8-4 – Forecast population and employment growth by LGA, 2016 to 2036 (Victoria in Future 2015)



8.1.2 Transportation network

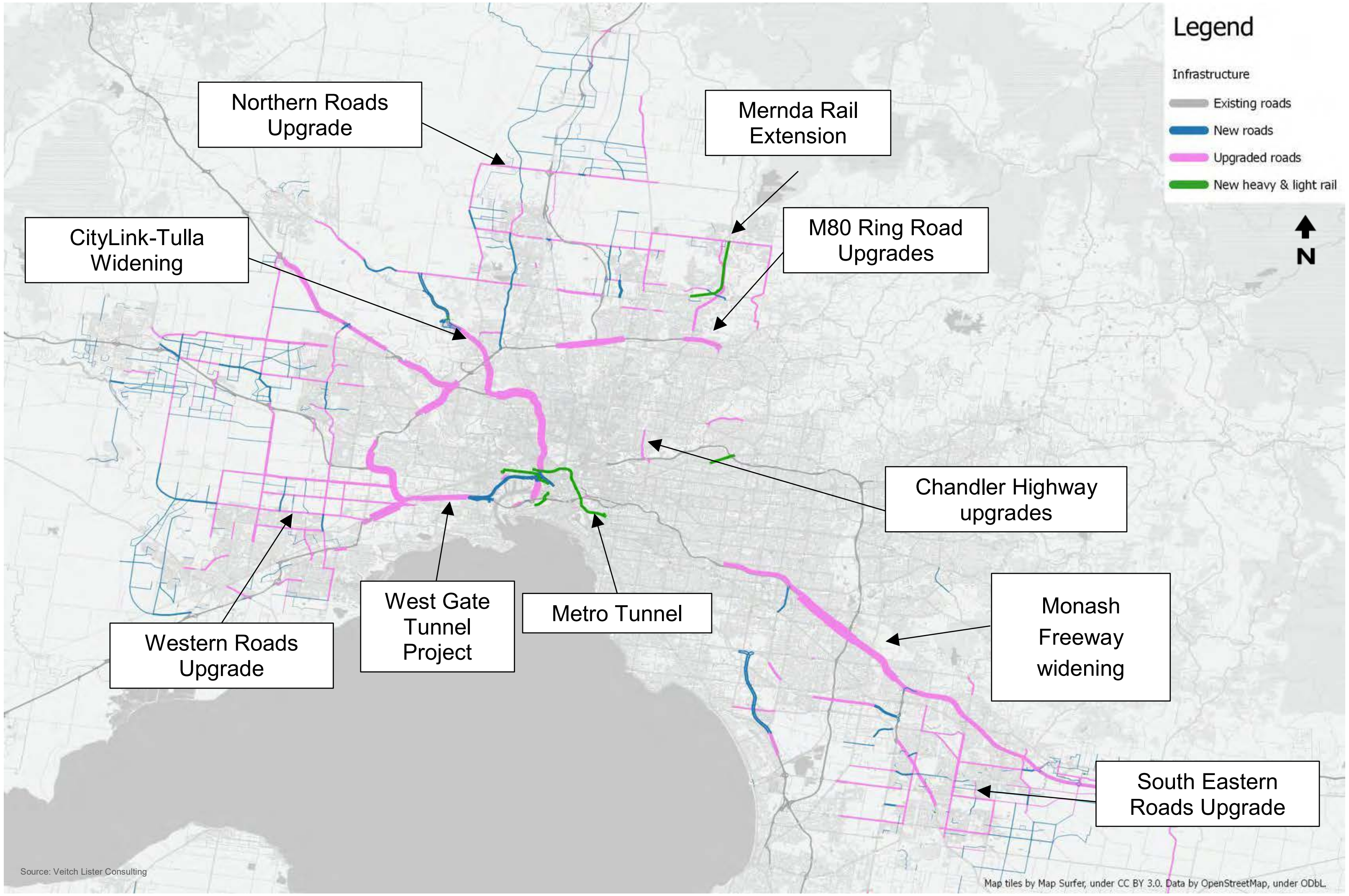
The 2036 transport network assumptions include all major road and public transport projects which have been committed to by the Victorian Government. These have been set out in Transport for Victoria's Transport Modelling Reference Case, which provides network assumptions for the horizon year of 2036. Note these assumptions do not necessarily represent Victorian Government policy or commitment.

The assumed transport network changes from 2016 to 2036, including new and upgraded infrastructure, is presented in Figure 8-5. Key projects assumed in the 2036 network include:

- **Metro Tunnel**: The Metro Tunnel project will comprise two new rail tunnels between South Kensington and South Yarra railway stations and five new underground stations. The project is anticipated to significantly increase capacity across Melbourne's rail network by reducing reliance on the City Loop.
- **Mernda Rail Extension**: This project was completed in 2018, and extended the South Morang rail line to the proposed Mernda town centre. It included three additional railway stations at Hawkstowe Parade (Hawkstowe), Marymede College (Middle Gorge) and Mernda. The new stations include park and ride facilities, bicycle storage and bus interchanges to draw upon the surrounding population catchments at South Morang, Mernda and Doreen.
- **Hurstbridge Stage 2 upgrades**: This project includes the duplication of rail tracks between Greensborough and Montmorency stations, and between Diamond Creek and Wattle Glen railway stations. It will allow additional train services to operate along the Hurstbridge rail line in peak periods.

- **West Gate Tunnel**: The West Gate Tunnel Project includes new tunnels and an elevated road connecting the West Gate Freeway with CityLink via the Port of Melbourne. The project also includes widening the West Gate Freeway between the M80 Ring Road to Williamstown Road, to ultimately serve as an alternative to the West Gate Bridge.
- **M80 Ring Road upgrades**: The M80 Ring Road upgrade is underway and involves widening and improvements along the full 38 kilometres of the M80 Ring Road from the Princes Freeway to Greensborough Bypass. The sections still to be completed include Princes Freeway to the Western Highway, Sydney Road to Edgars Road, and Plenty Road to Greensborough Bypass. The 2036 road network assumes the full completion of the M80 Ring Road upgrades.
- **CityLink-Tulla Widening (CTW)**: The CTW project provides 24 kilometres of upgrades from Melbourne Airport to Power Street. It provides an additional lane in each direction and will convert the freeway to a fully managed motorway.
- **Chandler Highway upgrades**: This project involves widening Chandler Highway from two to six lanes as well as intersection and signalling upgrades at Heidelberg Road and Yarra Boulevard. The original bridge will be converted into a shared-use path, which will improve walking and cycling connectivity across the Yarra River.
- **Northern, South-Eastern and Western Roads Upgrades (Suburban Roads Upgrade)**: The Suburban Roads Upgrade includes a package of arterial road upgrades in the northern, south-eastern and western suburbs. In the north these include widening Craigieburn Road and Childs Road as well as the completion of the Yan Yean Road duplication. In the south-east, the scope includes Healesville-Koo Wee Rup Road, Narre Warren-Cranbourne Road and Pound Road West. In the west, the arterial road upgrades will include Palmers Road, Leakes Road, Derrimut Road and Dohertys Road.
- **Monash Freeway widening**: The project will widen the Monash Freeway between Warrigal Road and Cardinia Road, and provide new and upgraded ramp signals along interchanges to improve traffic flow.

Figure 8-5 – Road, rail and tram upgrades, 2016 to 2036 (Transport for Victoria Transport Modelling Reference Case)



8.1.3 Network wide change in traffic volumes

The Victoria in Future 2015 population forecasts are expected to result in a significant increase in traffic on arterial roads and freeways across metropolitan Melbourne. The forecast change in traffic volumes between the modelled 2016 and 2036 'no project' scenarios are presented in Figure 8-6. Key observations include:

- Higher growth in the northern and western suburbs compared with the eastern suburbs, largely due to higher population growth projections in areas such as Donnybrook, Epping, Wyndham and Melton
- A large increase in traffic for the length of the M80 Ring Road due to additional capacity from the upgrade works
- Large increases along the West Gate Freeway, due to the capacity uplift of the West Gate Tunnel project
- Increases generally across the freeway network (Deer Park Bypass, Western Freeway, Princes Freeway, Tullamarine Freeway, Calder Freeway, Hume Freeway and Monash Freeway)
- Significant increases along the Chandler Highway due to widening works and local intersection upgrades
- Moderate growth on other key roads in the north-east such as Greensborough Bypass, Banksia Street and Fitzsimons Lane. This growth is limited due to these roads currently operating close to capacity throughout the day.

Separately, the forecast changes to daily truck volumes between the modelled 2016 and 2036 are presented in Figure 8-7. Truck traffic growth is generally concentrated along the freeway network, particularly along the West Gate Freeway due to the West Gate Tunnel project. In the north-east truck volume growth is constrained due to limited spare capacity on the road network, but is highest along Chandler Highway, Manningham Road and Fitzsimons Lane.

Figure 8-6 – Change in daily traffic volumes between modelled 2016 and 2036 'no project' scenario

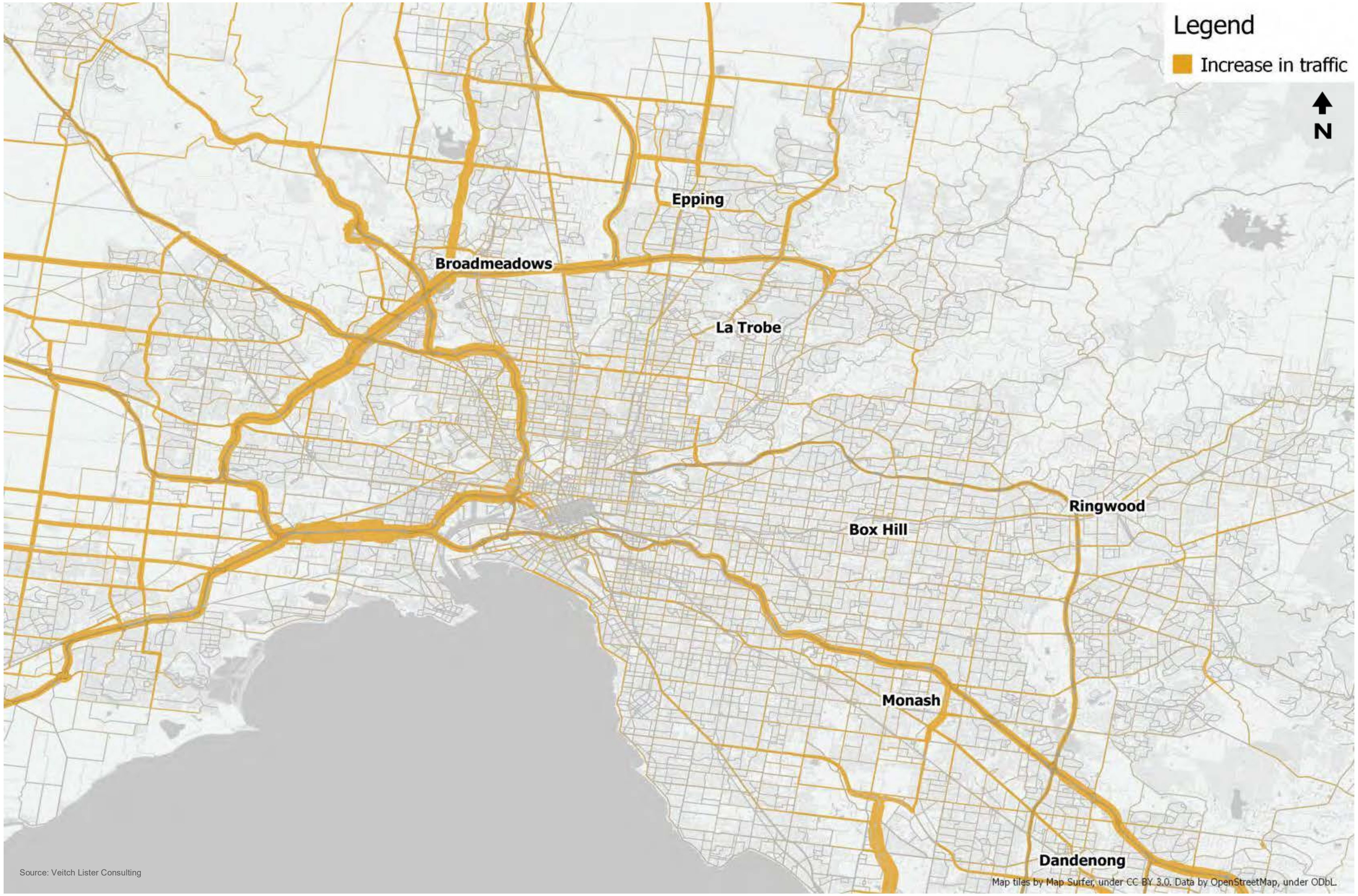
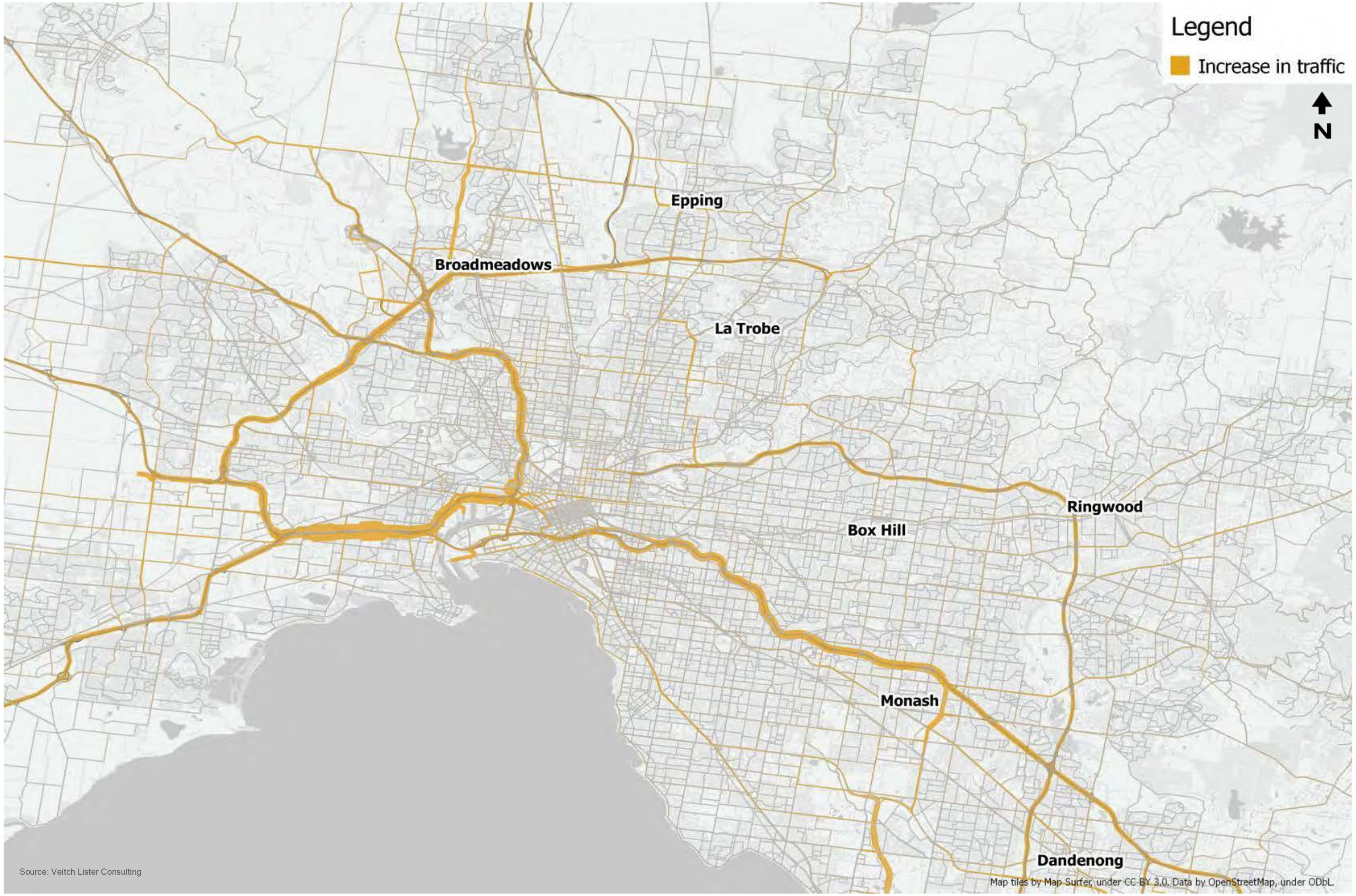


Figure 8-7 – Change in daily truck volumes between modelled 2016 and 2036 'no project' scenario



8.2 Local study area

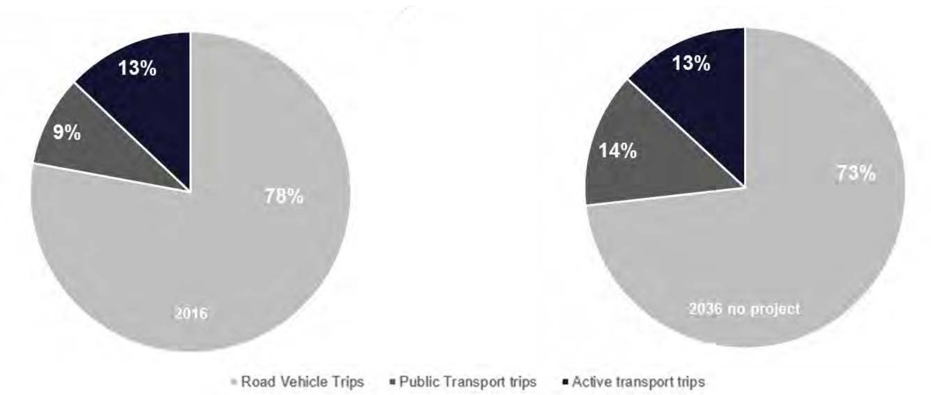
8.2.1 Network performance

Cars are forecast to remain as the dominant mode of transport in 2036, which is reflected in Figure 8-8 and Figure 8-9. These charts present mode share between the modelled 2016 and the 2036 'no project' case, for both metropolitan Melbourne and the north-east respectively. These mode share estimates have been forecast by the strategic transport model.

In both cases public transport mode share is predicted to increase, from 9 per cent to 14 per cent in metropolitan Melbourne, and from 8 per cent to 12 per cent in the north-east. Active transport mode share, which includes walking and cycling, is predicted to remain approximately static. This is likely due to public transport network improvements which are anticipated to occur by 2036, including upgrades across the heavy rail, tram and bus networks. These assumed upgrades make public transport a more attractive option in the future, relative to both active and private vehicle travel.

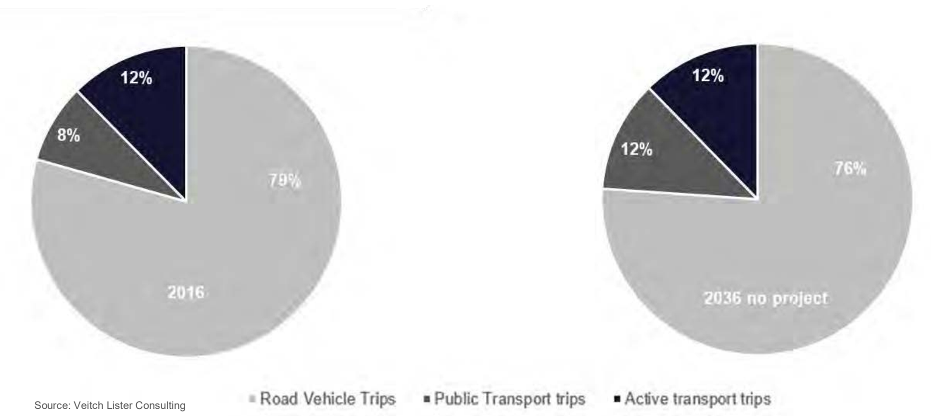
Accordingly, private vehicle mode share is forecast to reduce from 78 per cent to 73 per cent in metropolitan Melbourne, and from 79 per cent to 76 per cent in the north-east. Despite this, the 2036 forecasts indicate that across metropolitan Melbourne there would be over five times as many private vehicles than public transport trips.

Figure 8-8 – Mode share for metropolitan Melbourne, modelled 2036 'no project' scenario vs modelled 2016



Source: Veitch Lister Consulting

Figure 8-9 – Mode share for the north-east, modelled 2036 'no project' scenario vs modelled 2016



Source: Veitch Lister Consulting

The forecasts also indicate that congestion would continue to increase across metropolitan Melbourne and the north-east. Network statistics for both regions are shown in Table 8-2, with the percentage change relative to modelled 2016 conditions also provided. Observations of note include:

- The total number of trips, total vehicle kilometres travelled and total vehicle hours travelled are forecast to increase (by 25, 29 and 44 per cent respectively), but not by as much as the Melbourne average (33, 44 and 57 per cent). This is due to a lower forecast population growth rate within the study area, and the road network in the north-east operating close to capacity.
- While the growth in vehicle trips in the north-east is lower than the rest of Melbourne, average vehicle speeds are expected to decline at a faster rate. Vehicle speeds in the north-east are expected to decline by up to 16 per cent during the peak periods compared with 13 per cent across Melbourne on average.
- The growth in public transport usage is also lower in the north-east (85 per cent) when compared with metropolitan Melbourne (112 per cent). This is primarily due to a lower accessibility to public transport services in the north-east, with the majority of services delivered on-road via buses.
- Time spent travelling in congested conditions across the day is predicted to increase by 128 and 97 per cent for metropolitan Melbourne and the north-east respectively. The percentage changes for the AM and PM peaks are lower than across the day, indicating that congestion is growing faster in off-peak periods.

Table 8-2 – Network statistics, modelled 2036 'no project' scenario vs modelled 2016

Metric	Time period	Metropolitan Melbourne	North-east
Road Vehicle Trips (Car + LCV + HCV)	Daily	16,775,000 (+33%)	3,144,000 (+25%)
	AM peak (2 hour)	2,575,000 (+29%)	467,000 (+19%)
	PM peak (2 hour)	2,599,000 (+30%)	493,000 (+25%)
Total vehicle kilometres travelled (km)	Daily	178,393,000 (+44%)	28,780,000 (+29%)
	AM peak (2 hour)	27,214,000 (+36%)	4,336,000 (+22%)
	PM peak (2 hour)	29,087,000 (+38%)	4,585,000 (+22%)
Vehicle hours travelled due to congestion (hrs)	Daily	1,173,000 (+128%)	258,000 (+97%)
	AM peak (2 hour)	388,000 (+101%)	84,000 (+75%)
	PM peak (2 hour)	371,000 (+111%)	79,000 (+84%)
Total vehicle hours travelled (hrs)	Daily	4,356,000 (+57%)	846,000 (+44%)
	AM peak (2 hour)	893,000 (+56%)	177,000 (+44%)
	PM peak (2 hour)	907,000 (+59%)	176,000 (+44%)
Average speed (km/hr)	Daily	41 (-9%)	34 (-10%)
	AM peak (2 hour)	30 (-13%)	24 (-16%)
	PM peak (2 hour)	32 (-13%)	26 (-16%)
Public transport trips	Daily	3,131,000 (+112%)	480,000 (+85%)

Source: VLC Zenith Model

The growth in vehicle kilometres travelled was also analysed separately for freeways and non-freeways, as presented in Table 8-3. The percentage change compared with 2016 is also provided in brackets.

Across metropolitan Melbourne, the growth in vehicle kilometres travelled is similar for freeways and non-freeways, at approximately 45 per cent each. Conversely the north-east is forecast to experience faster growth in travel along non-freeway links arterial and local roads) as compared with freeways. This indicates that reliance on the north-eastern arterial road network is likely to increase into the future.

Table 8-3 – Vehicle kilometres travelled for freeways and non-freeways, modelled 2036 'no project' scenario vs modelled 2016

Metric	Time period	Metropolitan Melbourne	North-east
Freeway vehicle kilometres travelled (km)	Daily	52,787,000 (+46%)	5,952,000 (+25%)
	AM peak (2 hour)	6,925,000 (+37%)	753,000 (+16%)
	PM peak (2 hour)	7,508,000 (+38%)	812,000 (+16%)
Non-freeway vehicle kilometres travelled (km)	Daily	125,606,000 (+44%)	22,828,000 (+30%)
	AM peak (2 hour)	20,289,000 (+36%)	3,583,000 (+23%)
	PM peak (2 hour)	21,579,000 (+38%)	3,773,000 (+24%)

8.2.2 Traffic volumes

Forecast changes to average weekday traffic volumes between 2017 and 2036 'no project' are presented in Figure 8-10 to Figure 8-12. By 2036 traffic volumes on almost every road in the study are anticipated to increase, particularly along the freeway corridors. Note that EastLink has not been included in the traffic volume assessment as this data is commercially sensitive. The EastLink tunnels have been assessed for performance in the 2036 'no project' scenario through microsimulation modelling, as outlined in Section 8.3.

Key observations from these forecasts include:

- The Eastern Freeway is forecast to grow by approximately 15,000 to 25,000 vehicles per day across its length. The largest increase is anticipated between Burke Road and Bulleen Road, at approximately 24,000 vehicles per day.
- In the north, daily traffic volumes on the M80 Ring Road west of the Hume Freeway are predicted to increase substantially, at approximately 69,000 vehicles per day. East of Dalton Road, volumes are forecast to increase by over 35,000 vehicles per day. Growth along this corridor is facilitated by the assumed completion of the M80 Ring Road upgrades, which include Sydney Road to Edgars Road and Plenty Road to Greensborough Bypass.
- On the arterial road network, large volume increases are anticipated along Chandler Highway at approximately 30,000 vehicles per day. This is largely due to the assumed completion of widening works (from two to six lanes) as well as local intersection upgrades.
- It is likely that traffic volume growth along Bulleen Road north of the Eastern Freeway would be dampened by the duplication of the Chandler Highway. Total two-way traffic volumes are forecast to increase along this section by approximately 4,800 vehicles per day.
- In absolute terms, traffic volumes along arterial roads in the outer north are forecast to grow more than the inner north or eastern suburbs. These include Edgars Road (+16,700), High Street (+17,600), Dalton Road (+16,400), Plenty Road (+32,000) and Yan Yean Road (+15,200).
- Traffic volumes on Templestowe Road are forecast to increase significantly due to the assumed completion of widening works by 2036. This assumption has been sourced from the Transport for Victoria Reference Case.

Absolute traffic volumes for an average weekday in 2036 are presented in Figure 8-13 to Figure 8-15, and are summarised in Table 8-4.

Traffic volumes for the AM and PM peaks are provided in Appendix D – Forecast traffic volumes.

Figure 8-10 – Change in total average weekday traffic volumes (AWDT), 2036 ‘no project’ versus 2017 – study area north

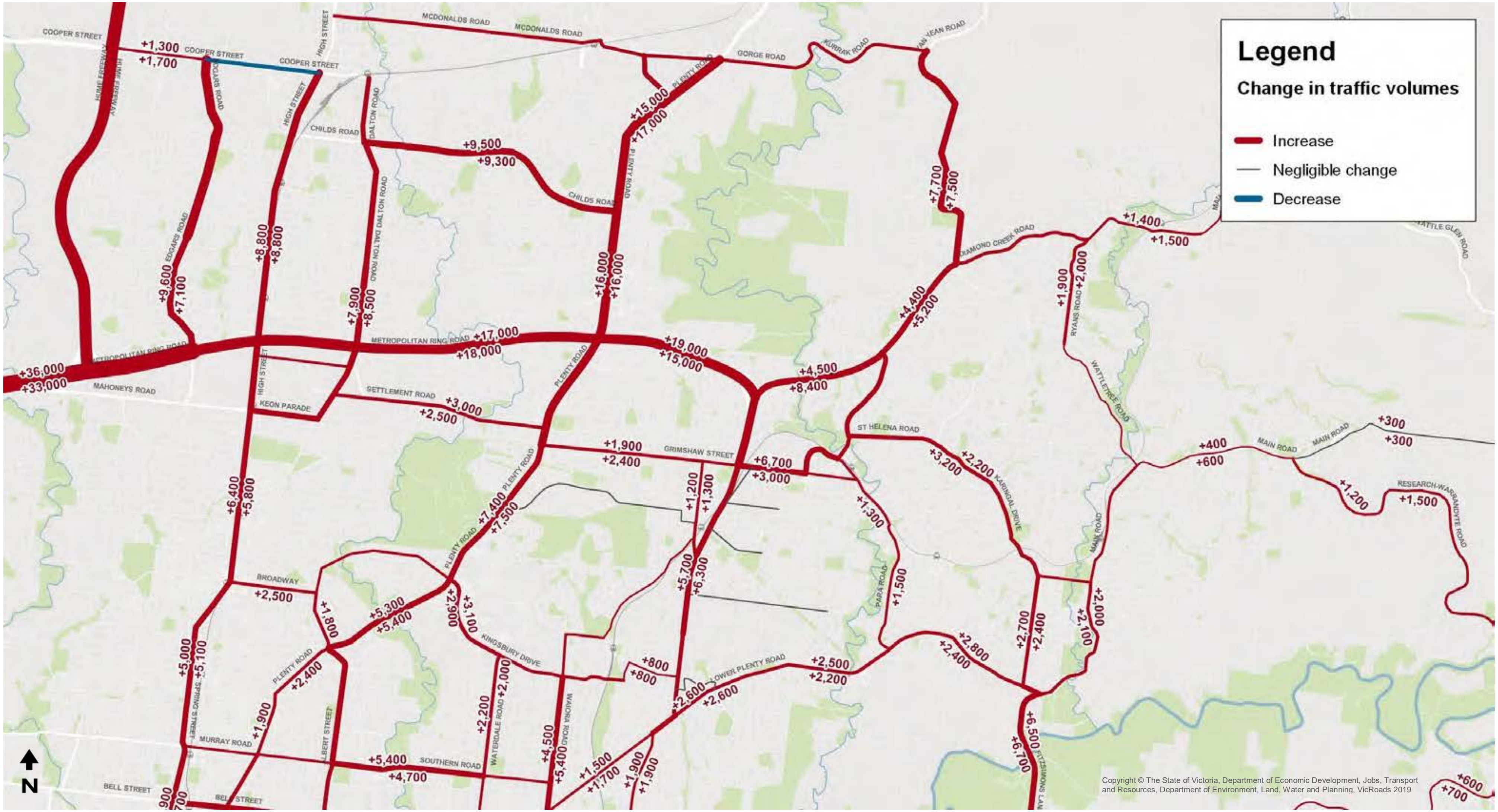


Figure 8-11 – Change in total average weekday traffic volumes (AWDT), 2036 'no project' versus 2017 – study area south

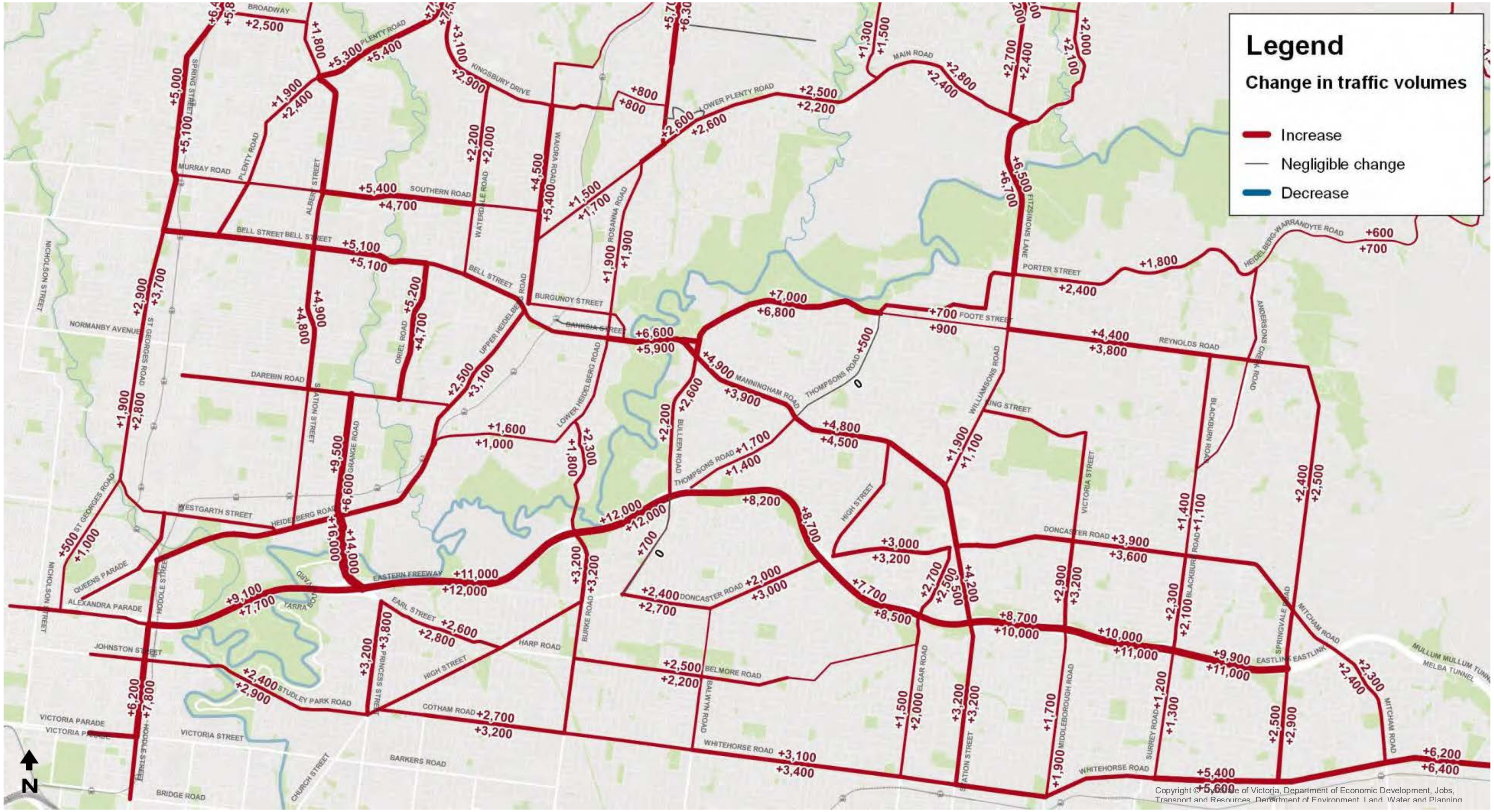


Figure 8-12 – Total average weekday traffic volumes (AWDT), 2036 'no project' versus 2017 – study area east

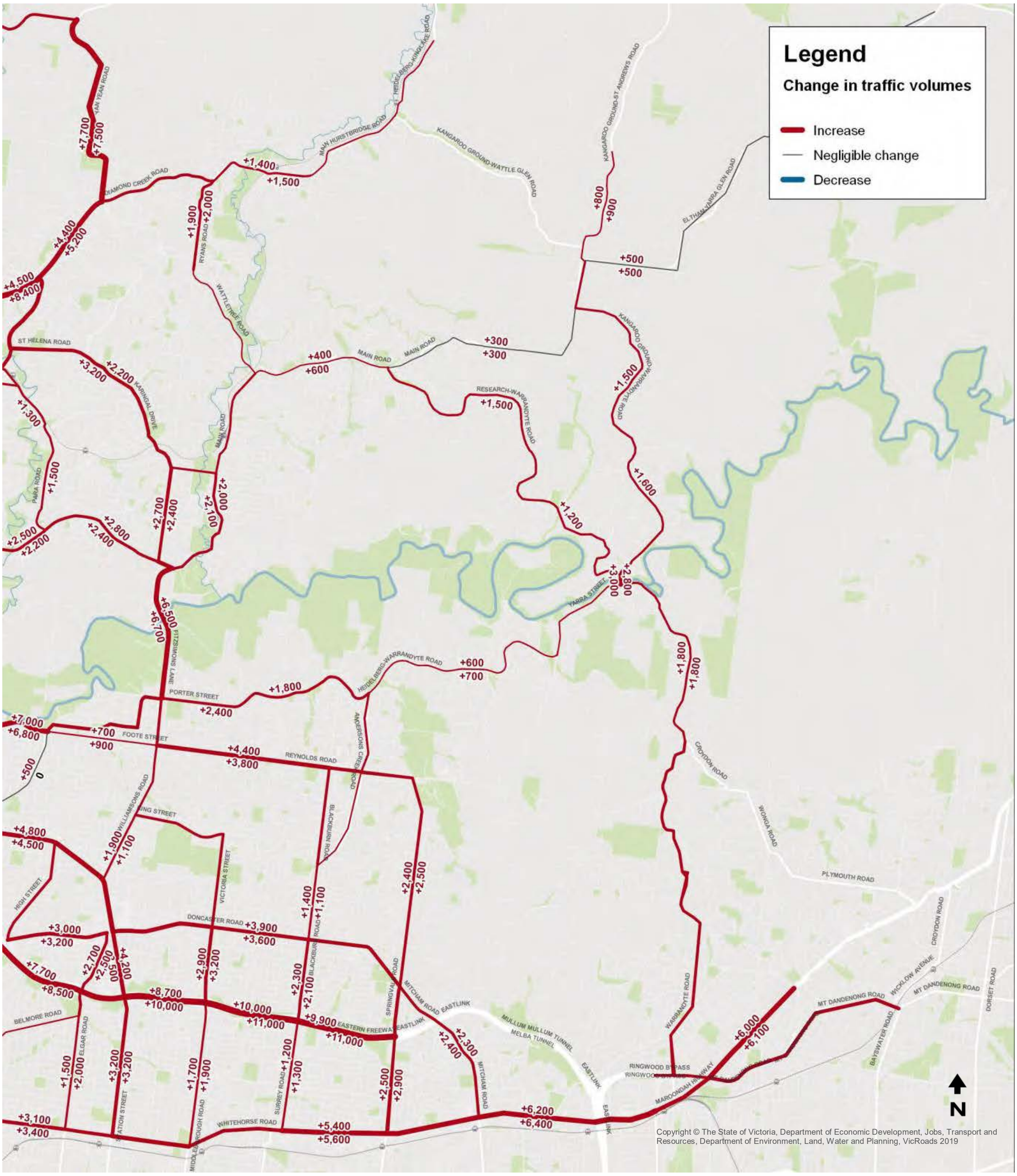


Figure 8-13 – Total average weekday traffic volumes (AWDT), 2036 'no project' – study area north

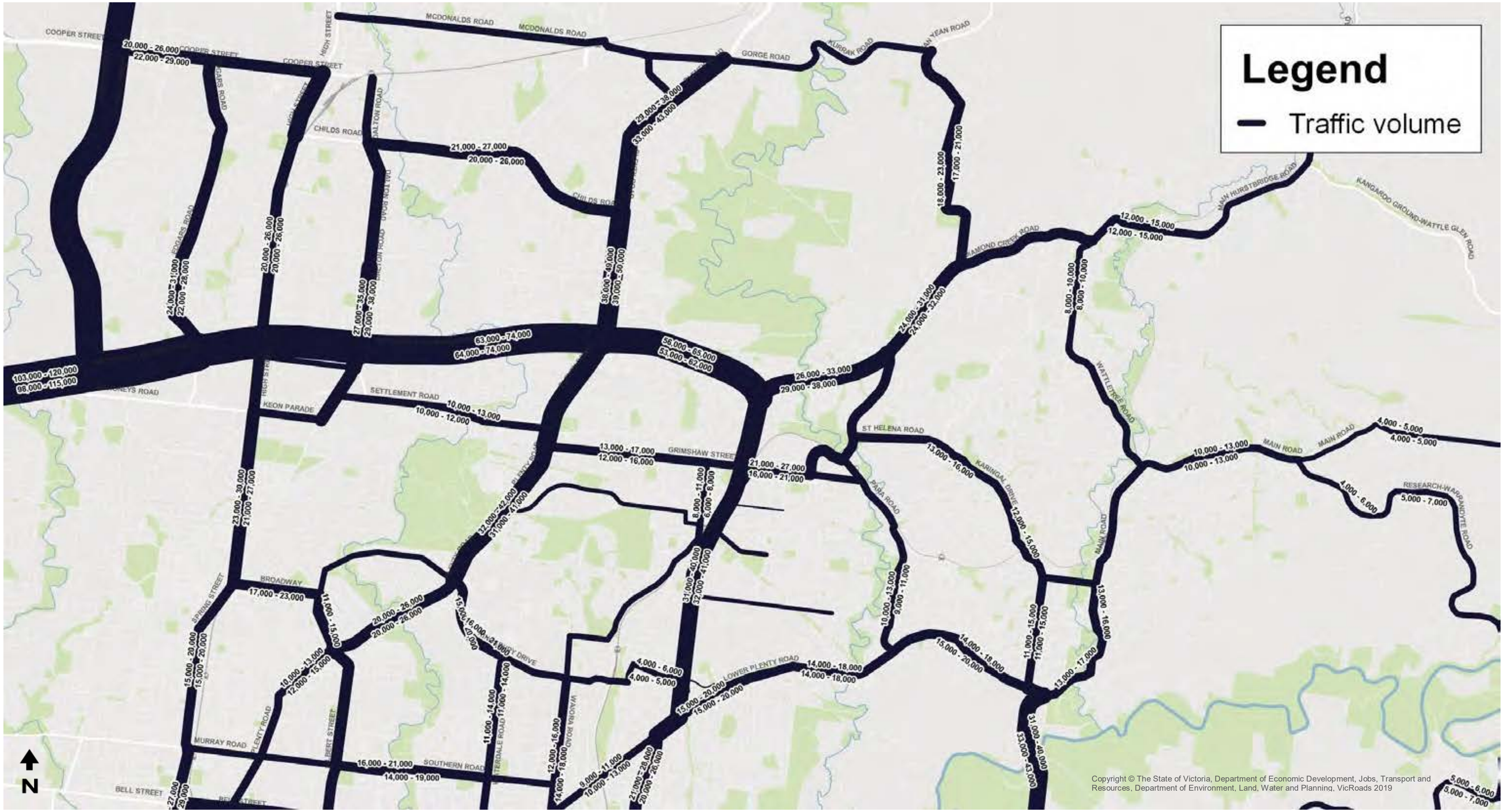


Figure 8-14 – Total average weekday traffic volumes (AWDT), 2036 'no project' – study area south

Figure 8-15 – Total average weekday traffic volumes (AWDT), 2036 'no project' – study area east

Table 8-4 – Total traffic volumes (average weekday), 2036 ‘no project’

Name	Location	Direction	2036 ‘no project’ daily volume –one way (24h)	2036 ‘no project’ versus 2017
Banksia St/Manningham Rd	At Yarra River	Eastbound	39,000–50,000	+6,600
Banksia St/Manningham Rd	At Yarra River	Westbound	36,000–46,000	+5,900
Bell St	Station St to Oriel Rd	Eastbound	25,000–33,000	+5,100
Bell St	Station St to Oriel Rd	Westbound	26,000–34,000	+5,100
Belmore Rd	Burke Rd to Balwyn Rd	Eastbound	10,000–14,000	+2,500
Belmore Rd	Burke Rd to Balwyn Rd	Westbound	9,000–12,000	+2,200
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Northbound	14,000–19,000	+1,400
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Southbound	15,000–19,000	+1,100
Blackburn Rd	Eastern Fwy to Doncaster Rd	Northbound	12,000–16,000	+2,300
Blackburn Rd	Eastern Fwy to Doncaster Rd	Southbound	12,000–16,000	+2,100
Bolton St	Bridge St to Main Rd	Northbound	11,000–15,000	+2,700
Bolton St	Bridge St to Main Rd	Southbound	11,000–15,000	+2,400
Broadway	High St to Boldrewood Pde	Eastbound	11,000–15,000	+1,800
Broadway	High St to Boldrewood Pde	Westbound	17,000–23,000	+2,500
Bulleen Rd	Doncaster Rd to Eastern Fwy	Northbound	7,000–9,000	+700
Bulleen Rd	Doncaster Rd to Eastern Fwy	Southbound	6,000–8,000	Minor change
Bulleen Rd	Eastern Fwy to Manningham Rd	Northbound	23,000–30,000	+2,200
Bulleen Rd	Eastern Fwy to Manningham Rd	Southbound	20,000–26,000	+2,600
Burke Rd	Doncaster Rd to Eastern Fwy	Northbound	15,000–19,000	+3,200
Burke Rd	Doncaster Rd to Eastern Fwy	Southbound	16,000–21,000	+3,200
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Northbound	18,000–24,000	+1,800
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Southbound	20,000–25,000	+2,300
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Northbound	34,000–43,000	+16,000
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Southbound	30,000–39,000	+14,000
Childs Rd	Dalton Rd to Plenty Rd	Eastbound	21,000–27,000	+9,500
Childs Rd	Dalton Rd to Plenty Rd	Westbound	20,000–26,000	+9,300
Cooper St	Hume Fwy to Edgars Rd	Eastbound	20,000–26,000	+1,300
Cooper St	Hume Fwy to Edgars Rd	Westbound	22,000–29,000	+1,700
Cotham Rd	Glenferrie Rd to Burke Rd	Eastbound	9,000–12,000	+2,700
Cotham Rd	Glenferrie Rd to Burke Rd	Westbound	9,000–12,000	+3,200
Dalton Rd	North of M80 Ring Road	Northbound	27,000–35,000	+7,900
Dalton Rd	North of M80 Ring Road	Southbound	29,000–38,000	+8,500
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Eastbound	24,000–31,000	+4,400
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Westbound	24,000–32,000	+5,200
Doncaster Rd	Balwyn Rd to Bulleen Rd	Eastbound	10,000–13,000	+2,400
Doncaster Rd	Balwyn Rd to Bulleen Rd	Westbound	10,000–13,000	+2,700
Doncaster Rd	Balwyn Rd to Eastern Fwy	Eastbound	12,000–15,000	+2,000
Doncaster Rd	Balwyn Rd to Eastern Fwy	Westbound	17,000–22,000	+3,000
Doncaster Rd	Blackburn Rd to Wetherby Rd	Eastbound	15,000–20,000	+3,900

Name	Location	Direction	2036 'no project' daily volume –one way (24h)	2036 'no project' versus 2017
Doncaster Rd	Blackburn Rd to Wetherby Rd	Westbound	15,000–19,000	+3,600
Doncaster Rd	East of Eastern Fwy	Eastbound	12,000–15,000	+3,000
Doncaster Rd	East of Eastern Fwy	Westbound	13,000–16,000	+3,200
Earl St	Princess St to Willsmere Rd	Northbound	8,000–10,000	+2,600
Earl St	Princess St to Willsmere Rd	Southbound	10,000–12,000	+2,800
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Eastbound	80,000–93,000	+10,000
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Westbound	83,000–96,000	+11,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Eastbound	70,000–82,000	+12,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Westbound	73,000–85,000	+12,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Eastbound	80,000–93,000	+11,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Westbound	80,000–94,000	+12,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Eastbound	73,000–85,000	+9,100
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Westbound	66,000–76,000	+7,700
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Eastbound	78,000–91,000	+8,700
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Westbound	80,000–93,000	+8,200
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Eastbound	78,000–91,000	+7,700
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Westbound	82,000–96,000	+8,500
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Eastbound	83,000–97,000	+8,700
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Westbound	86,000–100,000	+10,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Eastbound	72,000–84,000	+9,900
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Westbound	73,000–85,000	+11,000
Edgars Rd	North of M80 Ring Road	Northbound	24,000–31,000	+9,600
Edgars Rd	North of M80 Ring Road	Southbound	22,000–28,000	+7,100
Elgar Rd	Belmore Rd to Whitehorse Rd	Northbound	15,000–19,000	+1,500
Elgar Rd	Belmore Rd to Whitehorse Rd	Southbound	15,000–19,000	+2,000
Elgar Rd	North of Eastern Fwy	Northbound	11,000–15,000	+2,700
Elgar Rd	North of Eastern Fwy	Southbound	10,000–13,000	+2,500
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Eastbound	3,000–4,000	+500
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Westbound	3,000–4,000	+500
Erskine Rd	Ferguson St to Argyle St	Eastbound	4,000–6,000	+800
Erskine Rd	Ferguson St to Argyle St	Westbound	4,000–5,000	+800
Fitzsimons Ln	At Yarra River	Northbound	33,000–43,000	+6,700
Fitzsimons Ln	At Yarra River	Southbound	31,000–40,000	+6,500
Foote St	West of Fitzsimons Ln	Eastbound	9,000–12,000	+700
Foote St	West of Fitzsimons Ln	Westbound	8,000–11,000	+900
Grange Rd	Darebin Rd to Heidelberg Rd	Northbound	20,000–25,000	+9,500
Grange Rd	Darebin Rd to Heidelberg Rd	Southbound	14,000–18,000	+6,600
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Eastbound	26,000–33,000	+4,500
Greensborough Bypass	M80 Ring Road interchange to Diamond	Westbound	29,000–38,000	+8,400

Name	Location	Direction	2036 'no project' daily volume –one way (24h)	2036 'no project' versus 2017
	Creek Rd			
Greensborough Rd	South of Watsonia Rd	Northbound	31,000–40,000	+5,700
Greensborough Rd	South of Watsonia Rd	Southbound	32,000–41,000	+6,300
Grimshaw St	Greensborough Hwy to The Circuit	Eastbound	21,000–27,000	+6,700
Grimshaw St	Greensborough Hwy to The Circuit	Westbound	16,000–21,000	+3,000
Grimshaw St	Plenty Rd to Watsonia Rd	Eastbound	13,000–17,000	+1,900
Grimshaw St	Plenty Rd to Watsonia Rd	Westbound	12,000–16,000	+2,400
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Northbound	5,000–6,000	+600
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Southbound	5,000–7,000	+700
High St	Keon Pde to Broadway	Northbound	23,000–30,000	+6,400
High St	Keon Pde to Broadway	Southbound	21,000–27,000	+5,800
High St	North of Settlement Rd	Northbound	20,000–26,000	+8,800
High St	North of Settlement Rd	Southbound	20,000–26,000	+8,800
Hoddle St	Johnston St to Victoria St	Northbound	41,000–53,000	+6,200
Hoddle St	Johnston St to Victoria St	Southbound	43,000–55,000	+7,800
Hume Fwy	M80 Ring Road to Cooper St	Northbound	59,000–69,000	+20,000
Hume Fwy	M80 Ring Road to Cooper St	Southbound	60,000–70,000	+21,000
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Northbound	2,500–3,500	+800
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Southbound	2,500–3,500	+900
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Northbound	11,000–14,000	+3,000
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Southbound	10,000–13,000	+2,800
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Northbound	5,000–6,000	+1,500
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Southbound	5,000–6,000	+1,600
Karingal Drive	East of St Helena Rd	Northbound	13,000–16,000	+3,200
Karingal Drive	East of St Helena Rd	Southbound	12,000–15,000	+2,200
Kingsbury Drive	West of Waterdale Rd	Eastbound	16,000–21,000	+3,100
Kingsbury Drive	West of Waterdale Rd	Westbound	15,000–20,000	+2,900
Lower Heidelberg Rd	Near Ivanhoe Park	Eastbound	7,000–8,000	+1,600
Lower Heidelberg Rd	Near Ivanhoe Park	Westbound	5,000–7,000	+1,000
Lower Plenty Rd	Greensborough Rd to Para Rd	Eastbound	15,000–20,000	+2,600
Lower Plenty Rd	Greensborough Rd to Para Rd	Westbound	15,000–20,000	+2,600
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Eastbound	9,000–11,000	+1,500
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Westbound	10,000–13,000	+1,700
M80 Ring Road	Dalton Rd to Plenty Rd	Eastbound	63,000–74,000	+17,000
M80 Ring Road	Dalton Rd to Plenty Rd	Westbound	64,000–74,000	+18,000
M80 Ring Road	Hume Fwy to Sydney Rd	Eastbound	103,000–120,000	+36,000
M80 Ring Road	Hume Fwy to Sydney Rd	Westbound	98,000–115,000	+33,000
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Eastbound	56,000–65,000	+19,000

Name	Location	Direction	2036 ‘no project’ daily volume –one way (24h)	2036 ‘no project’ versus 2017
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Westbound	53,000–62,000	+15,000
Main Hurstbridge Rd	At Diamond Creek	Eastbound	12,000–15,000	+1,400
Main Hurstbridge Rd	At Diamond Creek	Westbound	12,000–15,000	+1,500
Main Rd	At Diamond Creek	Northbound	13,000–17,000	+2,100
Main Rd	At Diamond Creek	Southbound	13,000–16,000	+2,000
Main Rd	At Plenty River	Eastbound	14,000–18,000	+2,500
Main Rd	At Plenty River	Westbound	14,000–18,000	+2,200
Main Rd	Para Rd to Bolton St	Eastbound	14,000–18,000	+2,800
Main Rd	Para Rd to Bolton St	Westbound	15,000–20,000	+2,400
Main Rd	East of Ingrams Rd	Eastbound	4,000–5,000	+300
Main Rd	East of Ingrams Rd	Westbound	4,000–5,000	+300
Main Rd	East of Wattletree Rd	Eastbound	10,000–13,000	+400
Main Rd	East of Wattletree Rd	Westbound	10,000–13,000	+600
Manningham Rd	Bulleen Rd to Thompsons Rd	Eastbound	19,000–25,000	+4,900
Manningham Rd	Bulleen Rd to Thompsons Rd	Westbound	15,000–19,000	+3,900
Manningham Rd	Thompsons Rd to High St	Eastbound	19,000–25,000	+4,800
Manningham Rd	Thompsons Rd to High St	Westbound	18,000–23,000	+4,500
Maroondah Hwy	Mitcham Rd to Eastlink	Eastbound	30,000–39,000	+6,200
Maroondah Hwy	Mitcham Rd to Eastlink	Westbound	30,000–39,000	+6,400
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Northbound	30,000–38,000	+6,000
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Southbound	31,000–40,000	+6,100
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Northbound	16,000–20,000	+1,700
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Southbound	15,000–20,000	+1,900
Middleborough Rd	North of Eastern Fwy	Northbound	14,000–19,000	+2,900
Middleborough Rd	North of Eastern Fwy	Southbound	14,000–19,000	+3,200
Mitcham Rd	At Eastern Fwy	Northbound	13,000–17,000	+2,400
Mitcham Rd	At Eastern Fwy	Southbound	14,000–18,000	+2,300
Murray Rd	At Darebin Creek	Eastbound	16,000–21,000	+5,400
Murray Rd	At Darebin Creek	Westbound	14,000–19,000	+4,700
Oriel Rd	Bell St to Livingston St	Northbound	11,000–14,000	+5,200
Oriel Rd	Bell St to Livingston St	Southbound	10,000–13,000	+4,700
Para Rd	Rattray Rd to Main Rd	Northbound	10,000–13,000	+1,300
Para Rd	Rattray Rd to Main Rd	Southbound	9,000–11,000	+1,500
Plenty Rd	At Darebin Creek	Eastbound	20,000–26,000	+5,300
Plenty Rd	At Darebin Creek	Westbound	20,000–26,000	+5,400
Plenty Rd	Albert St to Murray Rd	Northbound	10,000–13,000	+1,900
Plenty Rd	Albert St to Murray Rd	Southbound	12,000–15,000	+2,400
Plenty Rd	Main Dr to Greenwood Dr	Northbound	32,000–42,000	+7,400
Plenty Rd	Main Dr to Greenwood Dr	Southbound	31,000–41,000	+7,500
Plenty Rd	McDonalds Rd to Bush Blvd	Northbound	29,000–38,000	+15,000

Name	Location	Direction	2036 ‘no project’ daily volume –one way (24h)	2036 ‘no project’ versus 2017
Plenty Rd	McDonalds Rd to Bush Blvd	Southbound	33,000–43,000	+17,000
Plenty Rd	North of Mckimmies Rd	Northbound	38,000–49,000	+16,000
Plenty Rd	North of Mckimmies Rd	Southbound	39,000–50,000	+16,000
Princess St	Duke St to Wills St	Northbound	15,000–20,000	+3,200
Princess St	Duke St to Wills St	Southbound	18,000–23,000	+3,800
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Northbound	5,000–7,000	+1,500
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Southbound	4,000–6,000	+1,200
Reynolds Rd	Blackburn Rd to Williamsons Rd	Eastbound	17,000–22,000	+4,400
Reynolds Rd	Blackburn Rd to Williamsons Rd	Westbound	17,000–22,000	+3,800
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Northbound	8,000–10,000	+1,800
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Southbound	8,000–10,000	+1,800
Rosanna Rd	Brown St to Reid St	Northbound	21,000–28,000	+1,900
Rosanna Rd	Brown St to Reid St	Southbound	20,000–26,000	+1,900
Ryans Rd	Diamond Creek Rd to Allendale Rd	Northbound	8,000–10,000	+1,900
Ryans Rd	Diamond Creek Rd to Allendale Rd	Southbound	8,000–10,000	+2,000
Settlement Rd	At Darebin Creek	Eastbound	10,000–13,000	+3,000
Settlement Rd	At Darebin Creek	Westbound	10,000–12,000	+2,500
Spring St	Broadway to Murray Rd	Northbound	15,000–20,000	+5,000
Spring St	Broadway to Murray Rd	Southbound	15,000–20,000	+5,100
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Northbound	12,000–15,000	+2,400
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Southbound	11,000–14,000	+2,500
Springvale Rd	Whitehorse Rd to Eastern Fwy	Northbound	27,000–36,000	+2,500
Springvale Rd	Whitehorse Rd to Eastern Fwy	Southbound	28,000–36,000	+2,900
St Georges Rd	Bell St to Normanby Ave	Northbound	21,000–27,000	+2,900
St Georges Rd	Bell St to Normanby Ave	Southbound	22,000–29,000	+3,700
St Georges Rd	Holden St to Alexandra Pde	Northbound	9,000–11,000	+500
St Georges Rd	Holden St to Alexandra Pde	Southbound	10,000–13,000	+1,000
St Georges Rd	Normanby Ave to Merri Pde	Northbound	21,000–27,000	+1,900
St Georges Rd	Normanby Ave to Merri Pde	Southbound	21,000–27,000	+2,800
Station St	Bell St to Darebin Rd	Northbound	19,000–25,000	+4,800
Station St	Bell St to Darebin Rd	Southbound	20,000–26,000	+4,900
Station St	Whitehorse Rd to Eastern Fwy	Northbound	14,000–18,000	+3,200
Station St	Whitehorse Rd to Eastern Fwy	Southbound	14,000–18,000	+3,200
Studley Park Rd	At Yarra River	Eastbound	10,000–13,000	+2,400
Studley Park Rd	At Yarra River	Westbound	11,000–15,000	+2,900
Surrey Rd	Whitehorse Rd to Eastern Fwy	Northbound	11,000–14,000	+1,200
Surrey Rd	Whitehorse Rd to Eastern Fwy	Southbound	11,000–15,000	+1,300
Templestowe Rd	Near Birrarrung Park	Eastbound	14,000–18,000	+7,000
Templestowe Rd	Near Birrarrung Park	Westbound	13,000–17,000	+6,800

Name	Location	Direction	2036 ‘no project’ daily volume –one way (24h)	2036 ‘no project’ versus 2017
Thompsons Rd	Manningham Rd to Foote St	Northbound	6,000–8,000	+500
Thompsons Rd	Manningham Rd to Foote St	Southbound	6,000–8,000	Minor change
Thompsons Rd	North-east of Eastern Fwy	Eastbound	11,000–14,000	+1,700
Thompsons Rd	North-east of Eastern Fwy	Westbound	13,000–16,000	+1,400
Tram Rd	North of Eastern Fwy	Northbound	17,000–22,000	+3,500
Tram Rd	North of Eastern Fwy	Southbound	19,000–25,000	+4,200
Upper Heidelberg Rd	Banksia St to Studley Rd	Northbound	9,000–11,000	+2,500
Upper Heidelberg Rd	Banksia St to Studley Rd	Southbound	10,000–13,000	+3,100
Waiora Rd	Southern Rd to Dougharty Rd	Northbound	12,000–16,000	+4,500
Waiora Rd	Southern Rd to Dougharty Rd	Southbound	14,000–18,000	+5,400
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Eastbound	6,000–8,000	+1,800
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Westbound	7,000–9,000	+2,400
Waterdale Rd	Southern Rd to Dougharty Rd	Northbound	11,000–14,000	+2,200
Waterdale Rd	Southern Rd to Dougharty Rd	Southbound	11,000–14,000	+2,000
Watsonia Rd	Princes St to Bungay St	Northbound	8,000–11,000	+1,200
Watsonia Rd	Princes St to Bungay St	Southbound	6,000–8,000	+1,300
Whitehorse Rd	Surrey Rd to Springvale Rd	Eastbound	21,000–27,000	+5,400
Whitehorse Rd	Surrey Rd to Springvale Rd	Westbound	22,000–28,000	+5,600
Whitehorse Rd	Union Rd to Elgar Rd	Eastbound	11,000–14,000	+3,100
Whitehorse Rd	Union Rd to Elgar Rd	Westbound	11,000–14,000	+3,400
Williamsons Rd	Manningham Rd to King St	Northbound	13,000–17,000	+1,900
Williamsons Rd	Manningham Rd to King St	Southbound	12,000–16,000	+1,100
Yan Yean Rd	North of Diamond Creek Rd	Northbound	18,000–23,000	+7,700
Yan Yean Rd	North of Diamond Creek Rd	Southbound	17,000–21,000	+7,500

Yarra River crossings

A comparison of the two-way daily traffic volumes along the existing Yarra River crossings are presented in Table 8-5, for 2017 and the 2036 ‘no project’ scenario. Total traffic volumes along the existing crossings are forecast to increase by approximately 27 per cent across the day. The largest growth is anticipated to occur at Chandler Highway, due to the completion of the bridge widening works from two to six lanes.

Table 8-5 – Daily traffic volumes crossing the Yarra River, 2036 'with project' and 2036 'no project' (two-way)

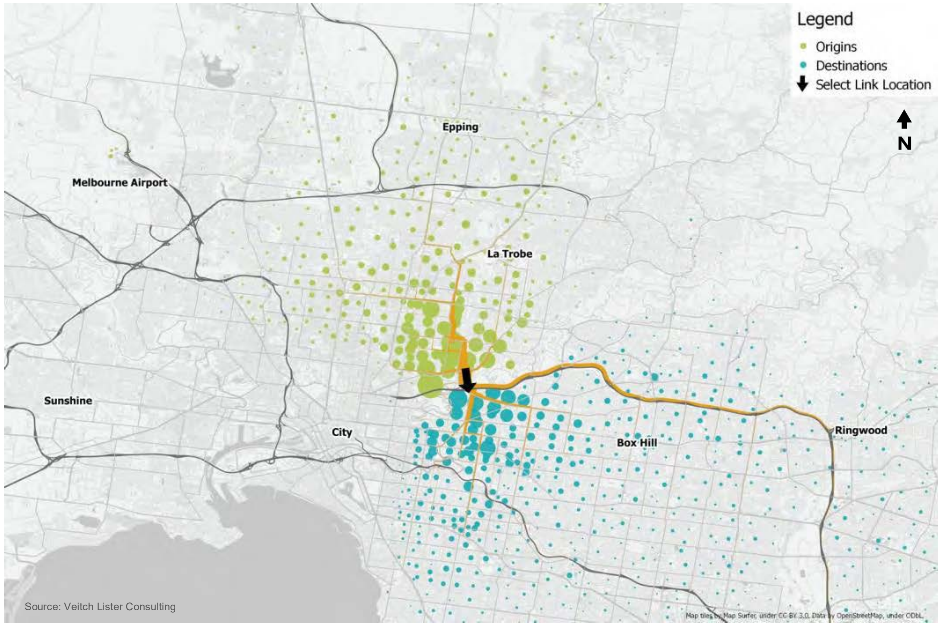
Location	2017	2036 'no project'	Change in traffic volumes
Chandler Highway	38,000 – 50,000	64,000 – 82,000	+65%
Burke Road	35,000 – 45,000	38,000 – 49,000	+10%
Manningham Road	64,000 – 83,000	75,000 – 96,000	+17%
Fitzsimons Lane	53,000 – 68,000	64,000 – 83,000	+21%
Warrandyte Bridge	16,000 – 21,000	21,000 – 27,000	+31%
Total	**206,000 – 267,000**	**262,000 – 337,000**	**+27%**

A comparison of the origins and destinations for each river crossing between the modelled 2016 and 2036 'no project' is presented in Figure 8-16 to Figure 8-20. A summary of the key observations is provided below:

- Traffic demand growth on Chandler Highway is driven by the assumed completion of upgrades and widening works to the bridge beyond 2016. Due to this additional capacity the catchment extends further north and west for trip origins, and to the south and east for trip destinations. The existing catchment area also generally becomes more concentrated, as more local trips take advantage of the Chandler Highway's additional capacity.
- Demand along Burke Road generally intensifies by 2036, particularly towards the areas of Balwyn and Kew. This is likely due to predicted land use changes over this period. There is a higher prevalence of longer trips in the 2036 forecast, with more trip origins further north from areas such as Epping, and destinations south of the Monash Freeway.
- By 2036 the demand catchment for Manningham Road is extended further west to the Tullamarine Freeway, and further north to growth areas such as Wollert. Destinations are also more widely dispersed, with more demand to the east in suburbs such as Ringwood.
  The existing demand catchments near the Heidelberg and Doncaster/Templestowe centres intensify into the future, indicating the significance of the river crossing to local trips.
- Similarly, trips using Fitzsimons Lane are generally anticipated to be longer in 2036. While the existing catchments immediately north and south of the river in areas such as Eltham and Templestowe intensify, there is substantial growth projected for origins and destination further away. More trip origins are predicted from the outer northern areas near Epping, and more trips are destined across the eastern suburbs for areas such as Box Hill and Glen Waverley.
- The demand catchment for the Warrandyte Bridge is not anticipated to change materially into the future, due to constrained population growth in the region. However, the bridge is anticipated to continue servicing a broad catchment into 2036.

Figure 8-16 – Origins and destinations of southbound traffic using Chandler Highway during the AM peak, modelled 2036 'no project' vs modelled 2016

2016



2036 'no project'

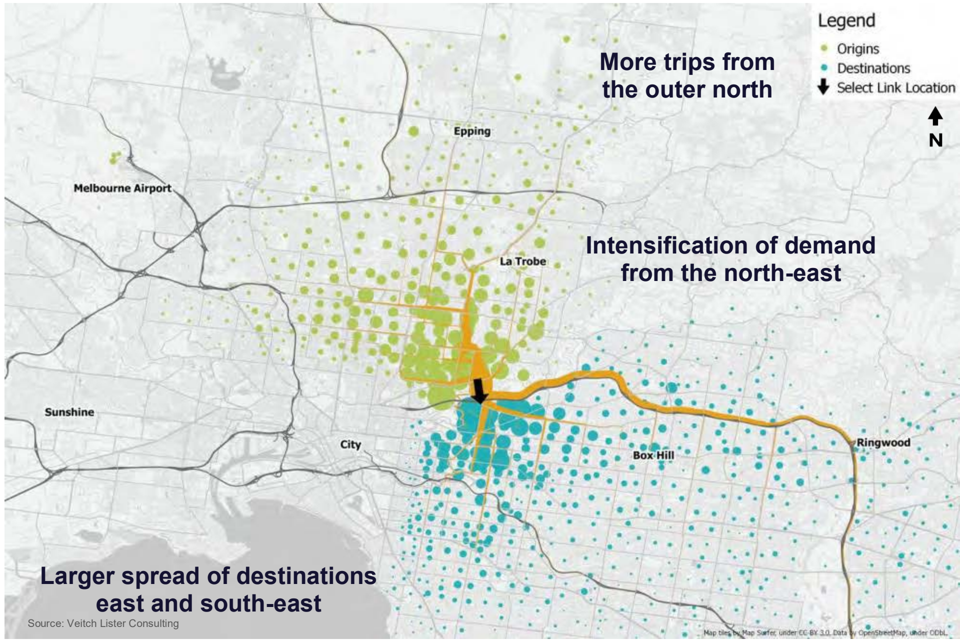
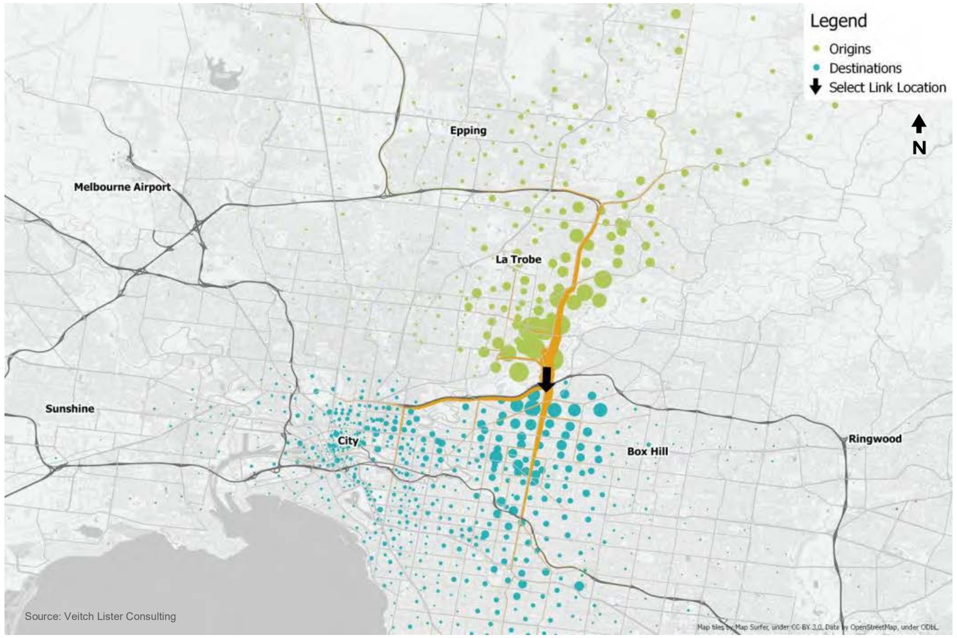


Figure 8-17 – Origins and destinations of southbound traffic using Burke Road during the AM peak, modelled 2036 'no project' vs modelled 2016

2016



2036 'no project'

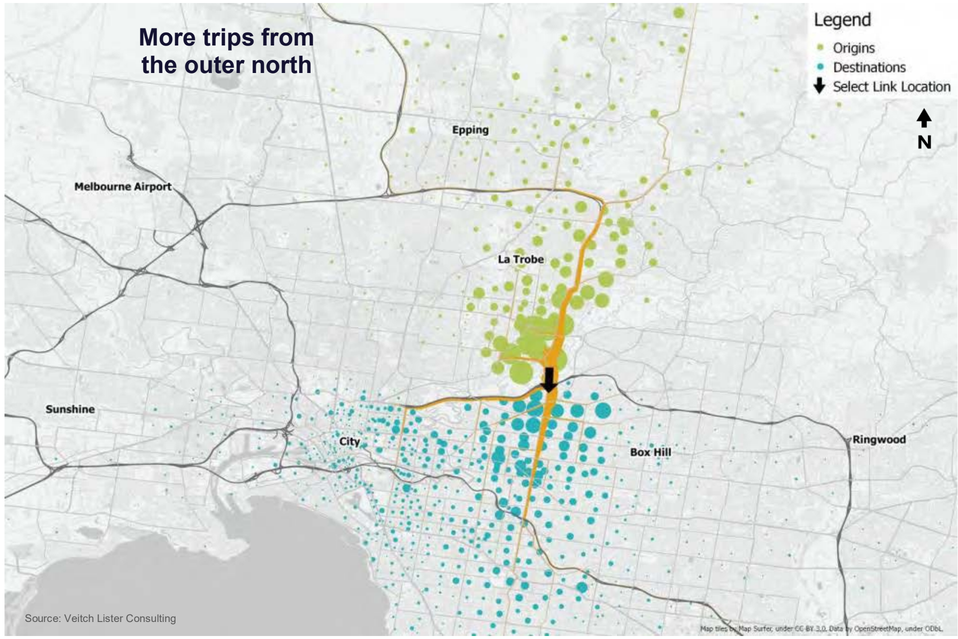
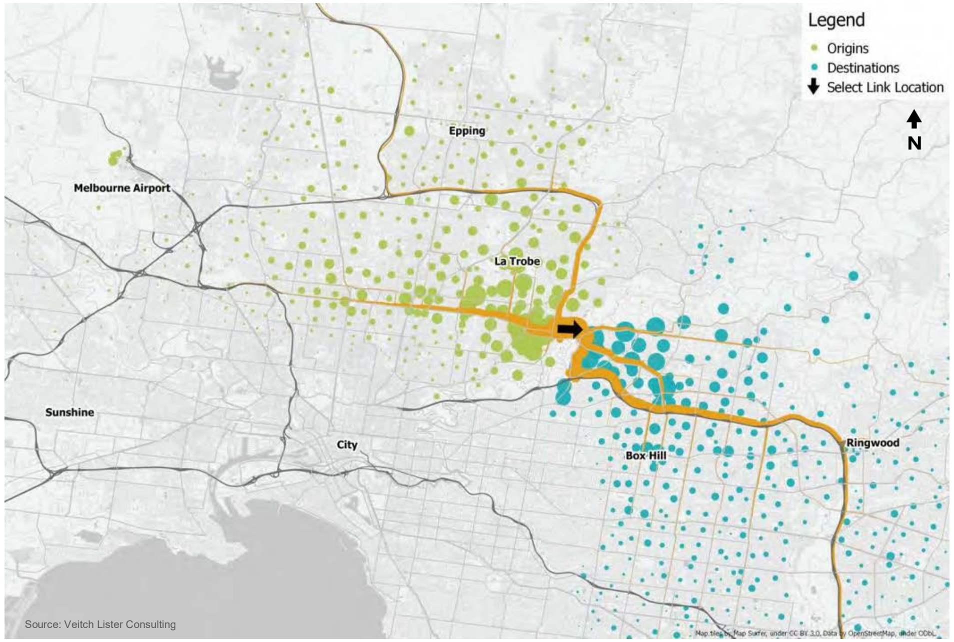


Figure 8-18 – Origins and destinations of southbound traffic using Manningham Road during the AM peak, modelled 2036 'no project' vs modelled 2016

2016



2036 'no project'

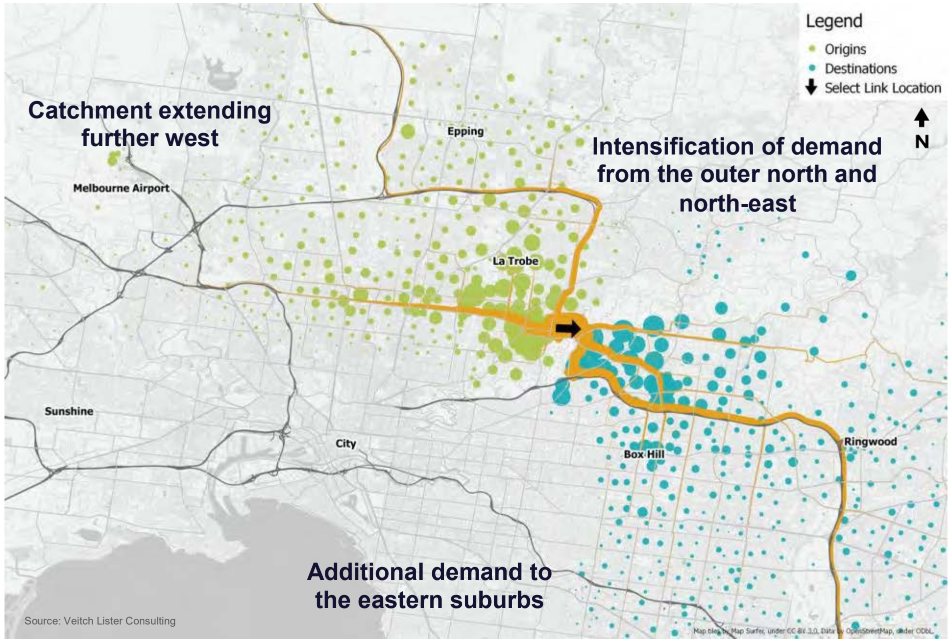
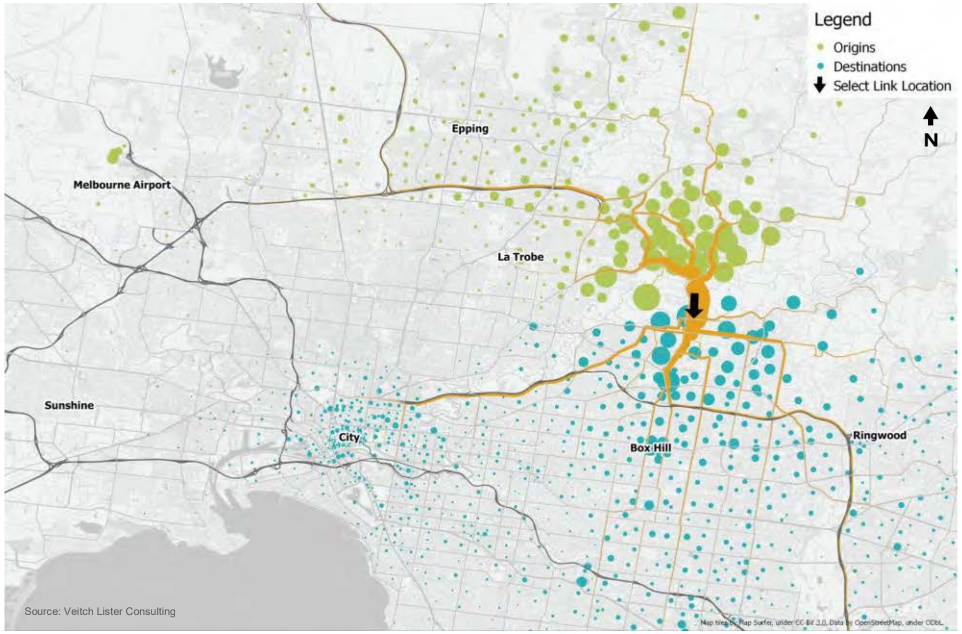


Figure 8-19 – Origins and destinations of southbound traffic using Fitzsimons Lane during the AM peak, modelled 2036 'no project' vs modelled 2016

2016



2036 'no project'

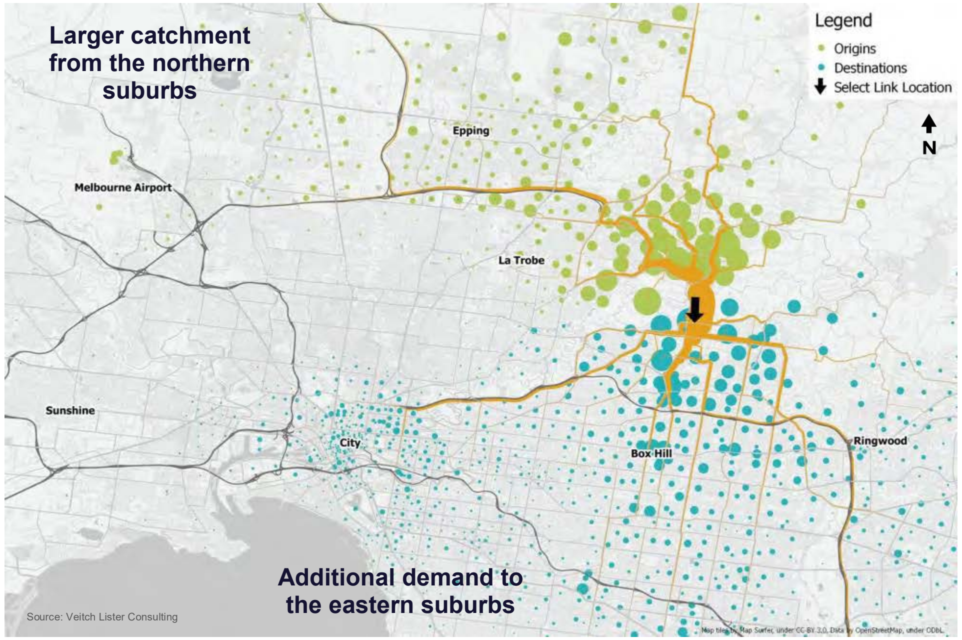
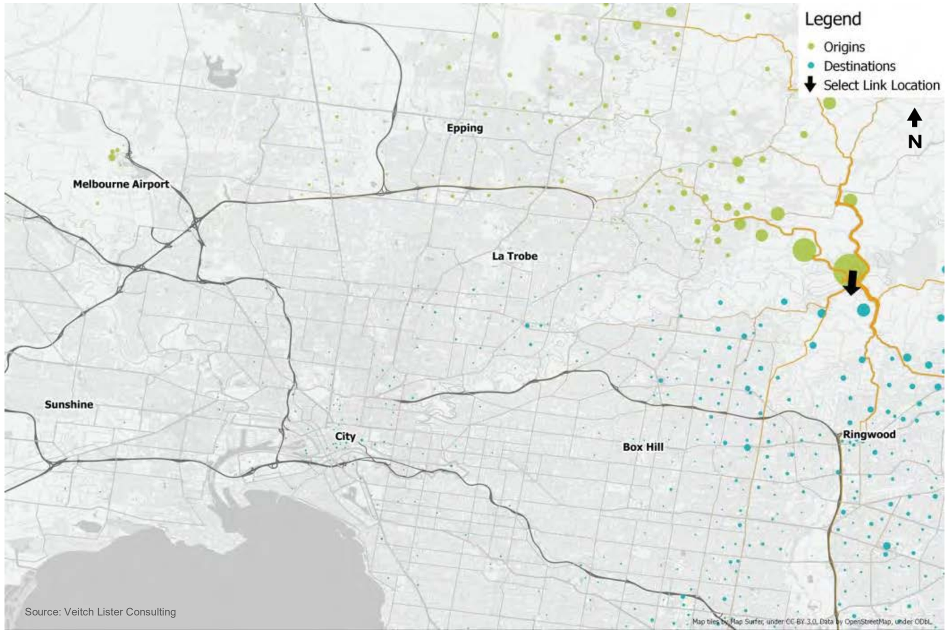
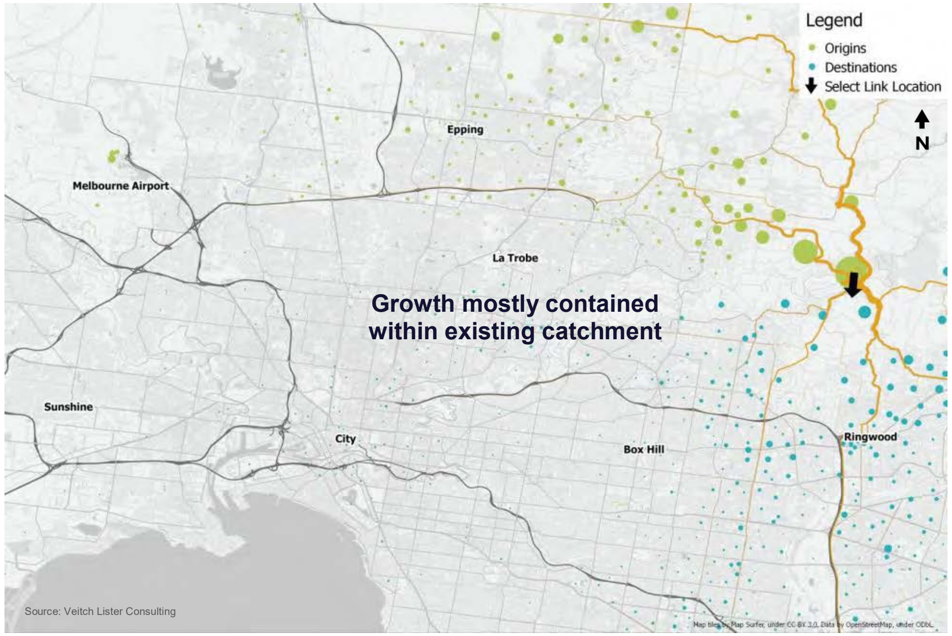


Figure 8-20 – Origins and destinations of southbound traffic using Warrandyte Bridge during the AM peak, modelled 2036 'no project' vs modelled 2016

2016



2036 'no project'



8.2.3 Crash assessment

Forecast traffic volume growth is predicted to increase vehicle crashes in the study area. Across the north-east, total crashes in the 2036 ‘no project’ scenario are predicted to increase by approximately 673 per year relative to 2016, as presented in Table 8-6.

Crashes along non-freeways (including arterial and local roads) are predicted to grow faster than those on freeways, which would deteriorate road safety for residents in the north-east. This is largely due to the forecast growth in vehicle kilometres travelled on non-freeways, which is predicted to be greater than that of freeways.

This estimate does not make allowance for future developments in road safety or crash prevention technology (such as autonomous vehicles). It can therefore be considered as a conservative assessment of potential annual vehicle crashes within the study area in the future.

Table 8-6 – Forecast annual vehicle crashes in the study area, modelled 2036 ‘no project’ vs modelled 2016

	2016		2036 ‘no project’		Change	
Road type	Crashes	Vehicle Kilometres Travelled	Crashes	Vehicle Kilometres Travelled	Crashes	Vehicle Kilometres Travelled
Freeways	154	4,768,000	192	5,952,000	+38	+1,184,000
Non-freeways	2,173	17,575,000	2,808	22,828,000	+635	+5,253,000
Total	**2,327**	**22,342,000**	**3,000**	**28,780,000**	**+673**	**+6,438,000**

8.3 Project corridor assessment

This section assesses the performance of the 2036 'no project' scenario along the project corridor. This assessment comprises the following two sections:

- Eastern Freeway assessment, between Hoddle Street and Springvale Road
- M80 Ring Road corridor assessment, spanning the M80 Ring Road to the Eastern Freeway.

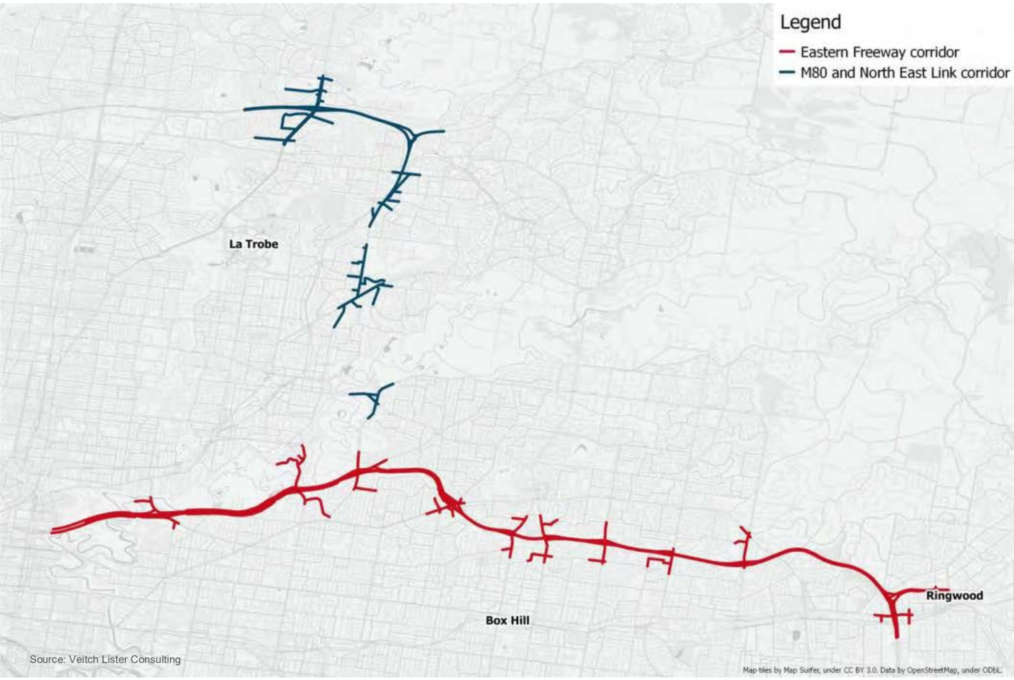
The M80 Ring Road model has been developed to assess the performance of the M80 Ring Road and North East Link corridor, as well as its connections to the arterial road network. Therefore, in the 'no project' scenario where North East Link itself does not exist, only the arterial road connections have been assessed.

Detailed microsimulation modelling has been undertaken for each project corridor for the AM and PM peaks. The extent of the microsimulation modelling for the two sections is presented in Figure 8-21.

This section provides a summary of the results of the microsimulation modelling using both Level of Service and average speed metrics. Detailed results from the microsimulation model is provided in Appendix E – Microsimulation results.

Note that bus and tram services have been included in the performance assessment and share the same Level of Service as general traffic.

Figure 8-21 – Overview of corridor assessment, 2036 'no project'



The development of the 2036 'no project' microsimulation model includes some assumptions regarding the road network. These are summarised as:

- All signalised intersections have been rephased to take into consideration the changes in traffic distribution.
- Chandler Highway between the Yarra River and the Eastern Freeway has been widened to three lanes in each direction.

These changes to the network have been discussed and agreed with VicRoads and would be undertaken by others prior to the completion of North East Link.

8.3.1 Performance indicators

Level of Service is the primary performance indicator used to assess the project corridors.
The metric is defined separately for freeways and arterial roads/signalised intersections, which are outlined below.

Freeway assessment – Level of Service

Traffic data (density, speed and delay) has been extracted from the microsimulation models to assess performance of the freeway and intersections. The Highway Capacity Manual Sixth Edition (HCM) has been used to generate density-based Level of Service outputs for the freeway road segments. The following definitions derived from HCM have been used to define the areas under assessment:

- Weaving segment: 'The base length of the weaving segment plus 152 metres (500 feet) upstream of the entry point to the weaving segment and 152 metres (500 feet) downstream of the exit point from the weaving segment'. A weaving segment is a freeway section where traffic flows cross each other, as they proceed from entering or exiting the freeway.
- Merge segment: 'From the point where the edges of the travel lanes of the merging roadways met to a point 457 metres (1500 feet) downstream of that point'. A merge segment is where vehicles enter the freeway.
- Diverge segment: 'From the point where the edges of the travel lanes of the diverging roadways met to a point 457 metres (1500 feet) upstream of that point'. A diverge segment is where vehicles exit the freeway.
- Basic freeway segment: 'any other segment along the freeway that are not defined in these influence areas'.

The density criteria in Table 8-7 have been derived from HCM and are used to calculate the Level of Service of each section of infrastructure assessed.

Table 8-7 – Density-based Level of Service classification summary

Level of Service	PCU/lane/km	Definition
A	0.0 to 6.8	Free flow traffic conditions.
B	6.8 to 11.2	Reasonably free flow traffic conditions.
C	11.2 to 16.2	Stable flow traffic conditions
D	16.2 to 21.7	Approaching unstable flow
E	21.7 to 28.0	Unstable flow, operating at capacity
F	>28.0	Forced or breakdown flow.

***Note**: PCU – Passenger Car Unit is a metric used to assess traffic-flow on a freeway. One car is considered as a single unit, while buses or trucks can be considered between 2 and 4 PCUs.*

The density calculation for freeways is suited for locations where the speed limit is 100 km/hr or above, and is not suited for locations with a speed limit lower than 100 km/hr. As such, the Level of Service is not assessed for freeway segments with a speed limit of less than 100 km/hr and are alternatively assessed using vehicle speeds.

Arterial roads and signalised intersections assessment – Level of Service

The following outputs have been extracted from the models to assess the performance of the freeway interchanges and arterial road intersections:

- Arrived hourly traffic volume by approach
- Average traffic delay by approach
- Calculated hourly HCM Level of Service by approach.

Level of Service classifications follow the HCM classifications for signalised intersections and are shown in Table 8-8.

Table 8-8 – Delay-based Level of Service classification summary

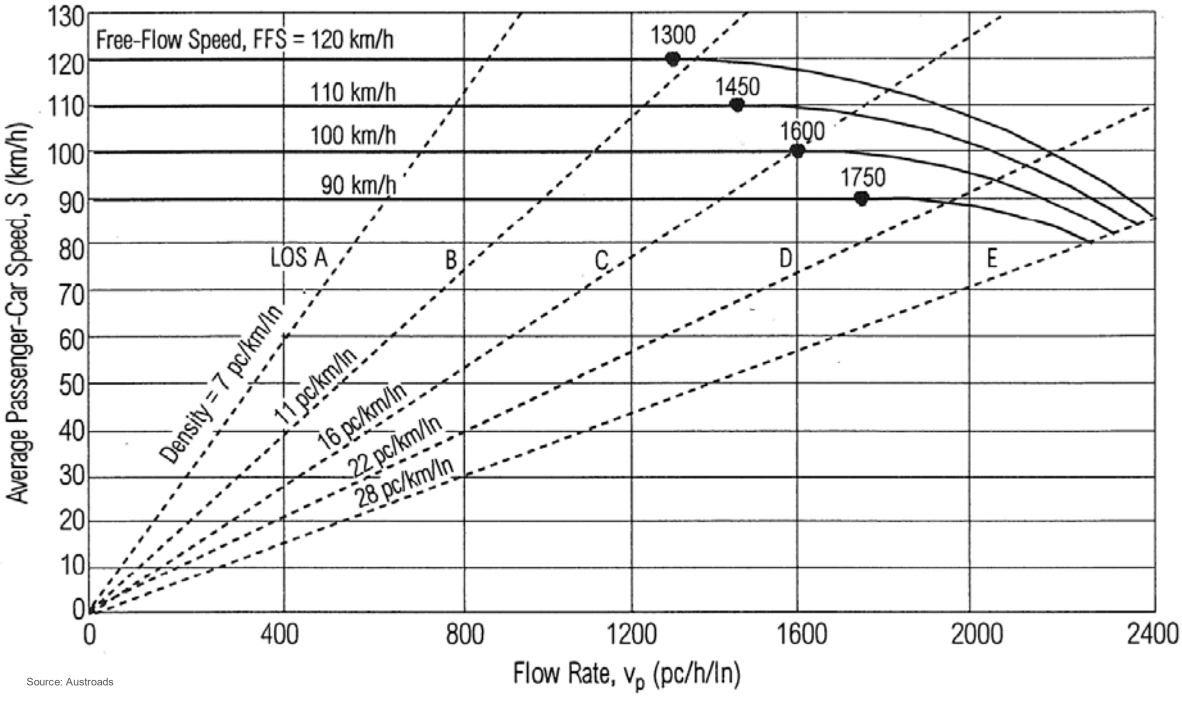
Level of Service	Average delay (seconds)
A	0–10
B	10–20
C	20–35
D	35–55
E	55–80
F	>80

Level of Service target

Both freeways and intersections are designed to operate at a Level of Service D or better in peak periods. Intersections are targeted at an overall Level of Service which is weighted by the performance of each individual approach. At this level, while drivers should be able to get through a set of traffic lights in a single phase, some longer delays may occur on minor approaches. At a Level of Service D traffic along freeways is still stable but approaching unstable flow where minor incidents may cause delays.

Level of Service D as a design target is an endorsed principle of VicRoads. It is the designated target because it is the point beyond which the probability of flow breakdown increases significantly. The chart contained in Figure 8-22 has been obtained from the Austroads Guide to Traffic Management and shows the breakdown of density-based Level of Service categories by free-flow speed. Level of Service D is shown to be the final category by which stable flow is maintained. This target is therefore the optimum balance between performance and investment into the road asset.

Figure 8-22 – Speed-flow curves and Level of Service categories for basic freeway segments



Source: Austroads

8.3.2 Peak period traffic volumes

The schematic maps in Figure 8-23 to Figure 8-26 present the 2036 ‘no project’ volumes along the Eastern Freeway. The volumes reflect total traffic (all vehicle classes) for the AM and PM peak periods.

Figure 8-23 – Eastern Freeway AM peak traffic volumes – Hoddle Street to Doncaster Road, 2036 'no project'

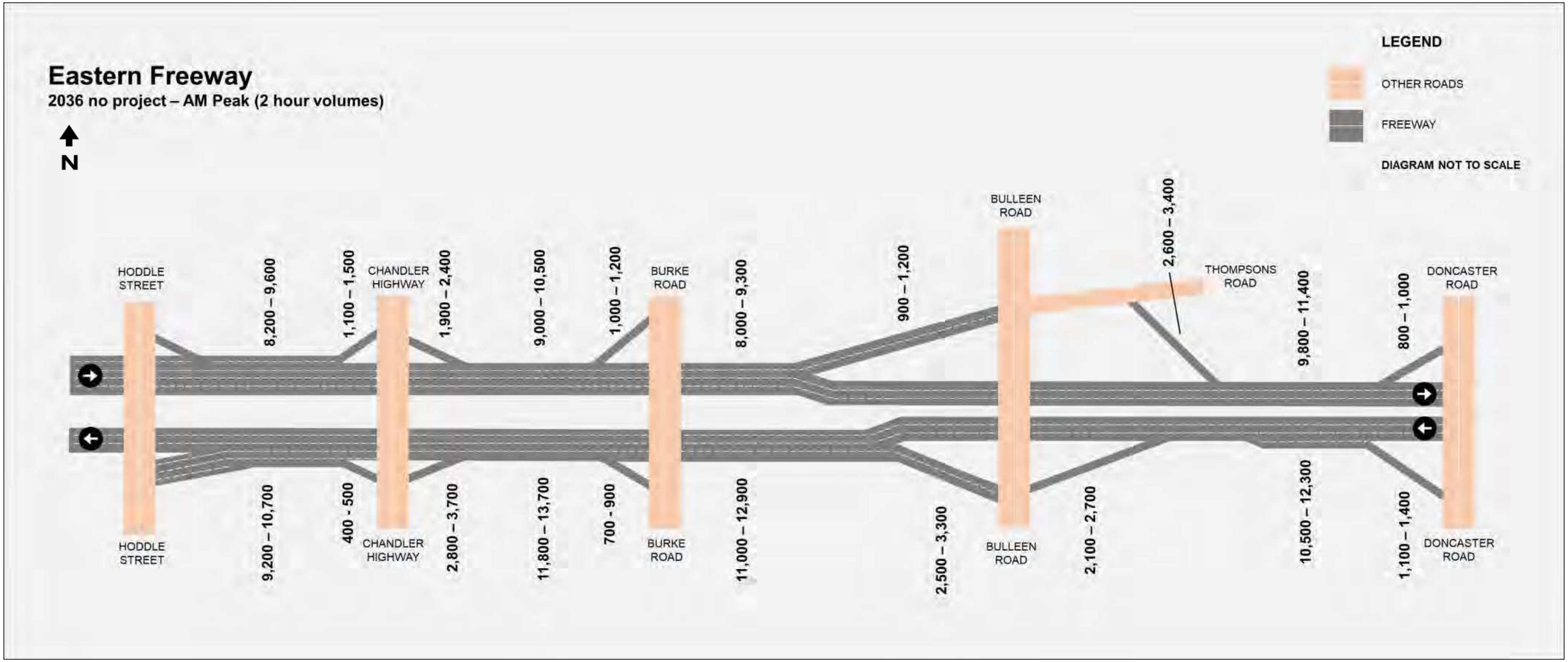


Figure 8-24 – Eastern Freeway AM peak traffic volumes – Doncaster Road to Springvale Road, 2036 'no project'

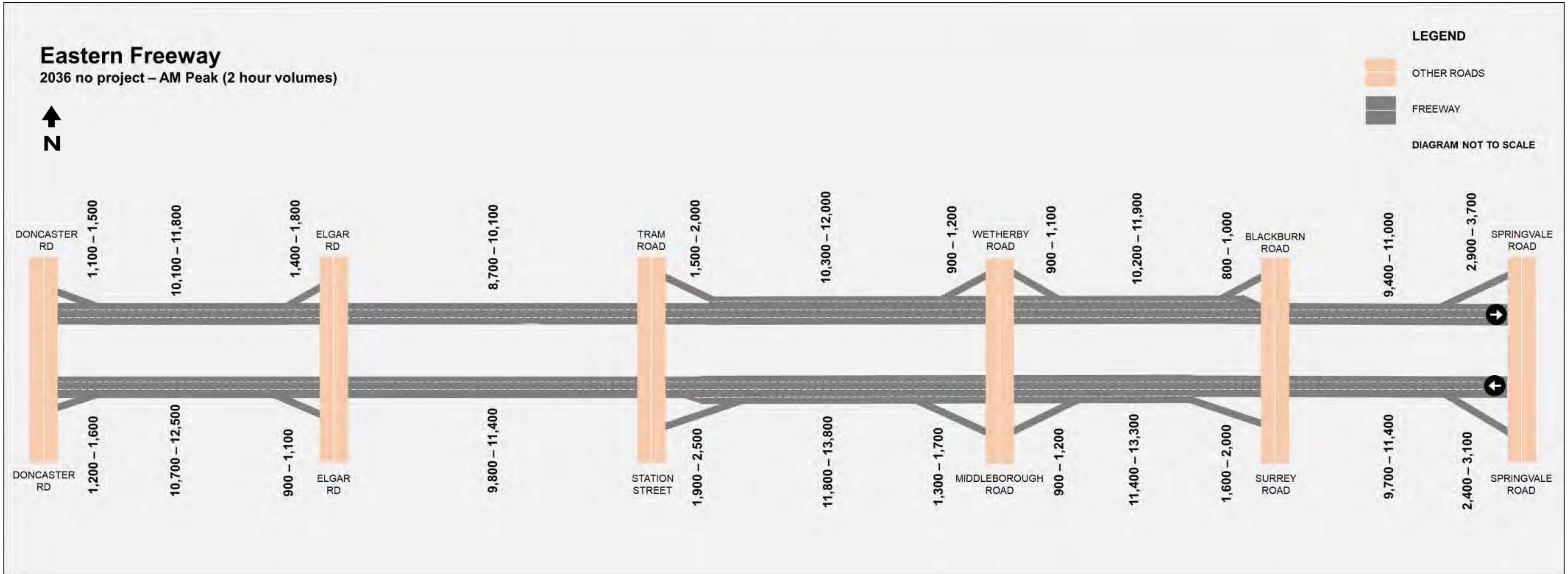


Figure 8-25 – Eastern Freeway PM peak traffic volumes – Hoddle Street to Doncaster Road, 2036 'no project'

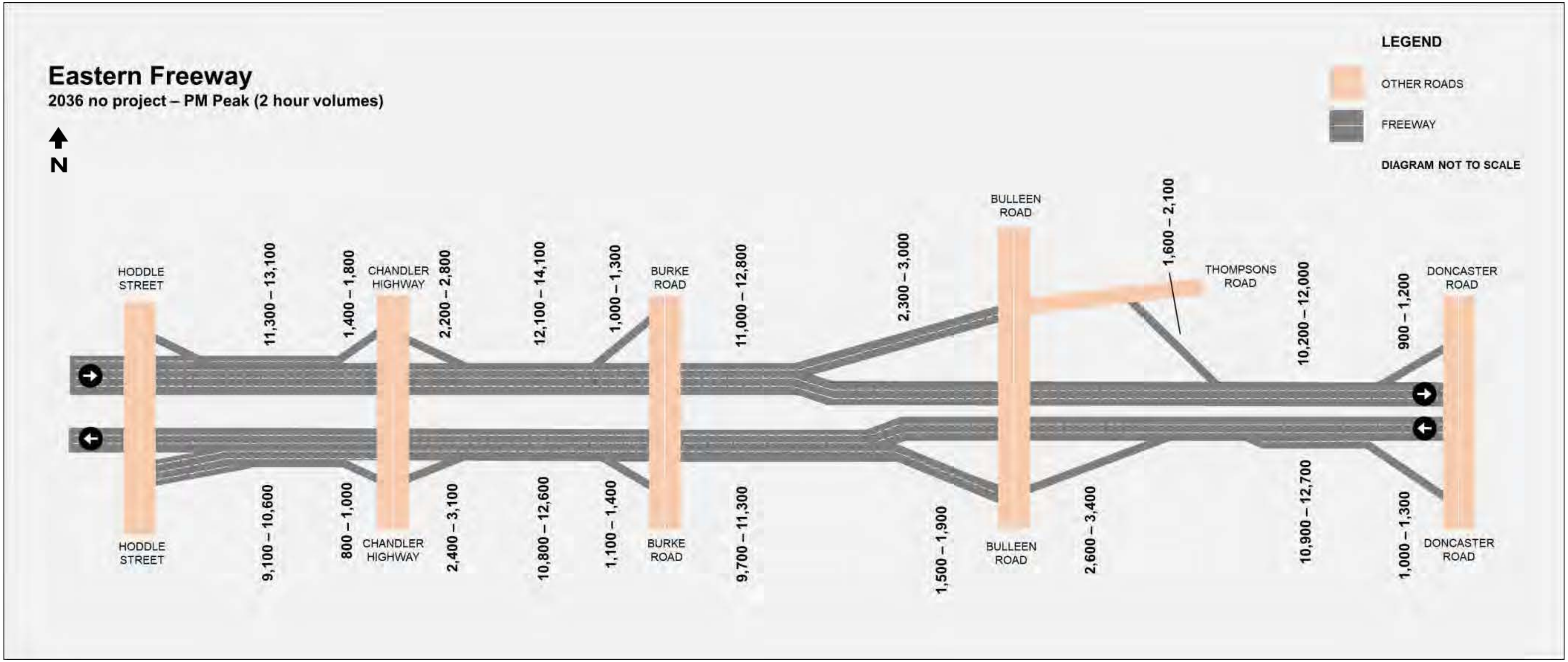
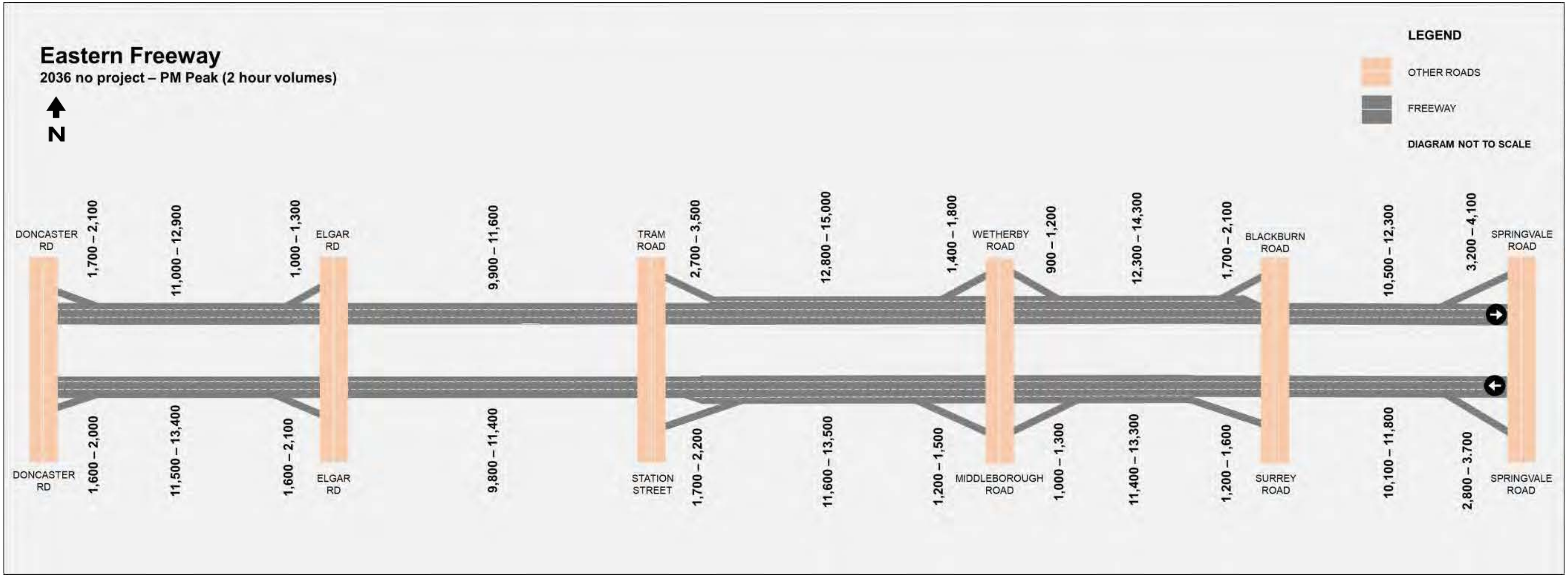


Figure 8-26 – Eastern Freeway PM peak traffic volumes – Doncaster Road to Springvale Road, 2036 'no project'



8.3.3 Peak period traffic speeds

Eastern Freeway – AM peak

The schematic map in Figure 8-27 presents the 2036 'no project' Eastern Freeway traffic speeds for the first AM peak hour.

Key observations include:

- Several flow breakdowns occur along the inbound mainline, primarily near merge and diverge points, as indicated by the orange and red colouring. The largest speed reductions occur between Middleborough Road and Elgar Road due to a concentration of closely-spaced and uncontrolled entry points through this segment, causing heavy weave throughout. Average traffic speeds along the mainline through this section are approximately 45 km/hr to 65 km/hr.
- Flow breakdowns are also estimated to occur near the Doncaster Road inbound on-ramp, where the merge is hindered by the three-lane mainline capacity, as well as a tight road curvature towards Bulleen Road. The Doncaster Road to Bulleen Road mainline generally operates at a reduced speed of 65 km/hr to 75 km/hr as a result.
- Heavy flow breakdown occurs at the Springvale Road inbound merge due to a large uncontrolled entry volume at this point. This impacts mainline speeds back towards the EastLink tunnels.
- The outbound direction generally operates well, with average speeds typically estimated above 85 km/hr. The exception is the EastLink tunnel, which operates at a speed limit of 80 km/hr.

The schematic map in Figure 8-28 presents the 2036 'no project' Eastern Freeway traffic speeds for the second AM peak hour.

Key observations include:

- There is generally a wider spread of inbound mainline flow breakdowns for the second peak hour. Similar issues around the Middleborough Road to Elgar Road segments exist again. Average speeds through this section are approximately 45 km/hr to 55 km/hr.
- Delays begin to occur between Bulleen Road and Chandler Highway in the inbound direction, commencing at the weave section between Burke Road and Chandler Highway. Speeds west of Chandler Highway are shown to be above 85 km/hr across both directions and both peak hours. Inbound freeway speeds west of Chandler Highway would be contingent upon the modelled queue length from Hoddle Street and Alexandra Parade.
- Some flow breakdown begins to occur in the outbound direction, notably at the Thompsons Road and Doncaster Road outbound merges. These instances cause localised flow breakdown and speed reductions to 45 km/hr to 55 km/hr.

Figure 8-27 – Eastern Freeway AM peak traffic speeds, 2036 'no project' – first hour

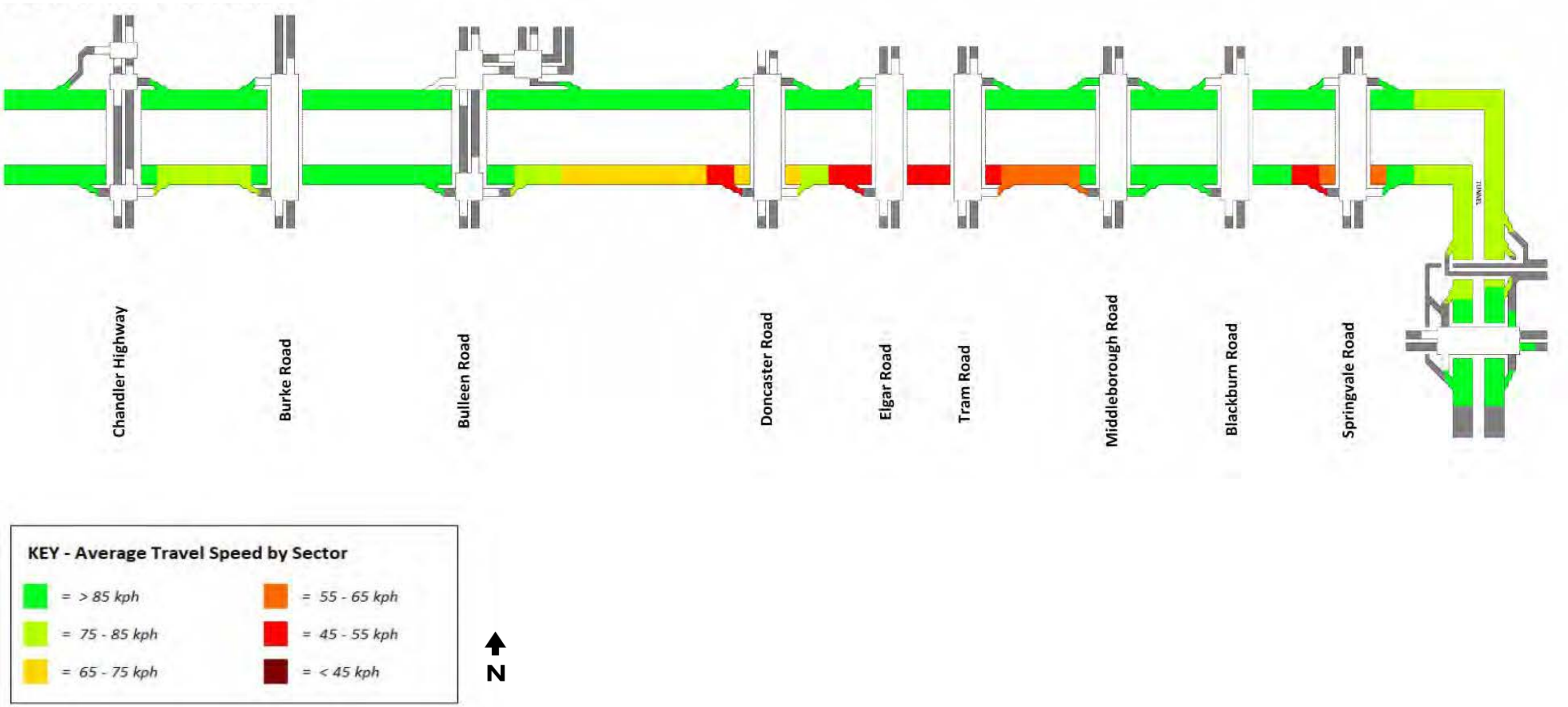


Figure 8-28 – Eastern Freeway AM peak traffic speeds, 2036 'no project' – second hour

Eastern Freeway – PM peak

The schematic map in Figure 8-29 presents the 2036 ‘no project’ Eastern Freeway traffic speeds for the first PM peak hour.

Key observations include:

- A heavy, sustained flow breakdown occurs along the outbound mainline segment between Chandler Highway and Doncaster Road, where speeds deteriorate to less than 45 km/hr. This is caused by the tight curvature of the mainline between Bulleen Road and Doncaster Road, a reduction in mainline capacity to three lanes through the same section, as well as a heavy weave movement between Doncaster Road and Elgar Road.
- Outbound travel speeds east of Elgar Road are generally above 85 km/hr, due to the ‘gating’ effect of the breakdown west of Elgar Road.
- Speeds along the inbound direction are typically faster, due to lower demand for this direction for the first peak hour, although some speed reductions occur at the diverges to Bulleen Road and Chandler Highway. Again, speeds between Doncaster Road and Bulleen Road are reduced due to mainline capacity constraints, down to 65 km/hr to 85 km/hr.

The schematic map in Figure 8-30 presents the 2036 ‘no project’ Eastern Freeway traffic speeds for the second PM peak hour.

Key observations include:

- Conditions along the outbound mainline are similar to the first hour, with major flow breakdown still occurring along the mainline from Chandler Highway to Elgar Road.
- Heavy flow breakdown is estimated along the inbound direction between Middleborough Road and Elgar Road, due to the demand for weave movements.
- The Bulleen Road to Chandler Highway inbound mainline segment also deteriorates significantly in speed, down to 45 km/hr to 55 km/hr. This is caused by large demand for the Chandler Highway inbound diverge, which creates weaving movements through the segment as well as queuing along the exit ramp which impacts mainline flow.
- The Springvale Road inbound merge causes heavy flow breakdown along the immediate mainline segment, due to large entry volumes merging onto the mainline.

Figure 8-29 – Eastern Freeway PM peak traffic speeds, 2036 'no project' – first hour

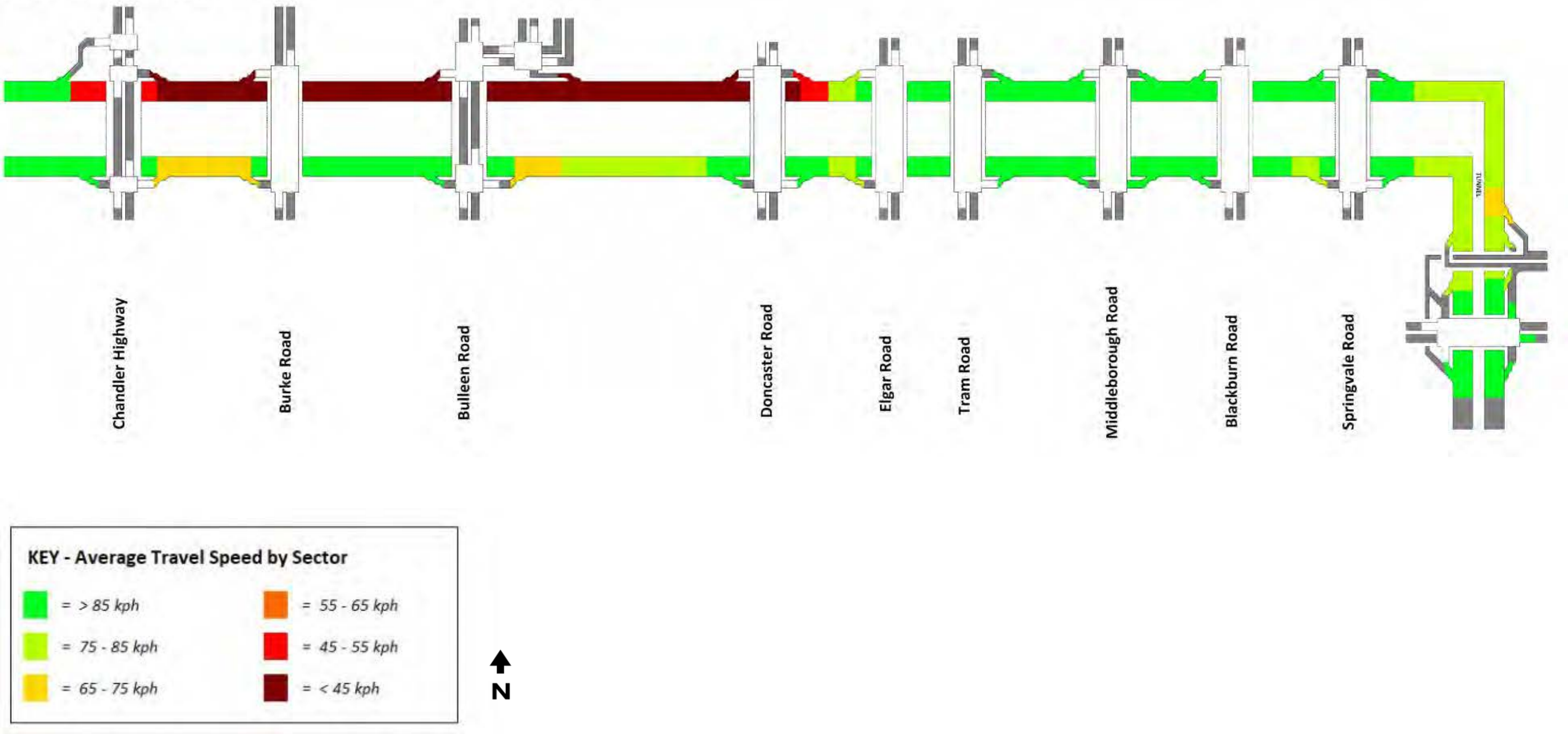
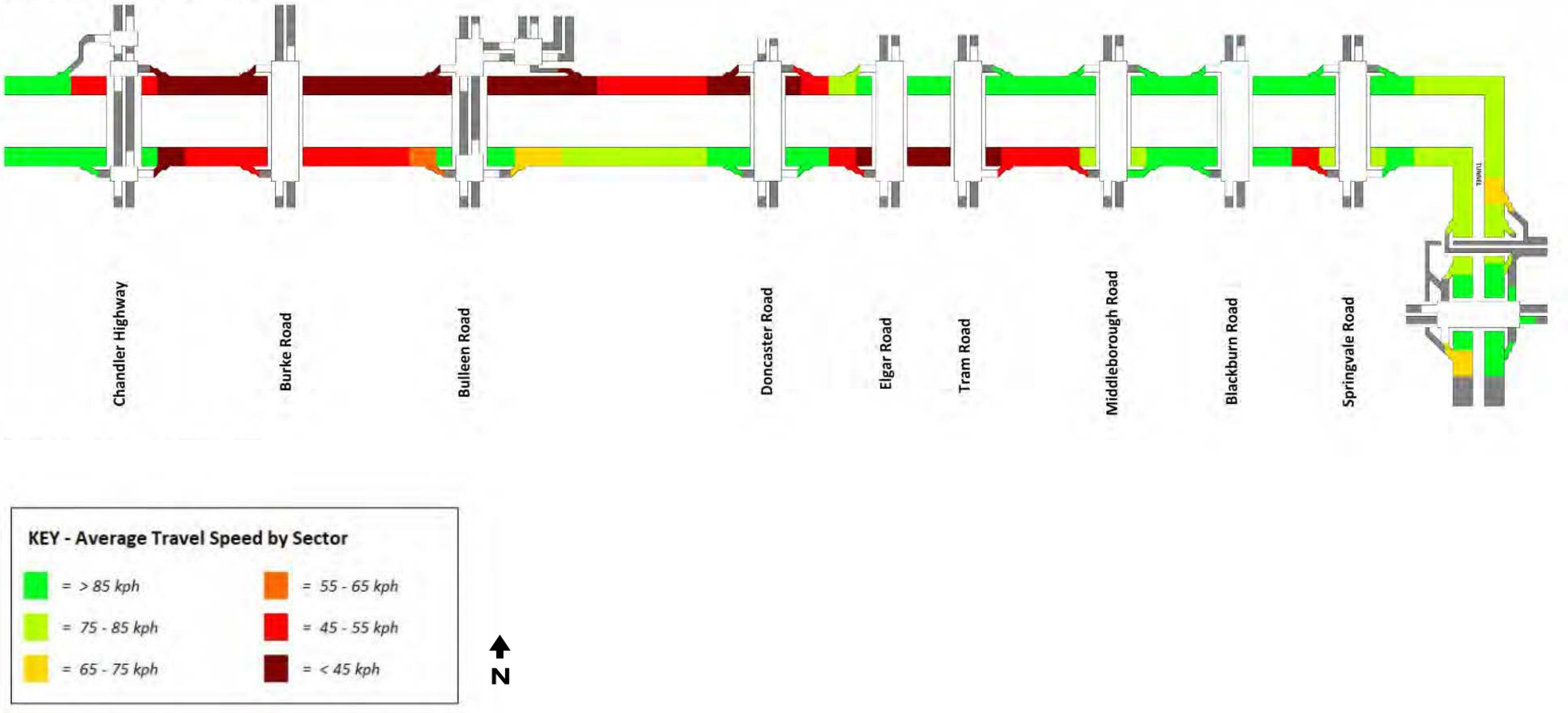


Figure 8-30 – Eastern Freeway PM peak traffic speeds, 2036 'no project' – second hour



M80 Ring Road interchange – AM peak and PM peak

The schematic maps in Figure 8-31 to Figure 8-34 present the 2036 'no project' M80 Ring Road interchange speeds for the AM and PM peak hours.

The main observation across all time periods is the heavy flow breakdown on the eastbound mainline east of Plenty Road. This is caused by extensive queueing at the signalised Greensborough Bypass intersection at the freeway terminus. The Plenty Road eastbound on-ramp also contributes to this due to high and uncontrolled entry volumes merging onto the mainline. Speeds along this segment are forecast to be lower than 45 km/hr on average across all four hours.

Travel speeds along other freeway segments are generally forecast to operate over 85 km/hr.

Figure 8-31 – M80 Ring Road interchange AM peak traffic speeds, 2036 'no project' – first hour

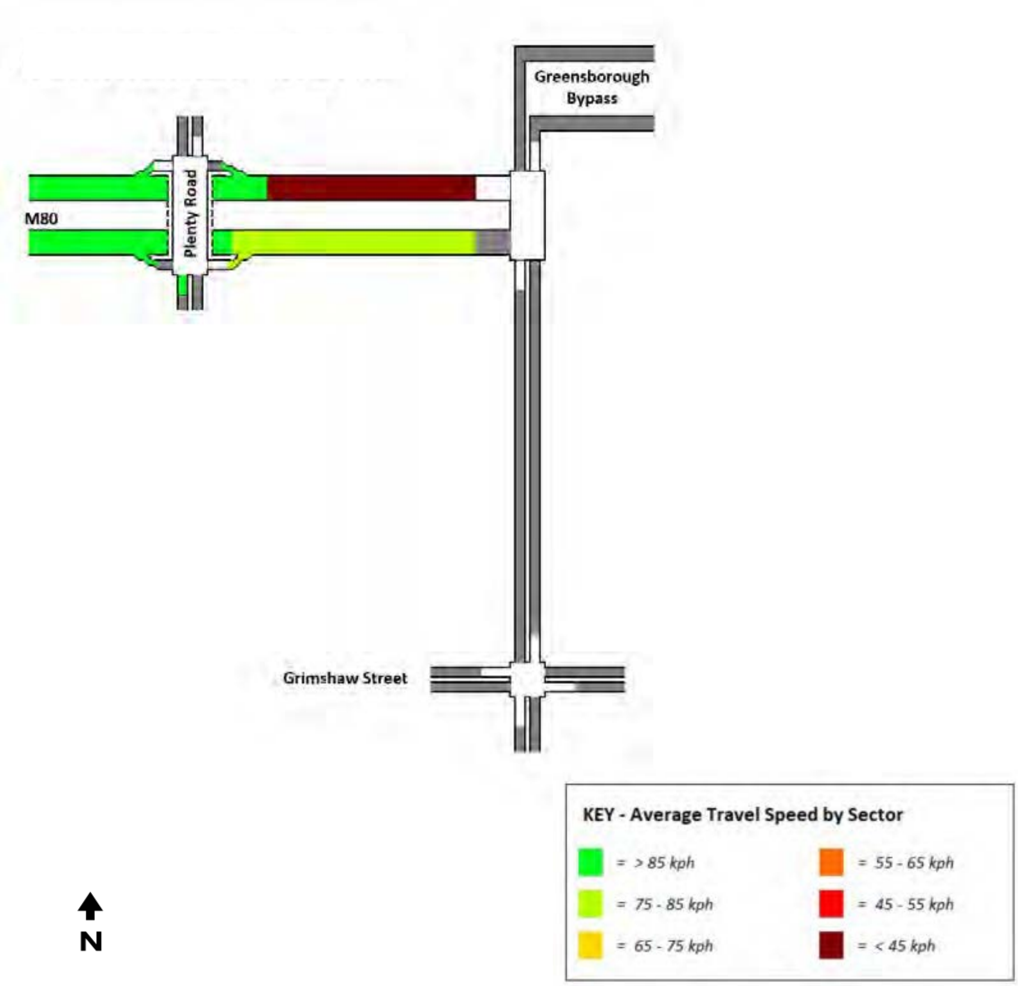


Figure 8-32 – M80 Ring Road interchange AM peak traffic speeds, 2036 'no project' – second hour

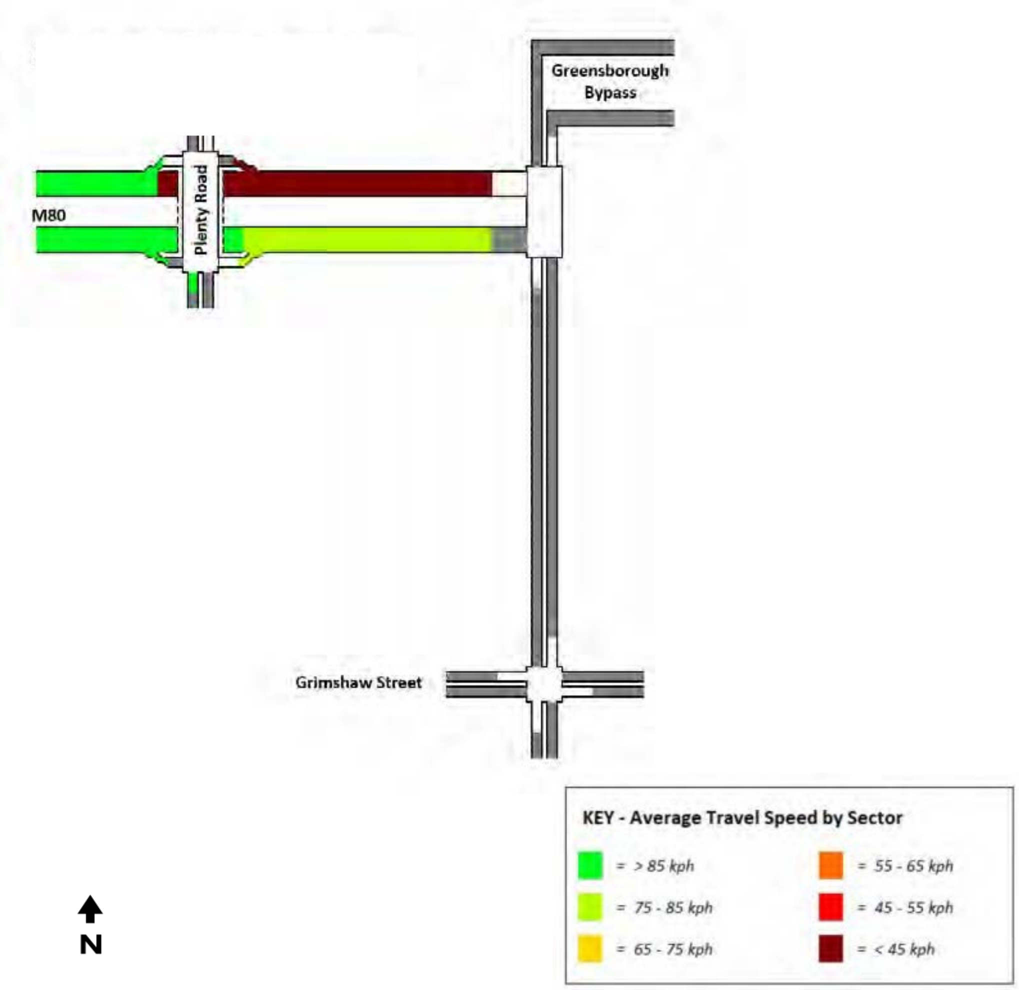


Figure 8-33 – M80 Ring Road interchange PM peak traffic speeds, 2036 'no project' – first hour

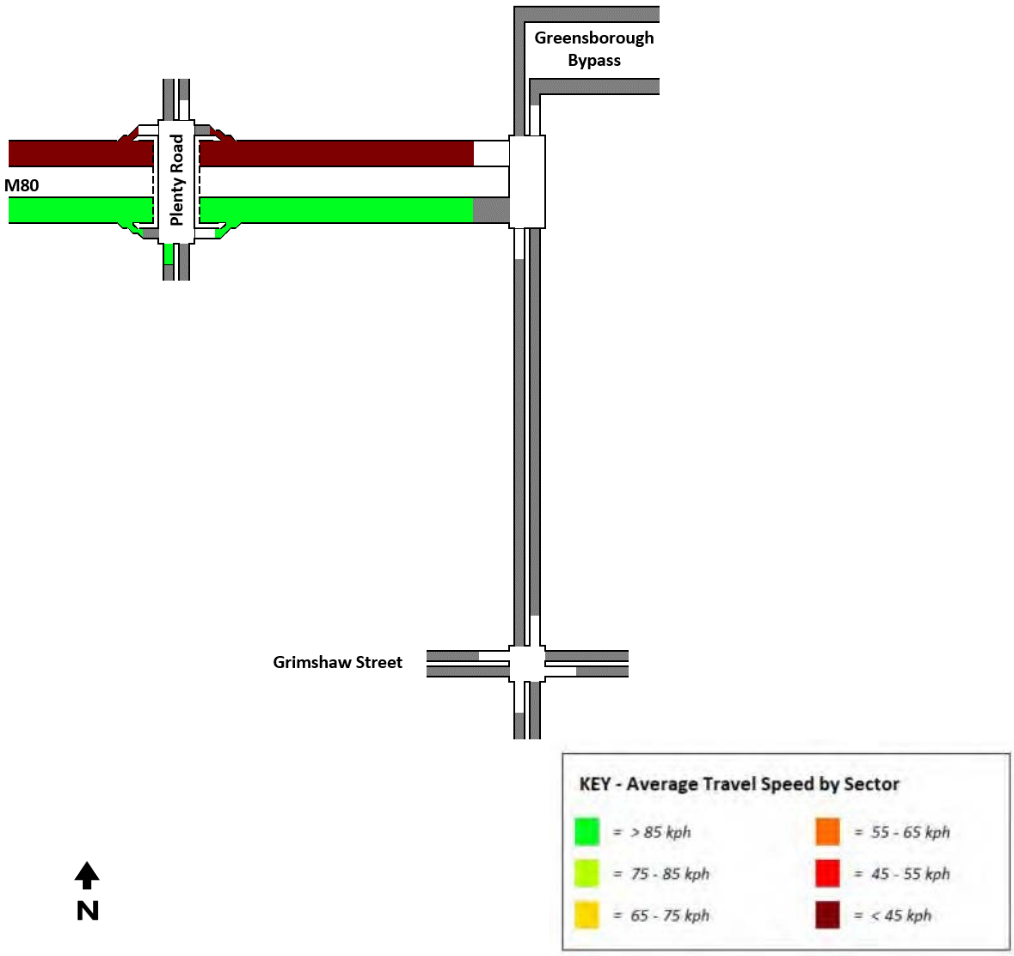
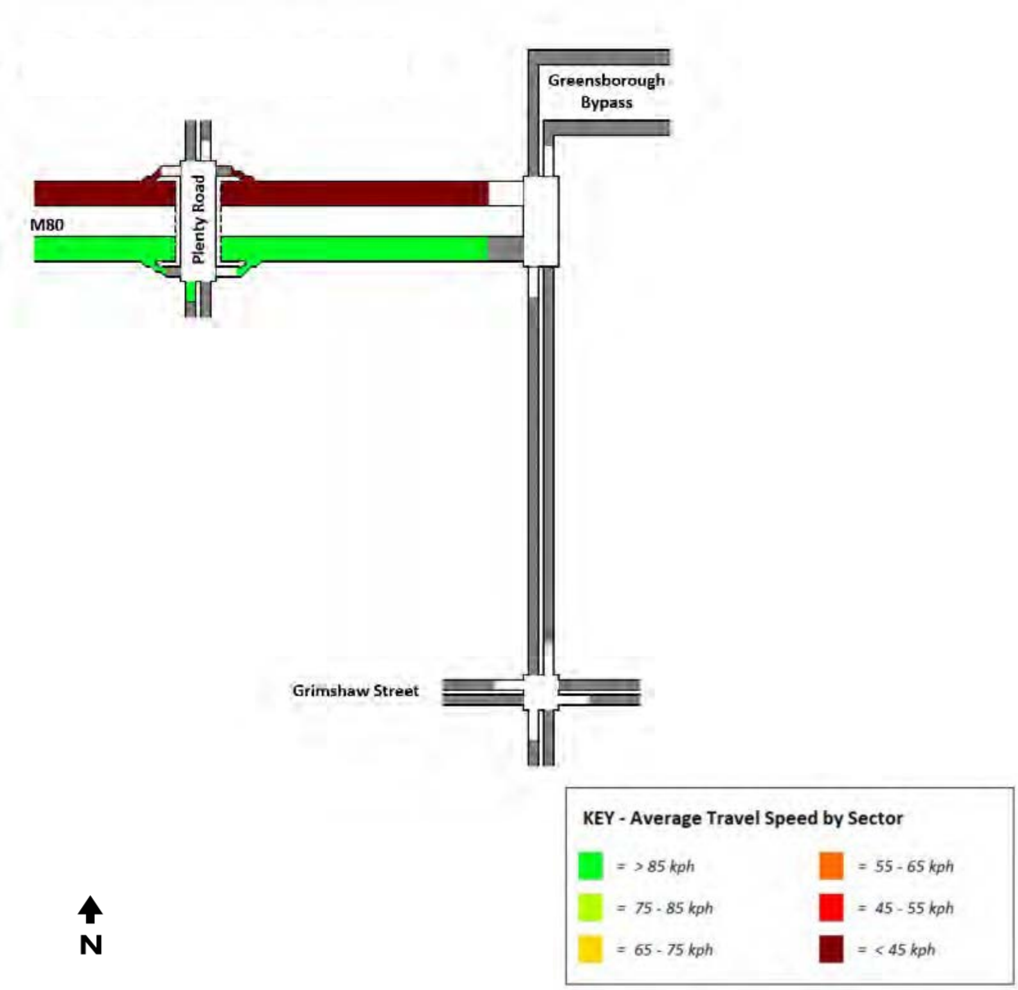


Figure 8-34 – M80 Ring Road interchange PM peak traffic speeds, 2036 'no project' – second hour



8.3.4 Peak period Level of Service

This section presents the Level of Service assessment along the project corridors. As discussed in Section 8.3.1, freeways use a density-based Level of Service which measures the volume of traffic demand per unit length. Freeway interchanges and signalised arterial road intersections alternatively use a delay-based Level of Service, which reflects time spent waiting at signals. A Level of Service D is deemed the minimum acceptable standard for both freeways and signalised intersections. For signalised intersections, the Level of Service D target is for the whole intersection, not individual approaches.

The density-based Level of Service for freeways is suited for locations where the speed limit is 100 km/hr or above, and is not suited for locations with speed limits lower than 100 km/hr. As such, in these locations the Level of Service are not assessed and vehicle speeds are alternatively used as the primary performance indicator.

Eastern Freeway – AM peak

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the first peak hour are presented in Figure 8-35 and Figure 8-36.

Key observations include:

- Much of the inbound mainline operates at a Level of Service F in this period. This occurs between Middleborough Road and Bulleen Road, as well as near the Springvale Road inbound merge. A Level of Service E is also estimated along the mainline between Burke Road and Chandler Highway.
- The outbound mainline operates at a Level of Service D or better.
- Intersection delays are estimated to be worst at Springvale Road south of the freeway as well as the Springvale Road interchange with the Eastern Freeway, with large delays anticipated for the northbound approach volumes. This is due to conflicts between through traffic (north-south traffic along Springvale Road) and traffic attempting to access the Eastern Freeway. This results in these intersections operating at a Level of Service F.
- All other intersections generally operate at a Level of Service D or better. This is partially due to the significant amount of congestion along the Eastern Freeway, preventing vehicles from exiting the freeway and travelling through the interchanges and onto the surrounding arterial roads.

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the second peak hour are presented in Figure 8-37 and Figure 8-38.

Key observations include:

- The inbound mainline generally operates at a Level of Service E or F between Middleborough Road and Chandler Highway. Levels of Service E and F are also estimated along the outbound mainline between Bulleen Road and Elgar Road, with the balance of the freeway typically operating at levels C and D.
- Intersection delays are heaviest at the Burke Road/Macarthur Road intersection due to the northbound approach, which operates at an overall Level of Service of F.
- The Bulleen Road/Thompsons Road/Eastern Freeway on-ramp intersections operate at an overall Level of Service E and F, due to heavy southbound movements from Bulleen Road.

Figure 8-35 – Eastern Freeway AM peak Level of Service, 2036 'no project' – Chandler Highway to Doncaster Road – first hour

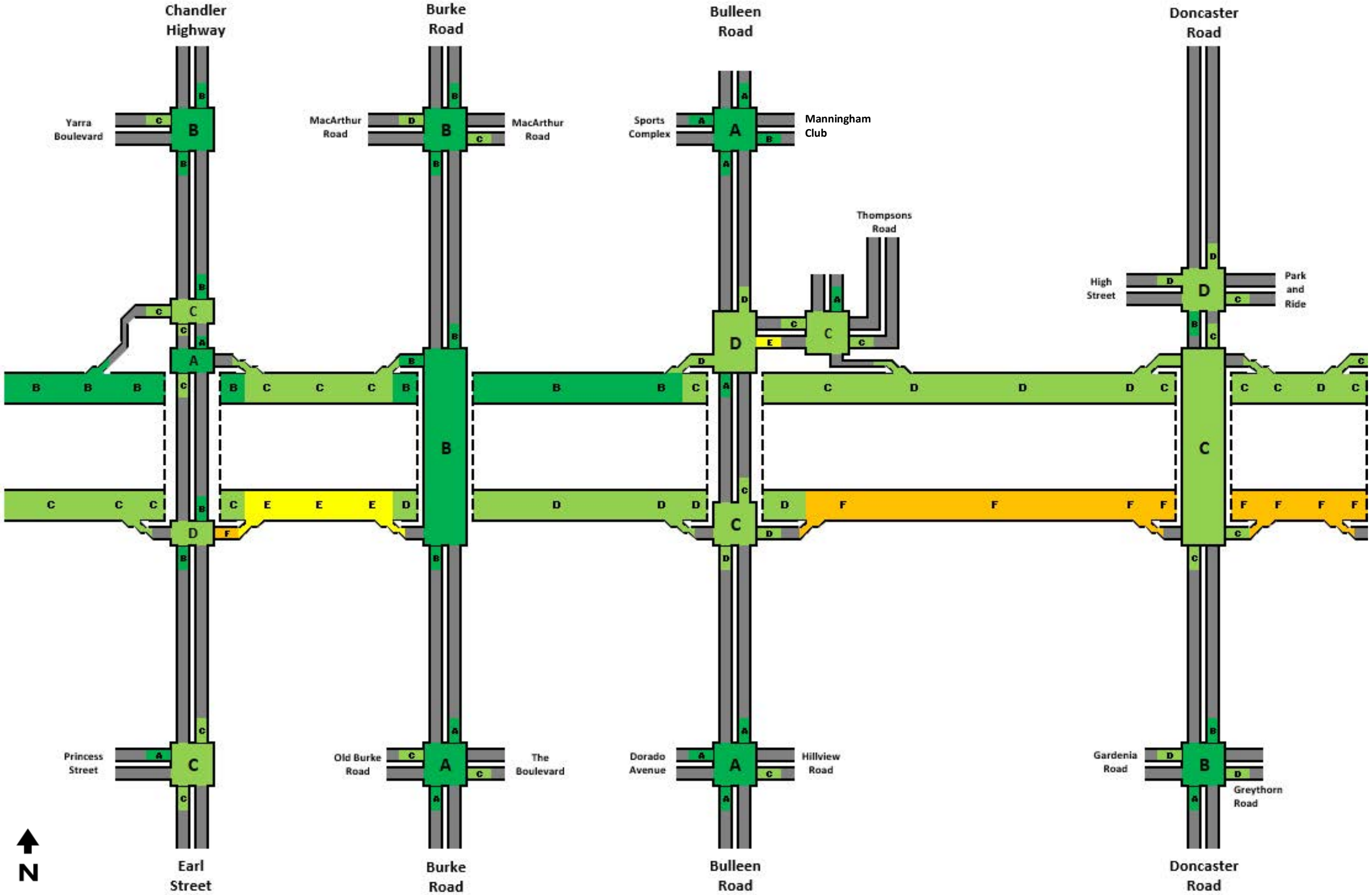


Figure 8-36 – Eastern Freeway AM peak Level of Service, 2036 'no project' – Elgar Road to Springvale Road – first hour

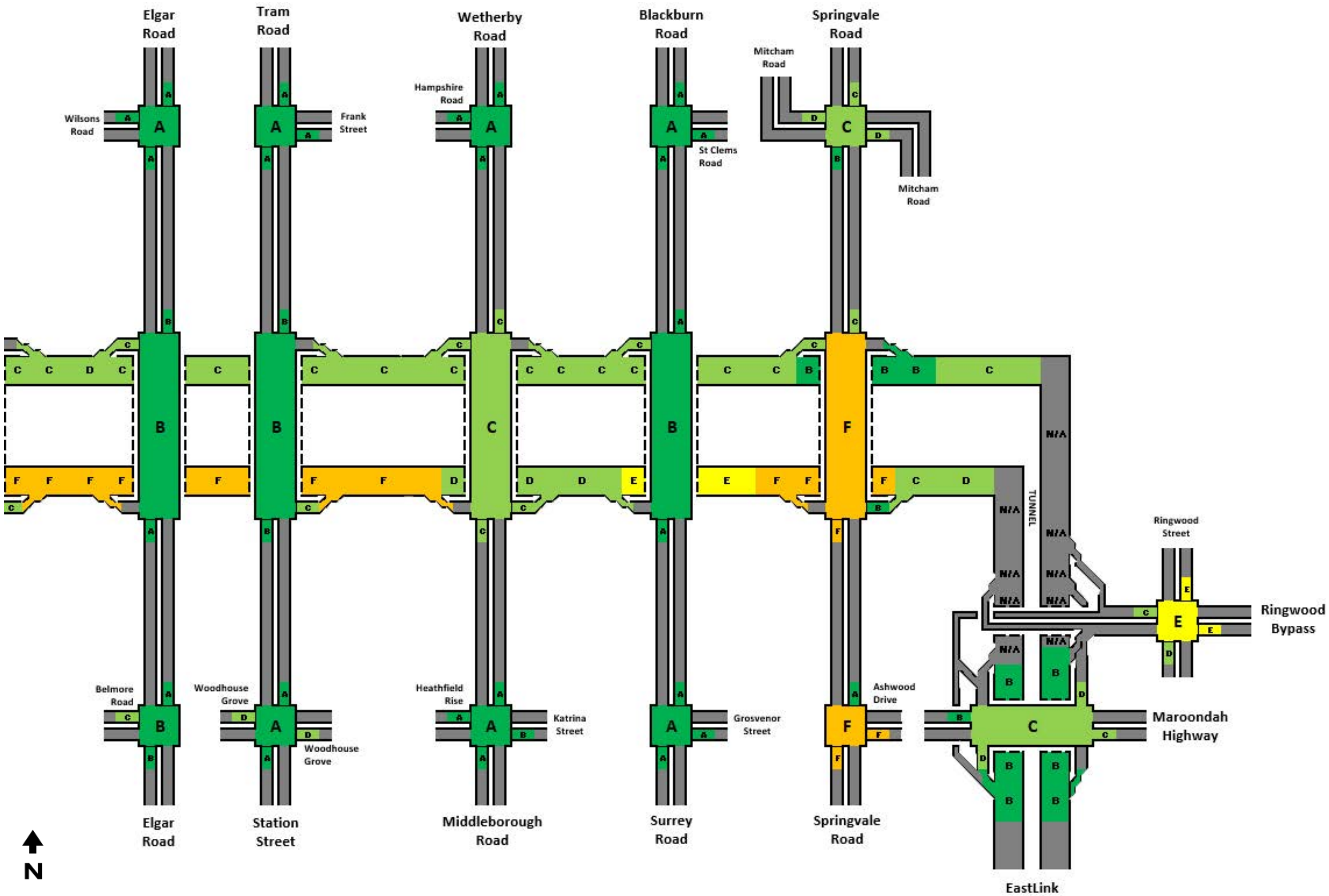


Figure 8-37 – Eastern Freeway AM peak Level of Service, 2036 'no project' – Chandler Highway to Doncaster Road – second hour

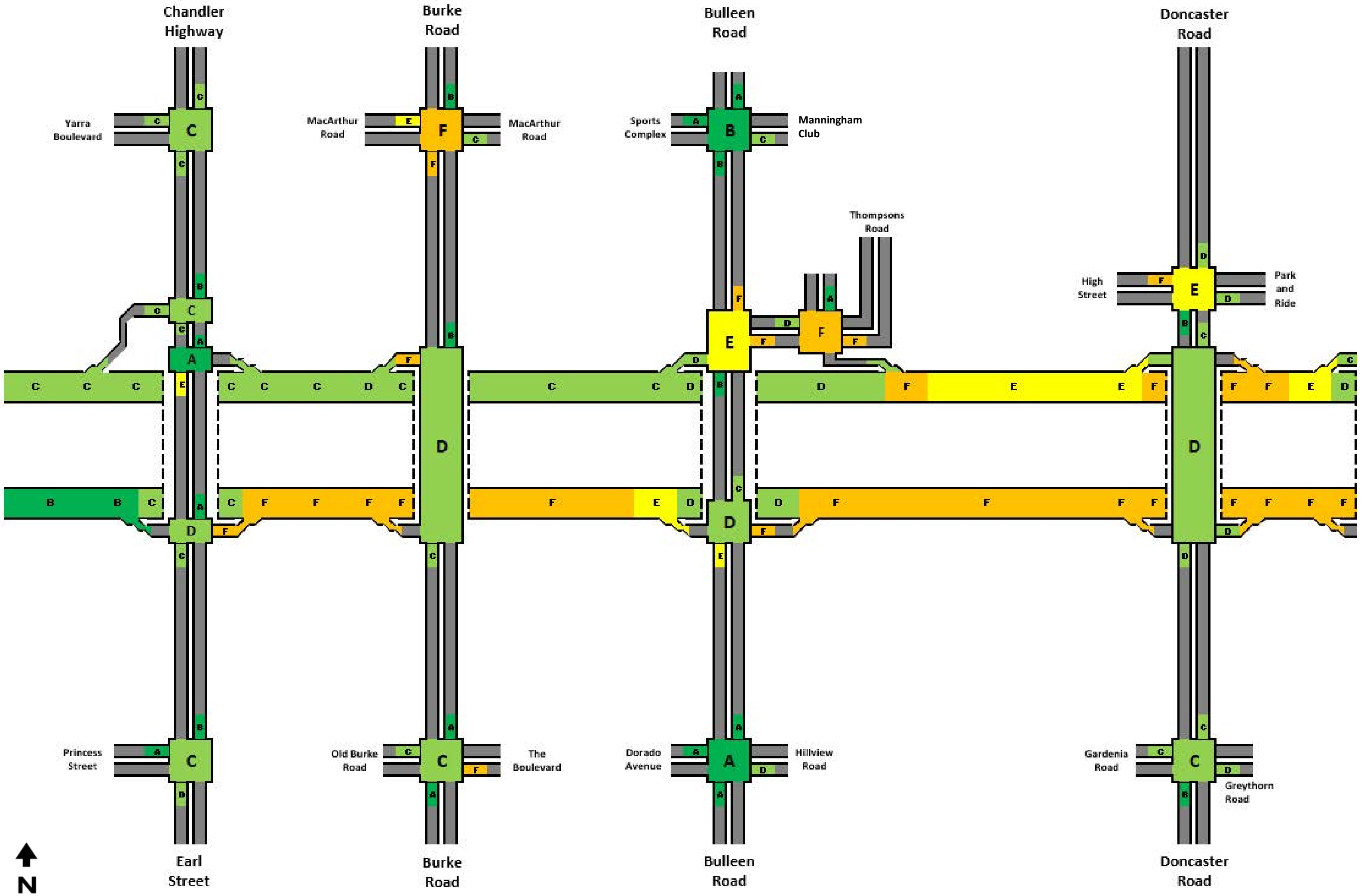
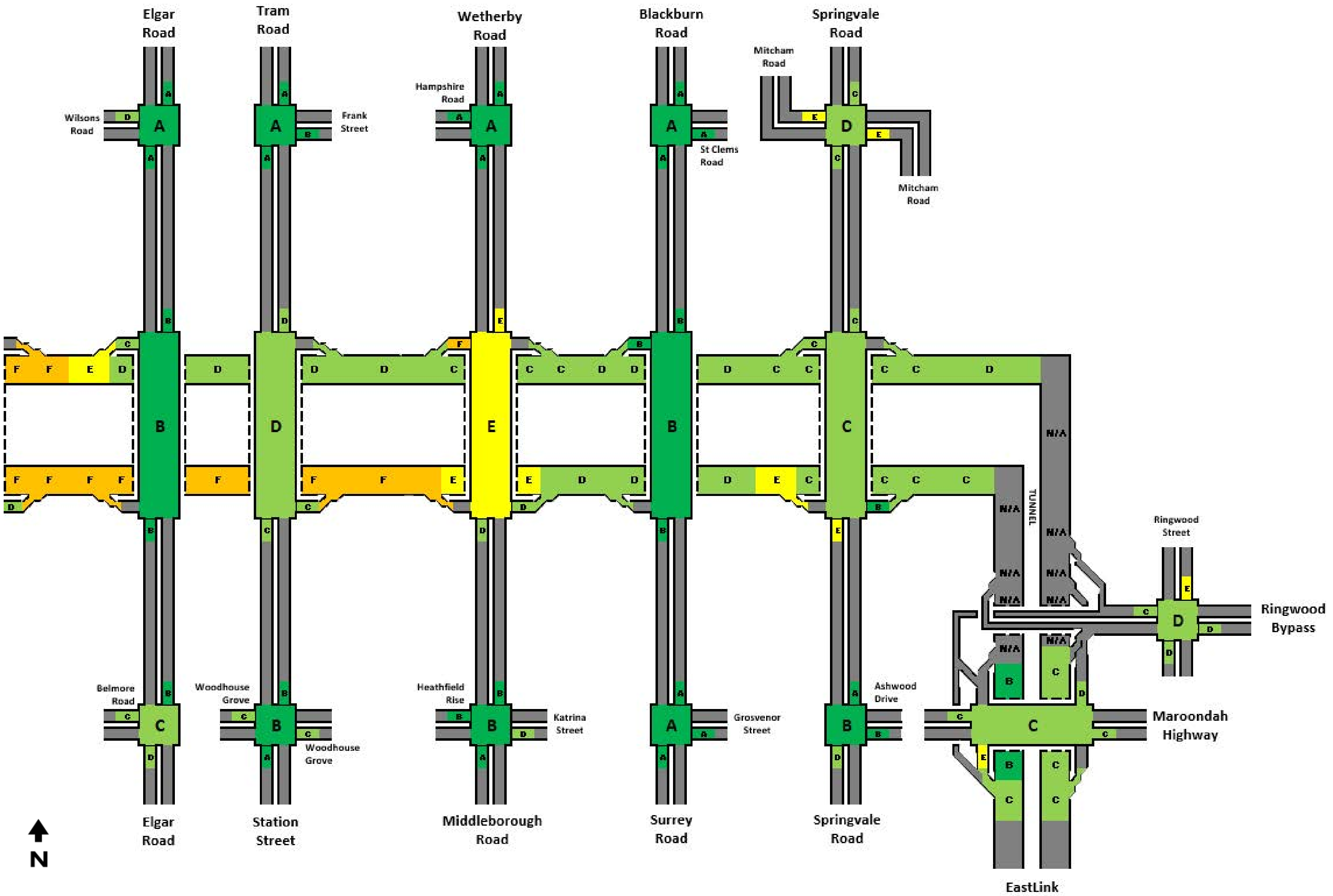


Figure 8-38 – Eastern Freeway AM peak Level of Service, 2036 'no project' – Elgar Road to Springvale Road – second hour



Eastern Freeway – PM peak

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the first peak hour are presented in Figure 8-39 and Figure 8-40.

Key observations include:

- Much of the outbound mainline operates at a Level of Service F in this period, occurring between Chandler Highway and Elgar Road. A 'gating' effect means the freeway east of Elgar Road operates at Level of Service C or D.
- The inbound mainline typically operates at a Level of Service E between Bulleen Road and Elgar Road and F just east of the Chandler Highway diverge.
- Intersections typically operate at a Level of Service D or better, with the exception of Ringwood Bypass/Ringwood Street due to the northbound and eastbound approaches. The Chandler Highway/Yarra Boulevard intersection operates at a Level of Service F due to heavy southbound movements along Chandler Highway. The Elgar Road/Belmore Road intersection operates at a Level of Service E due to heavy northbound movements along Belmore Road.
- Many intersections and interchanges are operating at a Level of Service A or B due to the significant amount of congestion along the Eastern Freeway, preventing vehicles from exiting the freeway and travelling onto the surrounding arterial roads.

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the second peak hour are presented in Figure 8-41 and Figure 8-42.

Key observations include:

- The outbound mainline again operates at a Level of Service F for the section between Chandler Highway and Elgar Road. A 'gating' effect means the freeway east of Elgar Road operates at Level of Service C or D.
- The inbound mainline generally operates at a Level of Service E or F between Middleborough Road and Chandler Highway. The approach to the inbound Springvale Road merge also operates at Level of Service F due to the heavy and uncontrolled entry volumes.
- Intersection delays are heavier in this period, with several operating at Levels of Service E or F. These include Chandler Highway/Yarra Boulevard, Doncaster Road/High Street, Springvale Road/Mitcham Road, Elgar Road/Belmore Road and Ringwood Bypass/Ringwood Street.

Figure 8-39 – Eastern Freeway PM peak Level of Service, 2036 ‘no project’ – Chandler Highway to Doncaster Road – first hour

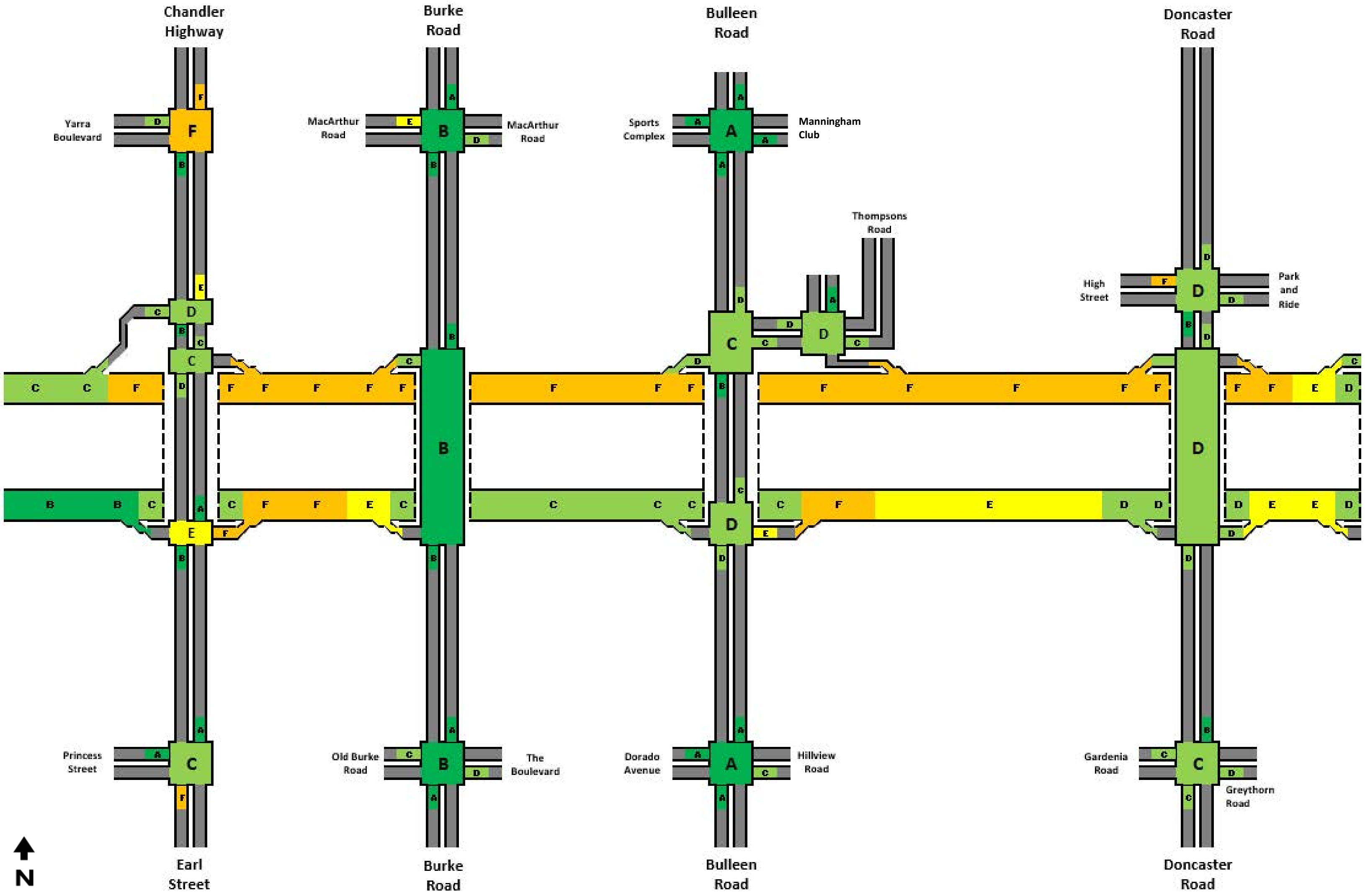


Figure 8-40 – Eastern Freeway PM peak Level of Service, 2036 'no project' – Elgar Road to Springvale Road – first hour

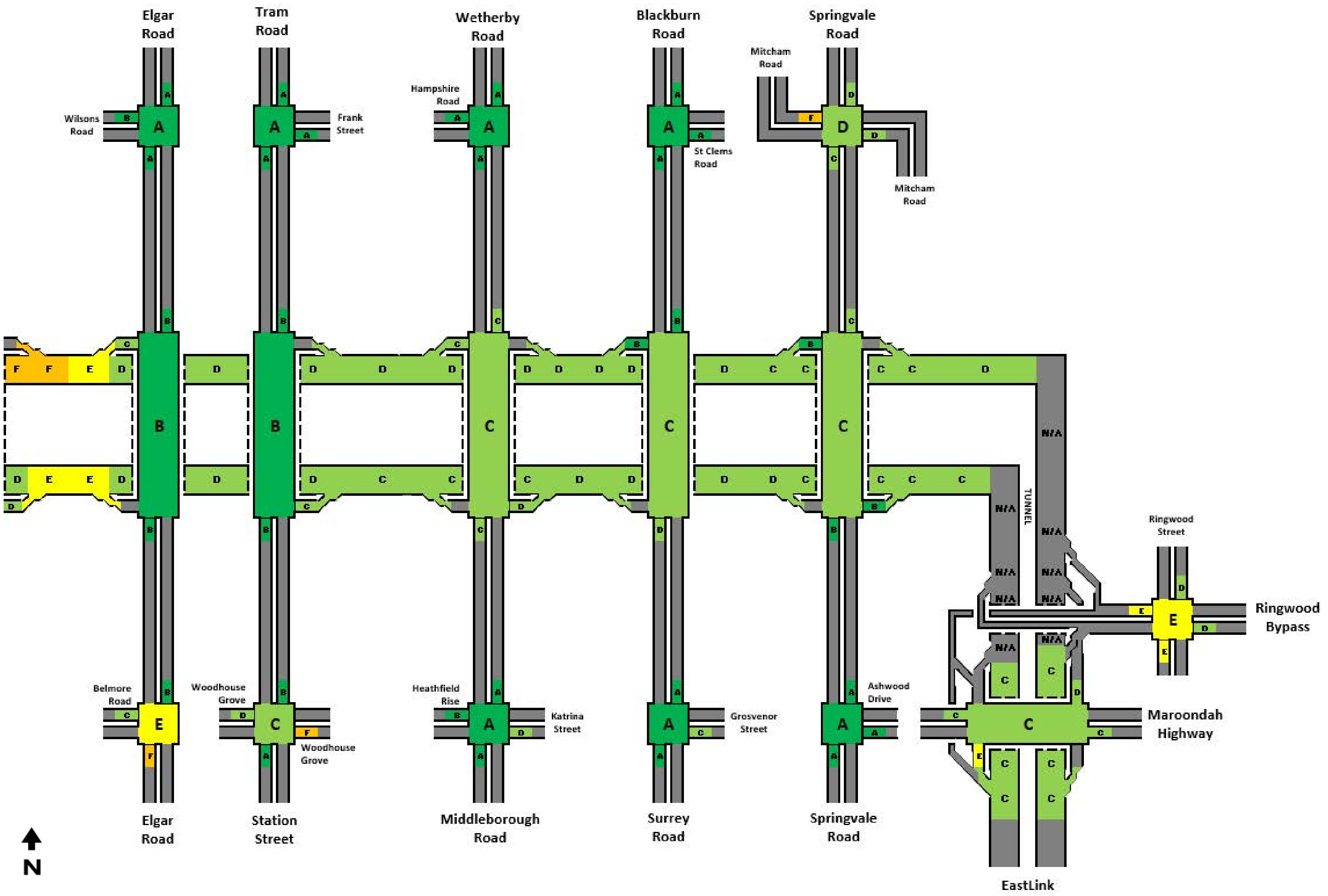


Figure 8-41 – Eastern Freeway PM peak Level of Service, 2036 'no project' – Chandler Highway to Doncaster Road – second hour

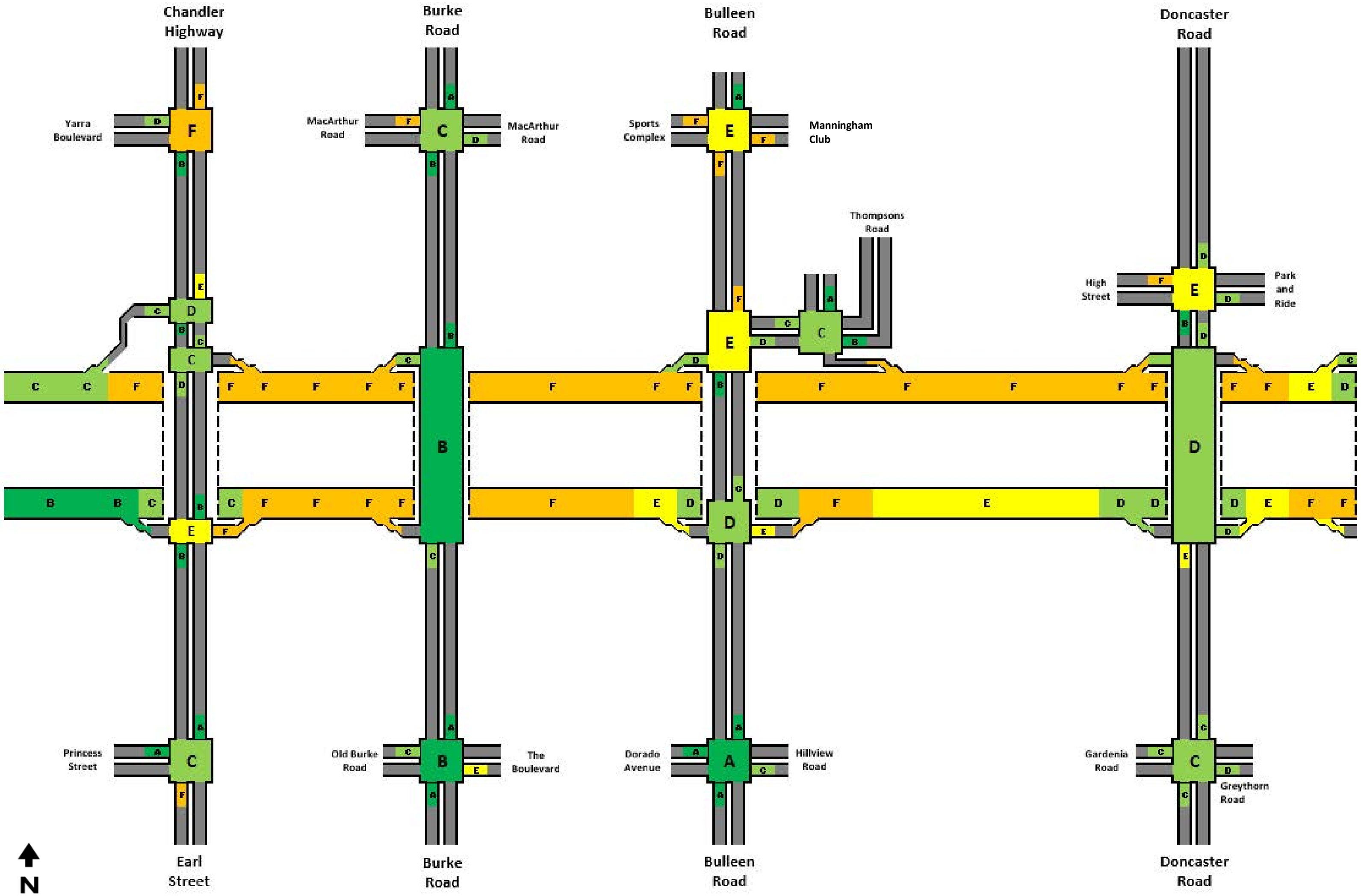
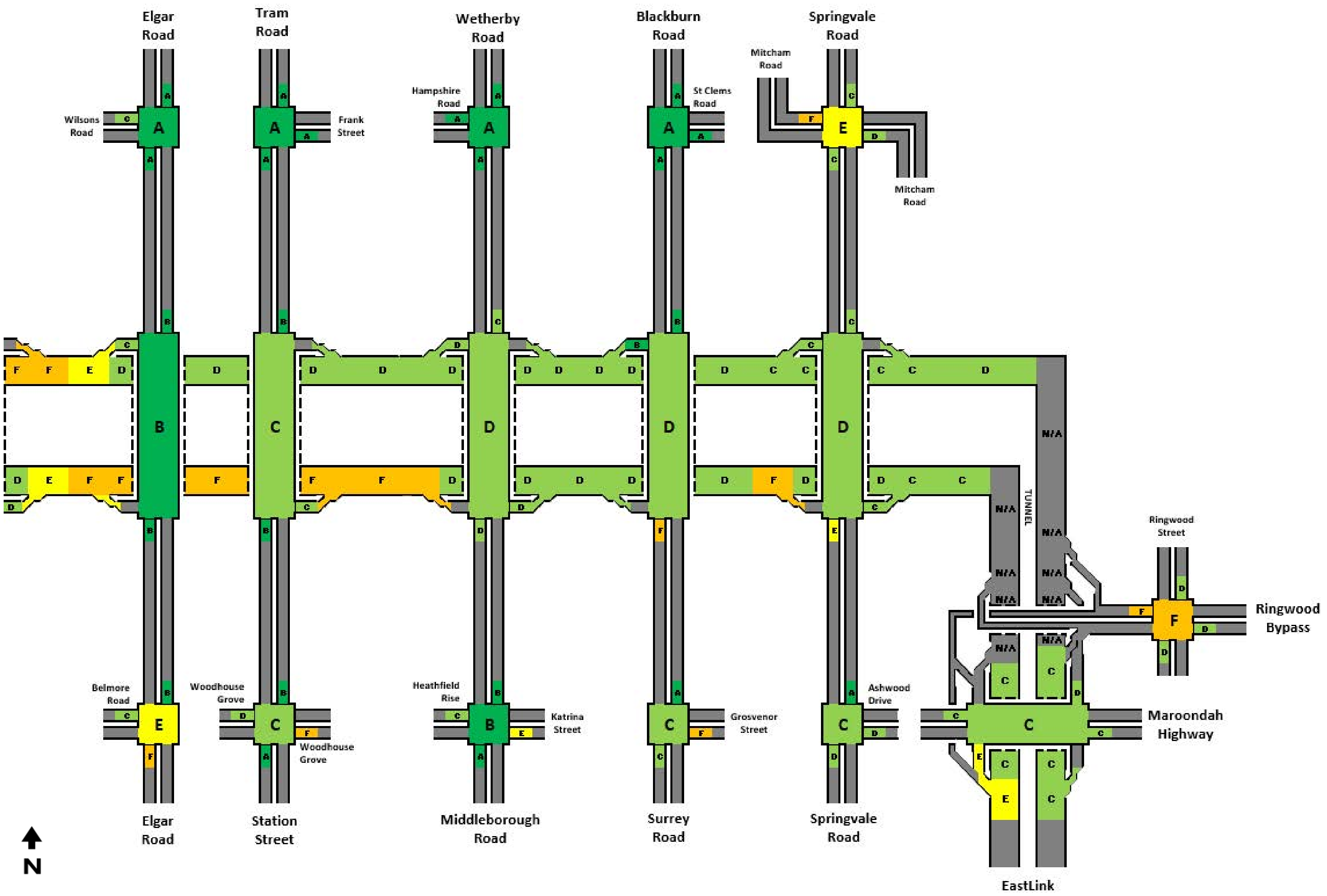


Figure 8-42 – Eastern Freeway PM peak Level of Service, 2036 'no project' – Elgar Road to Springvale Road – second hour



M80 Ring Road and North East Link corridor – AM peak and PM peak

The following schematic maps have been prepared, representing the modelled Level of Service along the M80 Ring Road and North East Link corridor:

- The first AM peak hour is presented in Figure 8-43 and Figure 8-44
- The second AM peak hour is presented in Figure 8-45 and Figure 8-46
- The first PM peak hour is presented in Figure 8-47 and Figure 8-48
- The second PM peak hour is presented in Figure 8-49 and Figure 8-50.

Key observations include:

- Across all periods the eastbound M80 Ring Road mainline east of Plenty Road operates at a Level of Service F. This is due to extensive queueing at the Greensborough Bypass intersection which also causes the entire M80 Ring Road interchange to operate at a Level of Service F. In the PM peak periods, the flow breakdown extends to west of Plenty Road due to higher entry volumes from the eastbound merge at the Plenty Road interchange.
- The Greensborough Bypass intersections at Grimshaw Street, Elder Street and Watsonia Road all generally operate at a Level of Service E or F. The driver of these delays is northbound traffic demand, where queuing from the Grimshaw Street intersection delays northbound flow at the Elder Street and Watsonia Road intersections.
- The Erskine Road intersection operates at a Level of Service E or F. This is mainly due to the high volume of traffic turning into Erskine Road from Greensborough Road. The right and left turn movements into Erskine Road can often queue back and block the through movements on Greensborough Road, reducing capacity for this movement.
- The Lower Plenty Road/Rosanna Road intersection operates at a Level of Service B or C in the AM peak and F in the PM peak. The most heavily delayed movements in the PM peak are the Lower Plenty Road eastbound approach and Rosanna Road northbound approach. This intersection operates at a high Level of Service due to the upstream queuing at the intersection of Erskine Street and Greensborough Road. The queuing and delays here effectively hold back traffic from accessing the intersection.
- The Bulleen Road/Manningham Road intersection operates at a Level of Service D in the AM peak and E in the PM peak. The most heavily delayed movement in the PM peak is the Manningham Road westbound approach.

Figure 8-43 – M80 Ring Road and North East Link Corridor AM peak Level of Service, 2036 'no project' – M80 Ring Road to Watsonia Road – first hour

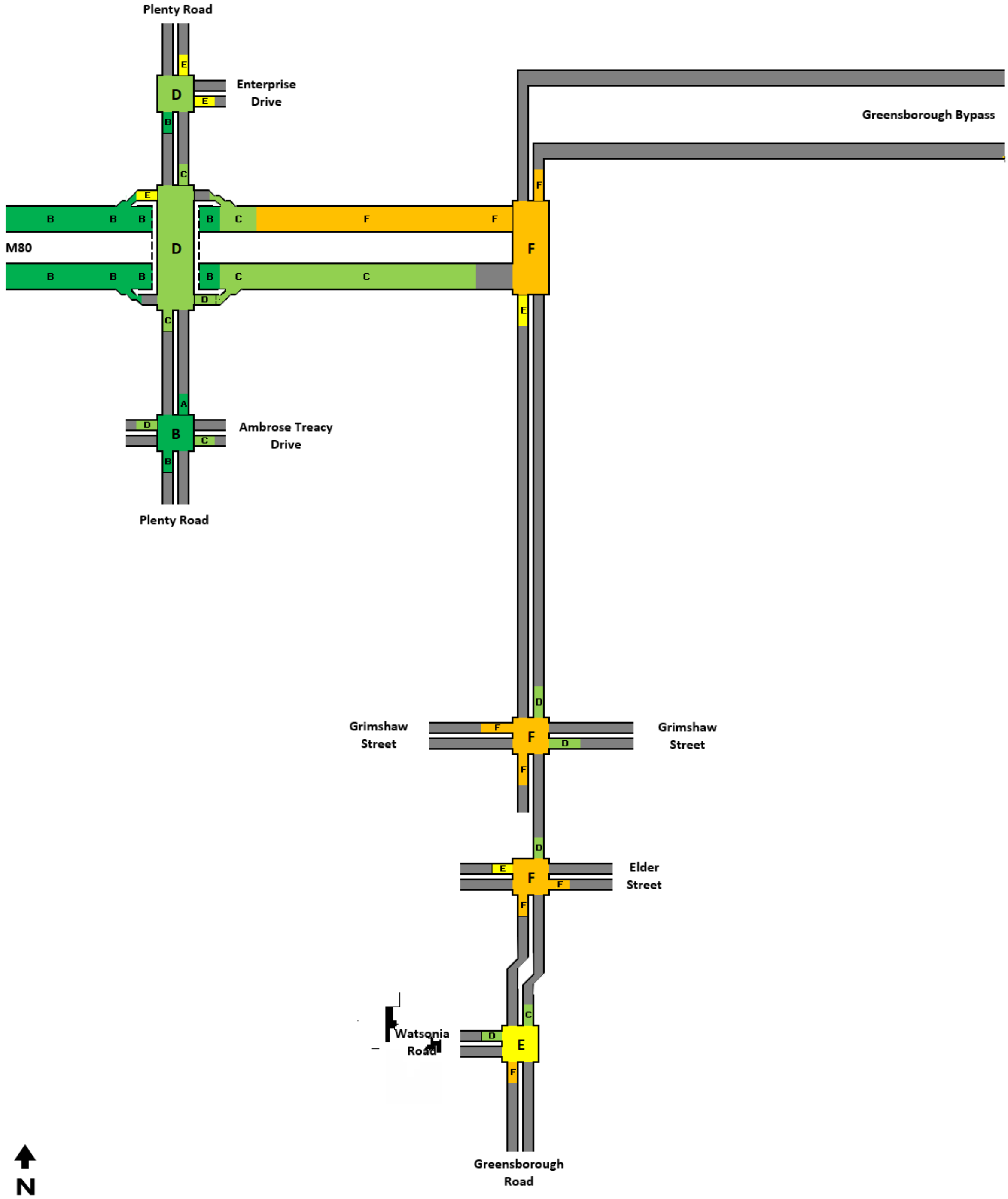


Figure 8-44 – M80 Ring Road and North East Link Corridor AM peak Level of Service, 2036 'no project' – Lower Plenty Road and Manningham Road – first hour

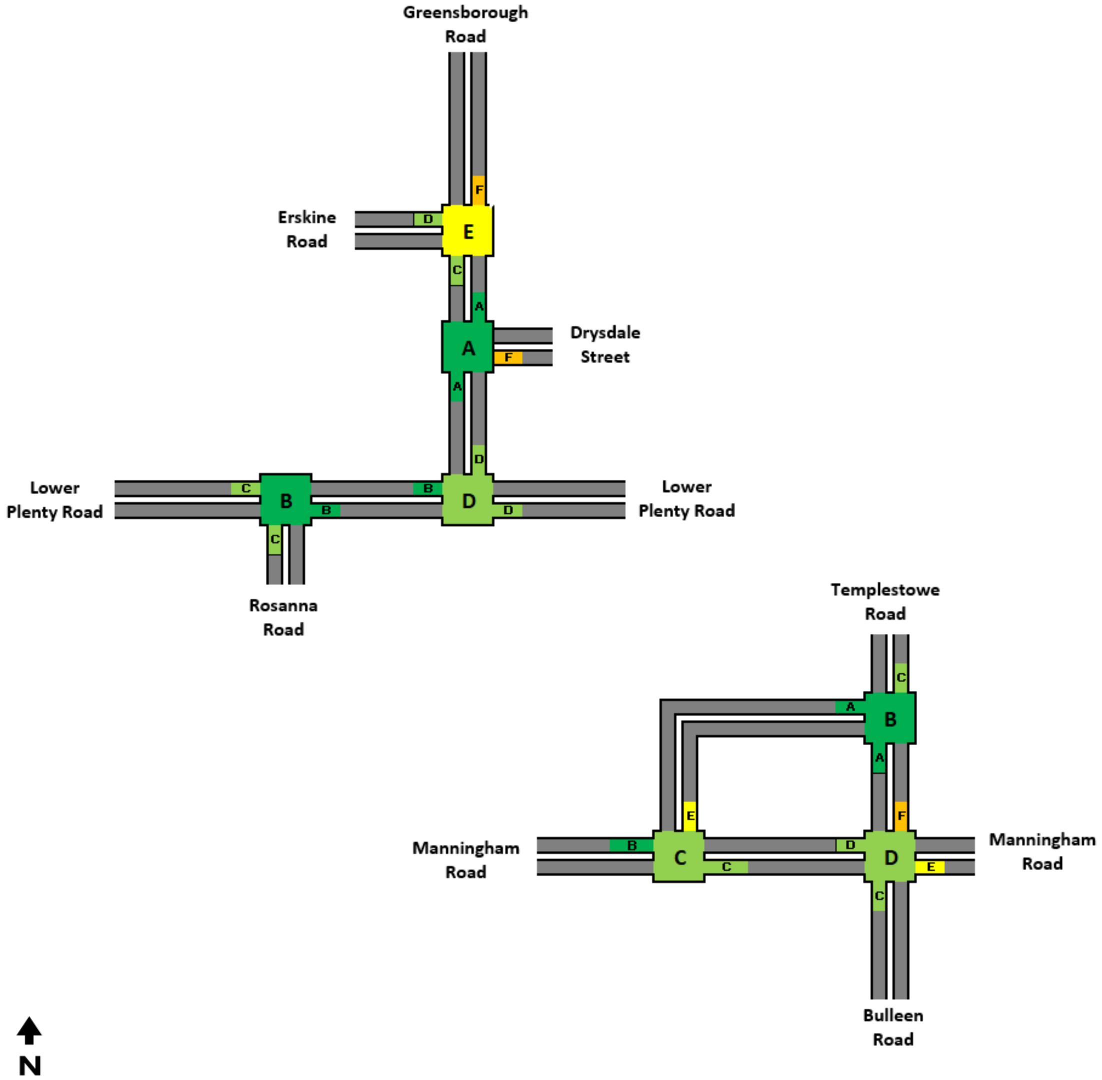


Figure 8-45 – M80 Ring Road and North East Link Corridor AM peak Level of Service, 2036 'no project' – M80 Ring Road to Watsonia Road – second hour

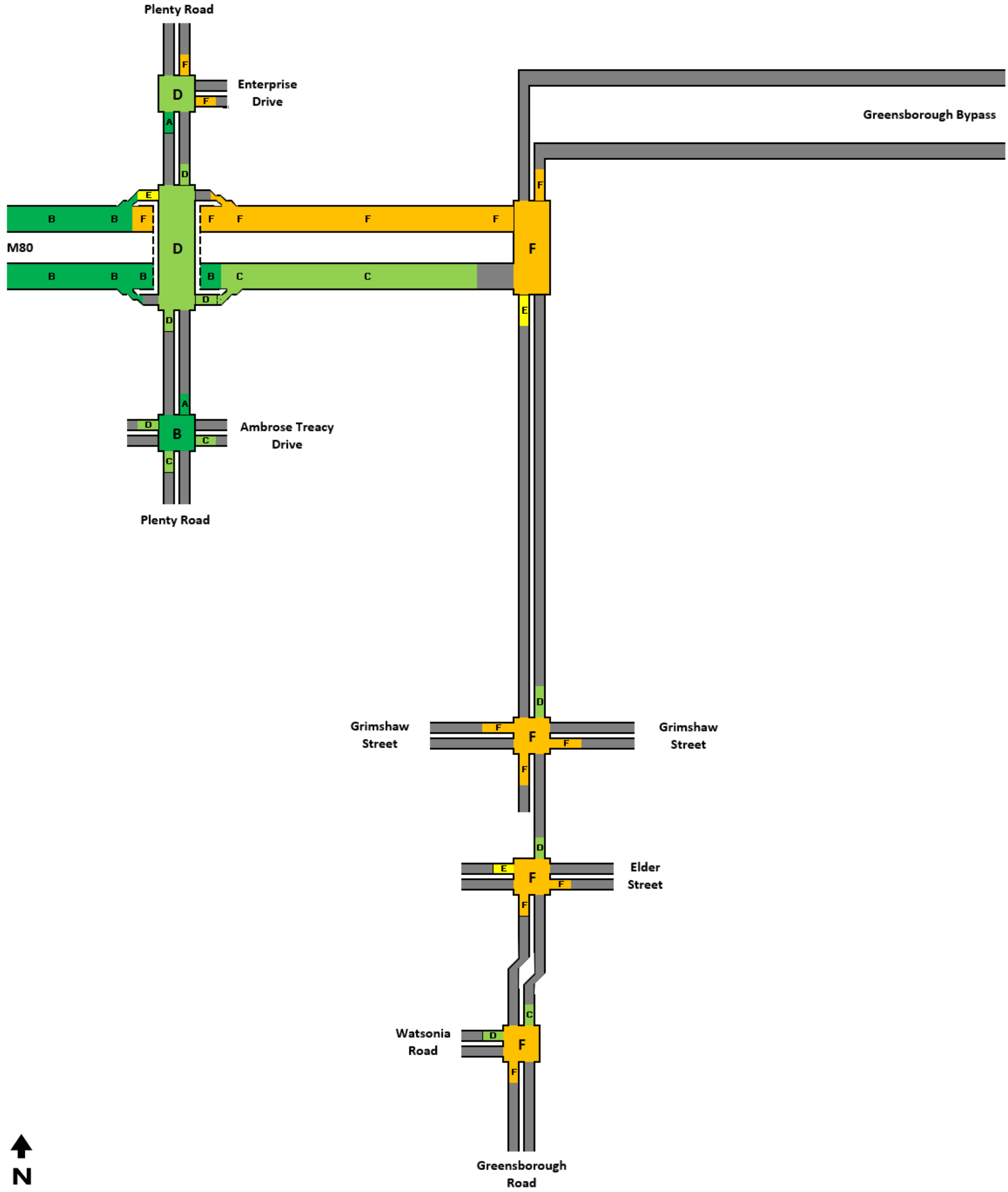


Figure 8-46 – M80 Ring Road and North East Link Corridor AM peak Level of Service, 2036 'no project' – Lower Plenty Road and Manningham Road – second hour

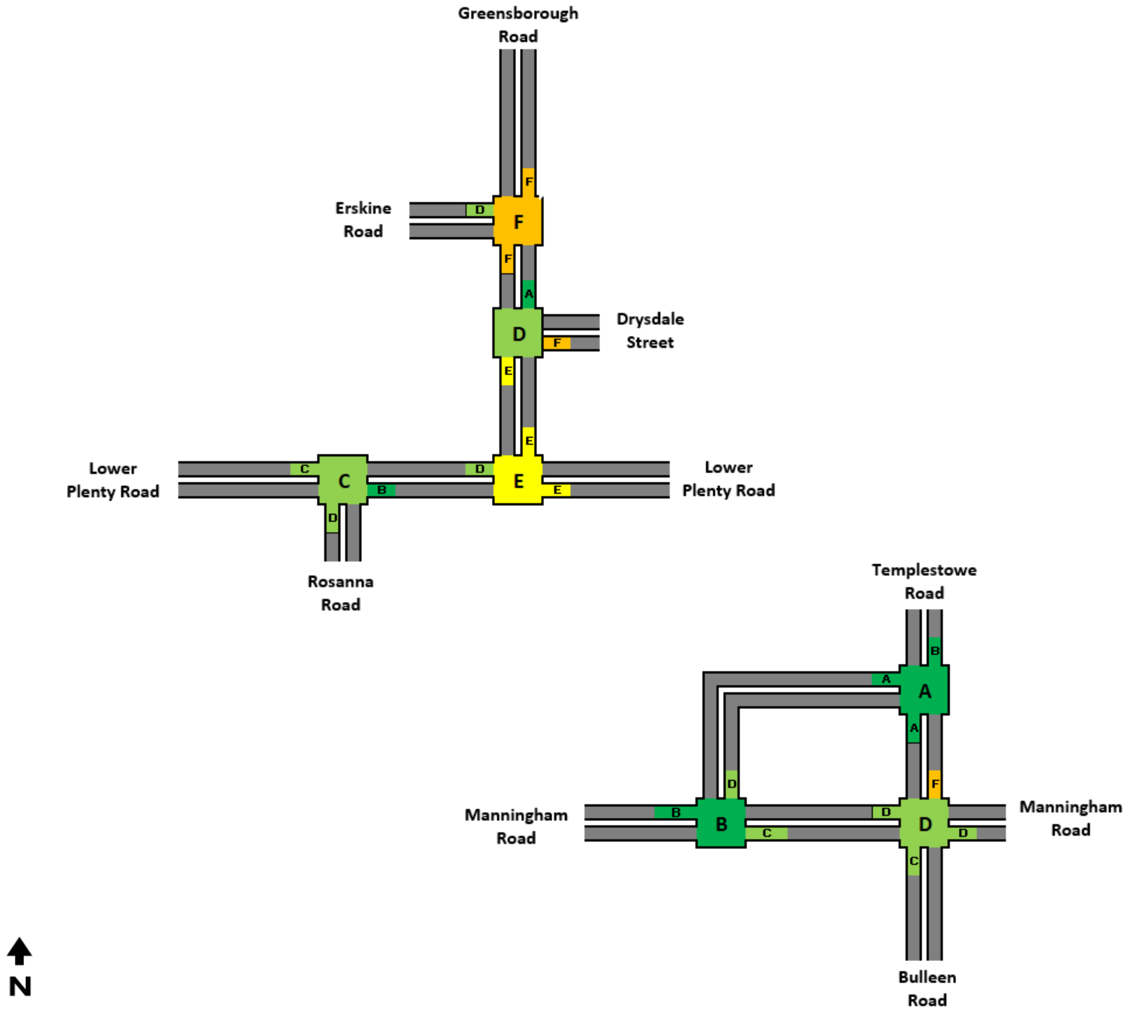


Figure 8-47 – M80 Ring Road and North East Link Corridor PM peak Level of Service, 2036 'no project' – M80 Ring Road to Watsonia Road – first hour

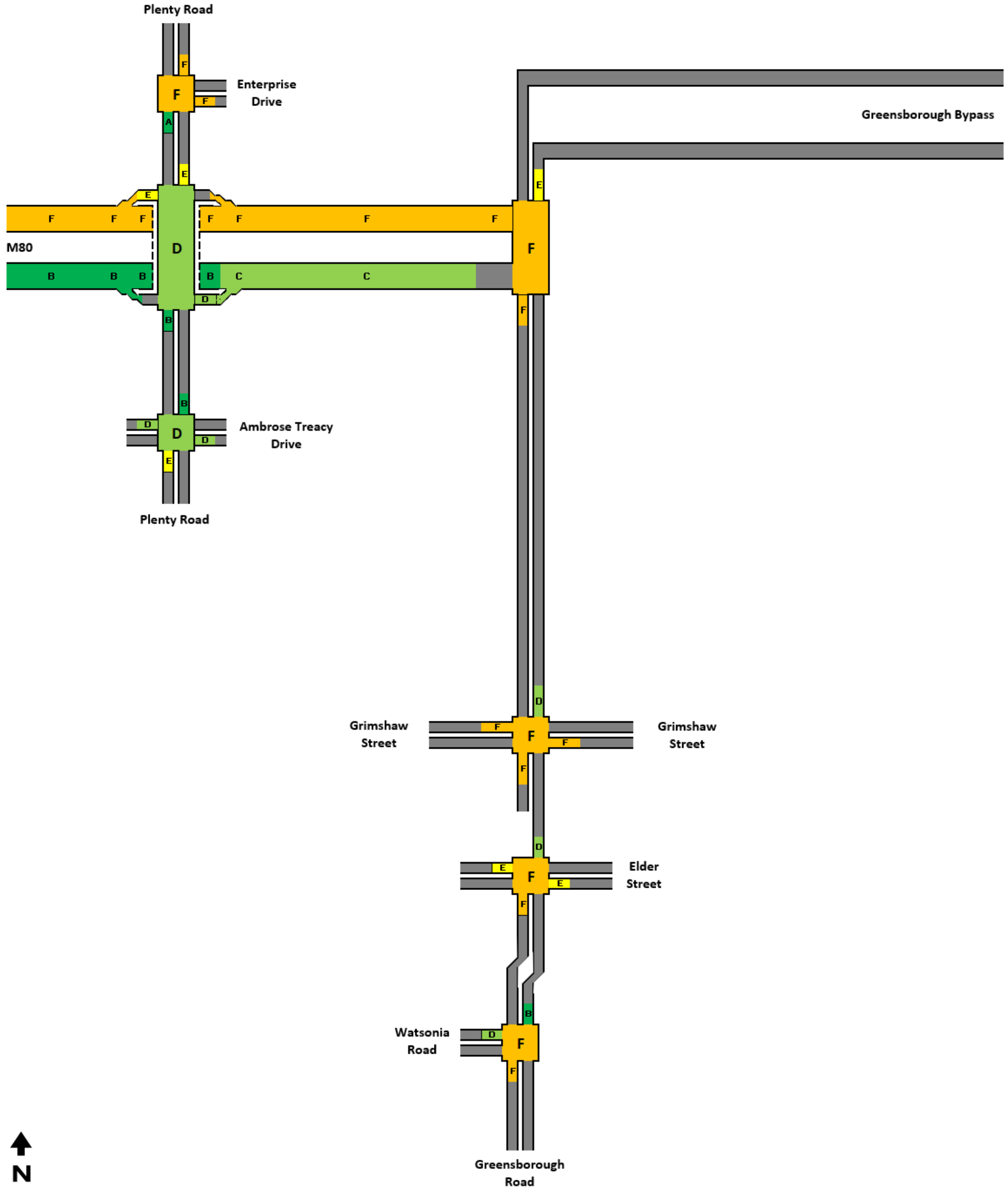


Figure 8-48 M80 Ring Road and North East Link Corridor PM peak Level of Service, 2036 ‘no project’ – Lower Plenty Road and Manningham Road – first hour

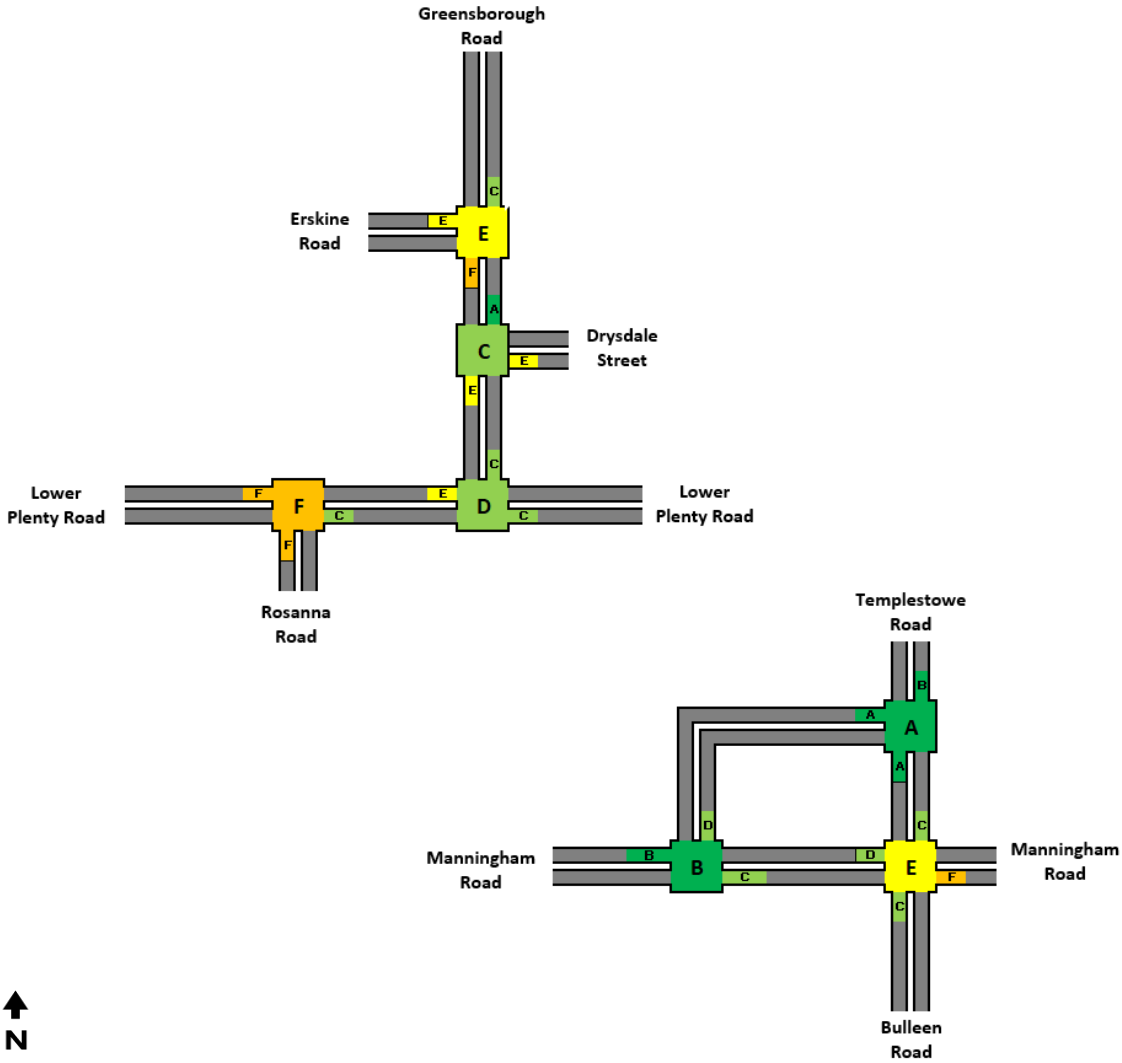


Figure 8-49 M80 Ring Road and North East Link Corridor PM peak Level of Service, 2036 'no project' – M80 Ring Road to Watsonia Road – second hour

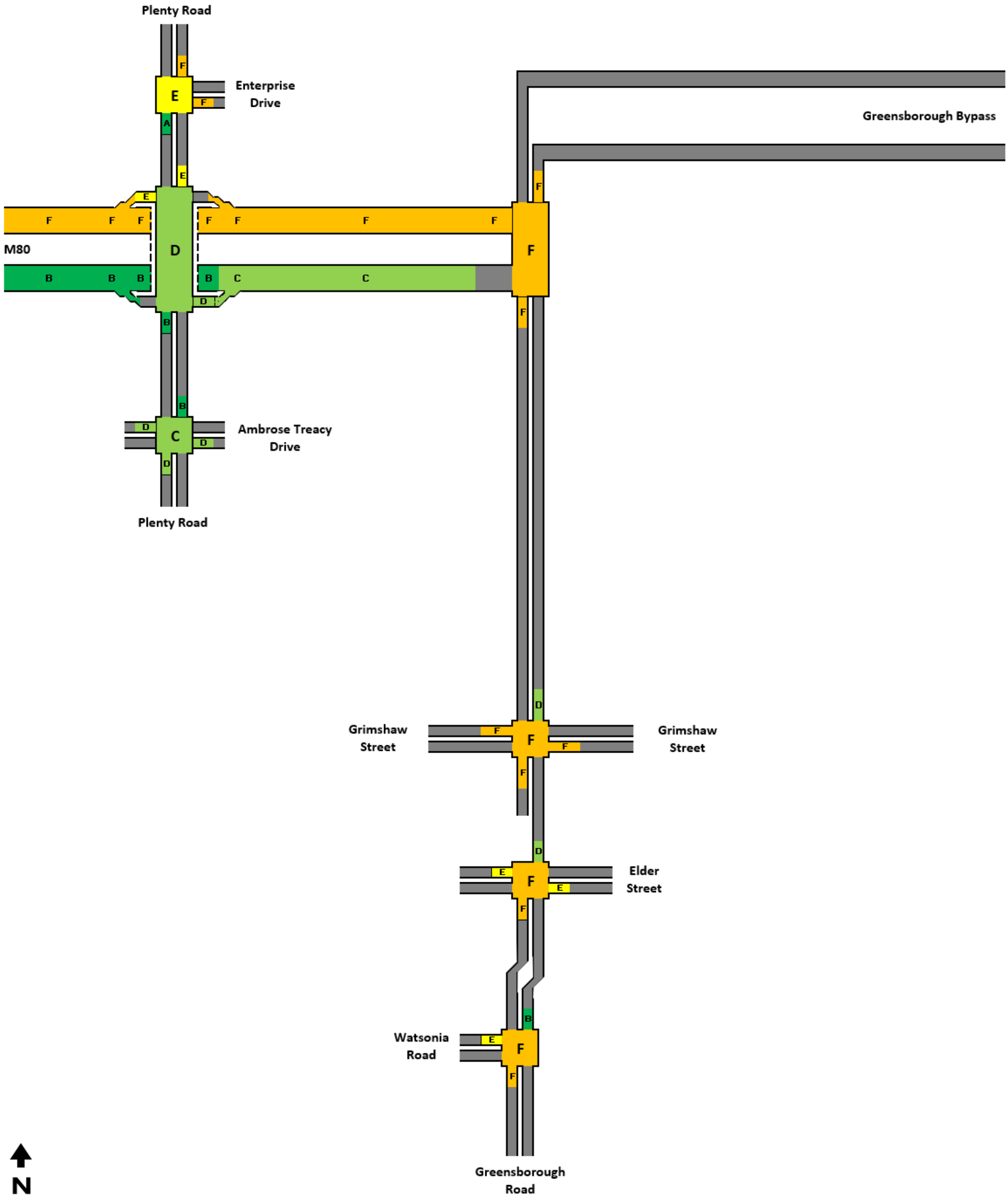
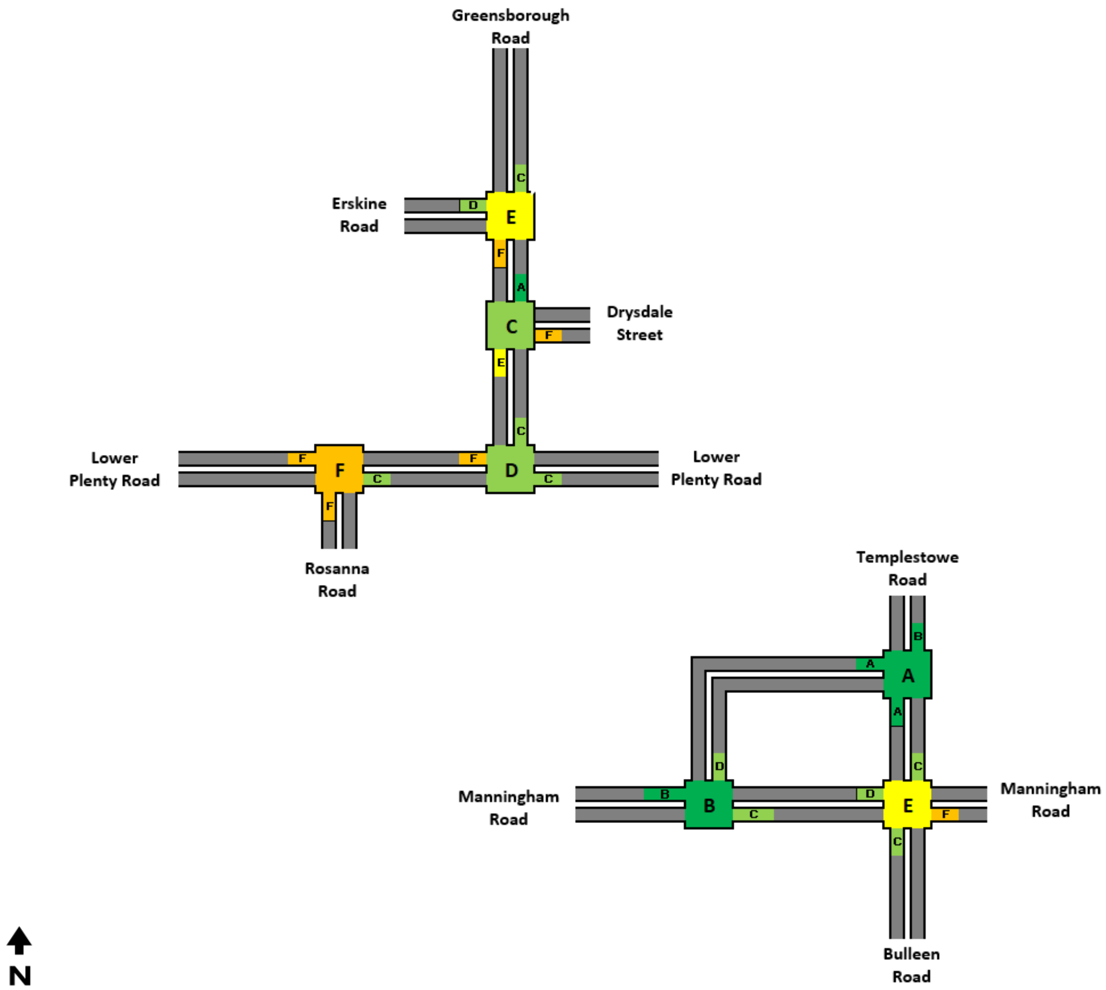


Figure 8-50 M80 Ring Road and North East Link Corridor PM peak Level of Service, 2036 'no project' – Lower Plenty Road and Manningham Road – second hour



8.4 Travel time and accessibility changes

For individual routes in the north-east, forecast travel times were assessed along the six corridors presented in Figure 8-51.

Travel times by route, period and direction are presented in Figure 8-52 to Figure 8-53. All six corridors are anticipated to worsen by 2036, with the largest travel time increases forecast along the Greensborough Road – Rosanna Road – Bulleen Road corridor. This route is predicted to increase to a total average travel time of 54 minutes in peak periods.

Similarly travel times along the Eastern Freeway are forecast to increase from an average of 29 to 34 minutes in the AM peak westbound, and 23 to 27 minutes in the PM peak eastbound. Routes through the north-eastern arterial road network (Routes A to D) are all anticipated to generally increase by several minutes each across peak and counter-peak period.

Figure 8-51 – Assessed travel time routes

Figure 8-52 – Forecast average travel times, AM peak westbound/southbound – 2017 and 2036 'no project'

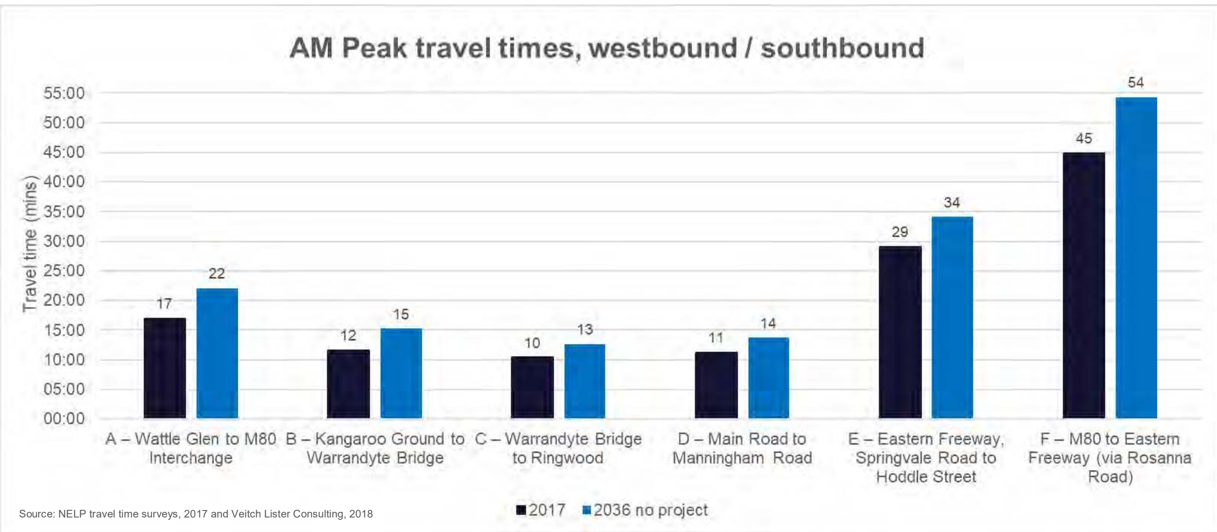


Figure 8-53 – Forecast average travel times, PM peak westbound/southbound – 2017 and 2036 'no project'

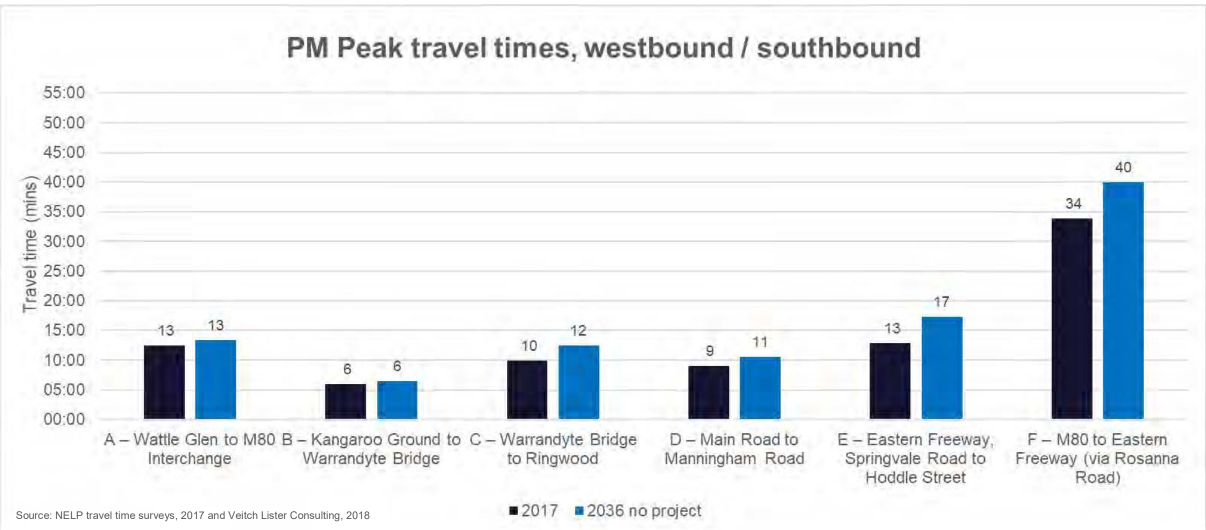


Figure 8-54 – Forecast average travel times, PM peak eastbound/northbound – 2017 and 2036 'no project'

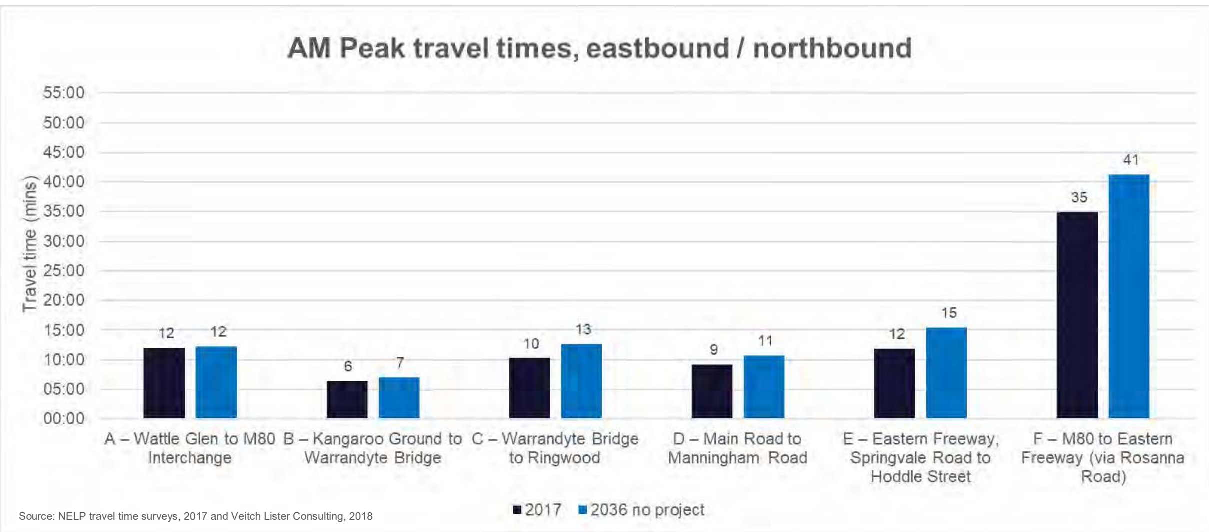
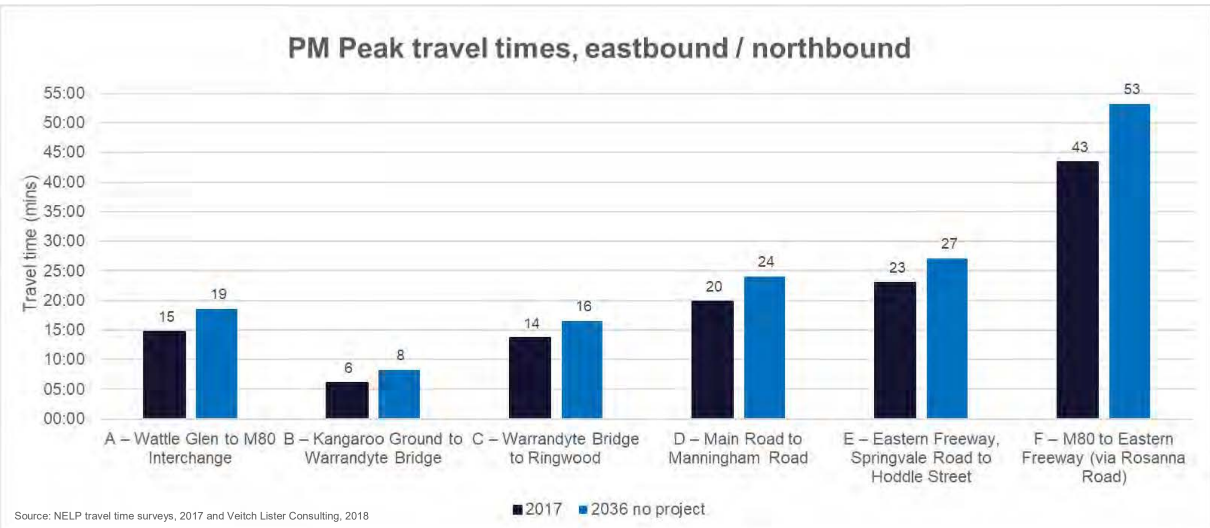


Figure 8-55 – Forecast average travel times, AM peak eastbound/northbound – 2017 and 2036 'no project'



Travel times are also anticipated to deteriorate at a network-wide level by 2036. Three indicative locations – Greensborough, Doncaster and Epping – have been chosen to assess changes in future network-wide travel times. For each location, contour plots have been prepared to show the predicted travel times across Melbourne with darker red colouring indicating longer journey times. Note that the charts present average travel times across two-hour AM and PM peaks, rather than the 'worst case' travel times for each period.

A comparison of modelled AM and PM peak travel times from Greensborough for the modelled 2016 and the 2036 'no project' scenario is presented in Figure 8-56. In the 2016 model, trips from Greensborough to the CBD and western suburbs are generally estimated to take over one hour in the AM peak. Travel times are generally faster in the PM peak, due to generally lower congestion levels during this period, as well as the 'counter-peak' nature of these movements (that is, opposite direction to peak flow). By 2036 travel times are generally predicted to deteriorate, particularly for trips to the CBD and western suburbs.

The travel time contours from Doncaster are more widely dispersed than Greensborough, as presented in Figure 8-57. This is due to the presence of the Eastern Freeway and the surrounding, established grid-structured arterial road network, which affords faster travel times to destinations in the eastern, south-eastern and inner suburbs. By 2036, travel times from Doncaster are forecast to worsen particularly for destinations in the west, including Melbourne Airport and Sunshine.

Travel time contour plots for Epping are presented in Figure 8-58. Travel times from Epping are generally more constrained than Doncaster or Greensborough, due to its location further away from central Melbourne. Travel times in the PM peak are again faster than those in the AM peak, due to lower overall congestion levels in this period and the counter-peak direction of flow. By 2036, travel times are predicted to worsen, particularly for destinations to the eastern and inner suburbs.

Figure 8-56 – Comparison of average AM and PM peak travel times from Greensborough, modelled 2036 ‘no project’ vs modelled 2016

	2016	2036 ‘no project’
AM Peak		
PM Peak		

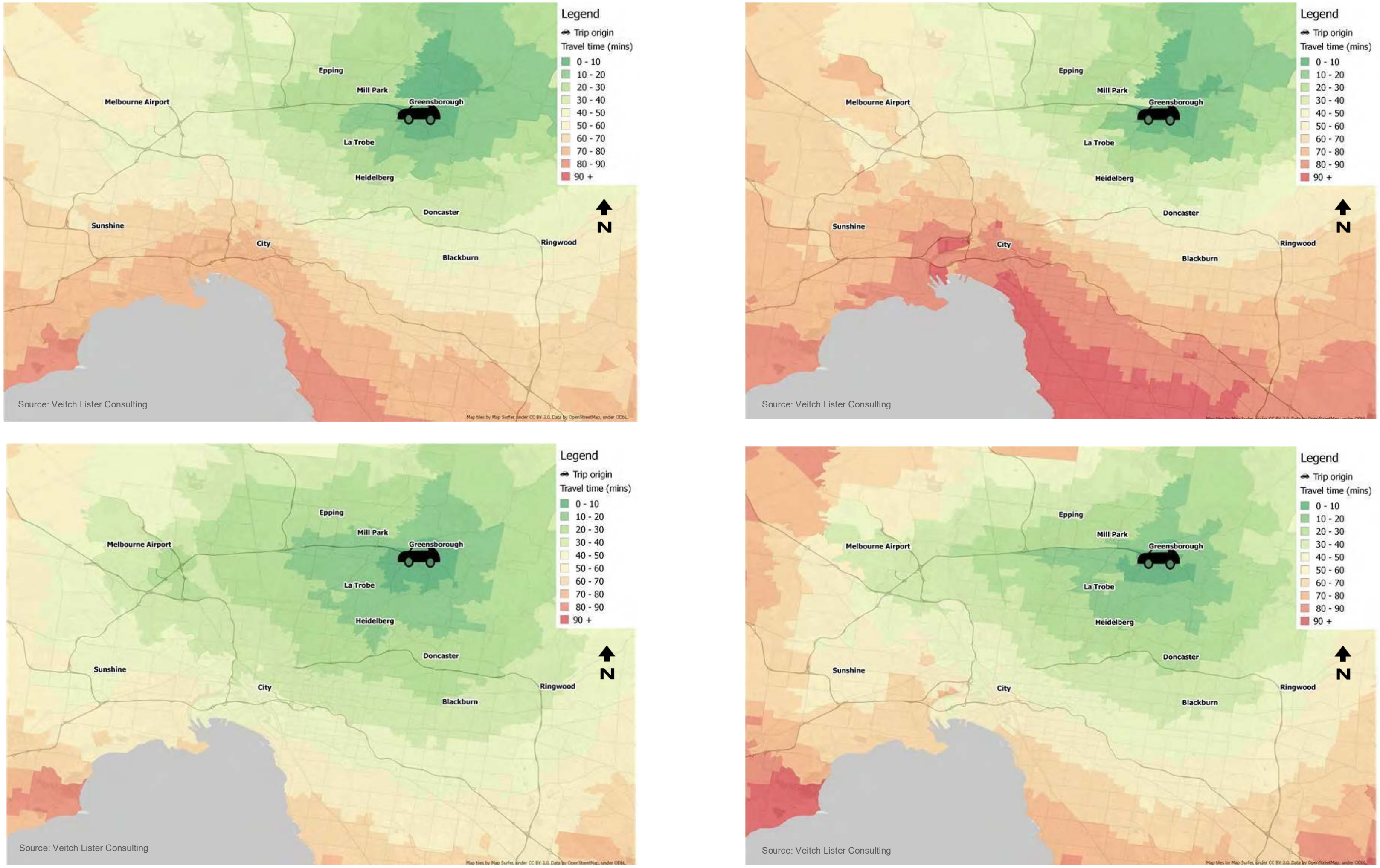


Figure 8-57 – Comparison of average AM and PM peak travel times from Doncaster, modelled 2036 'no project' vs modelled 2016

2016 | **2036 'no project'**

AM Peak

PM Peak

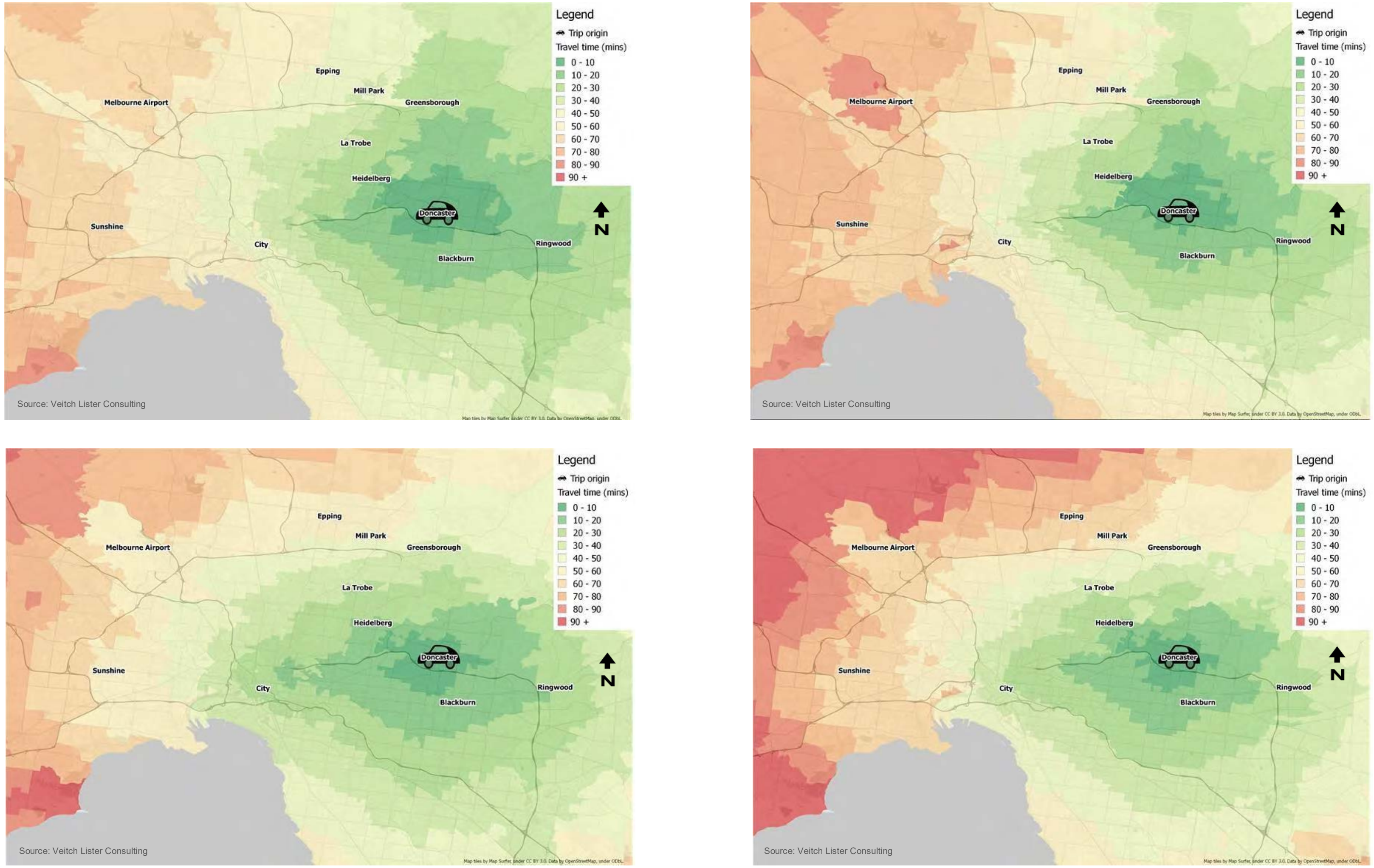
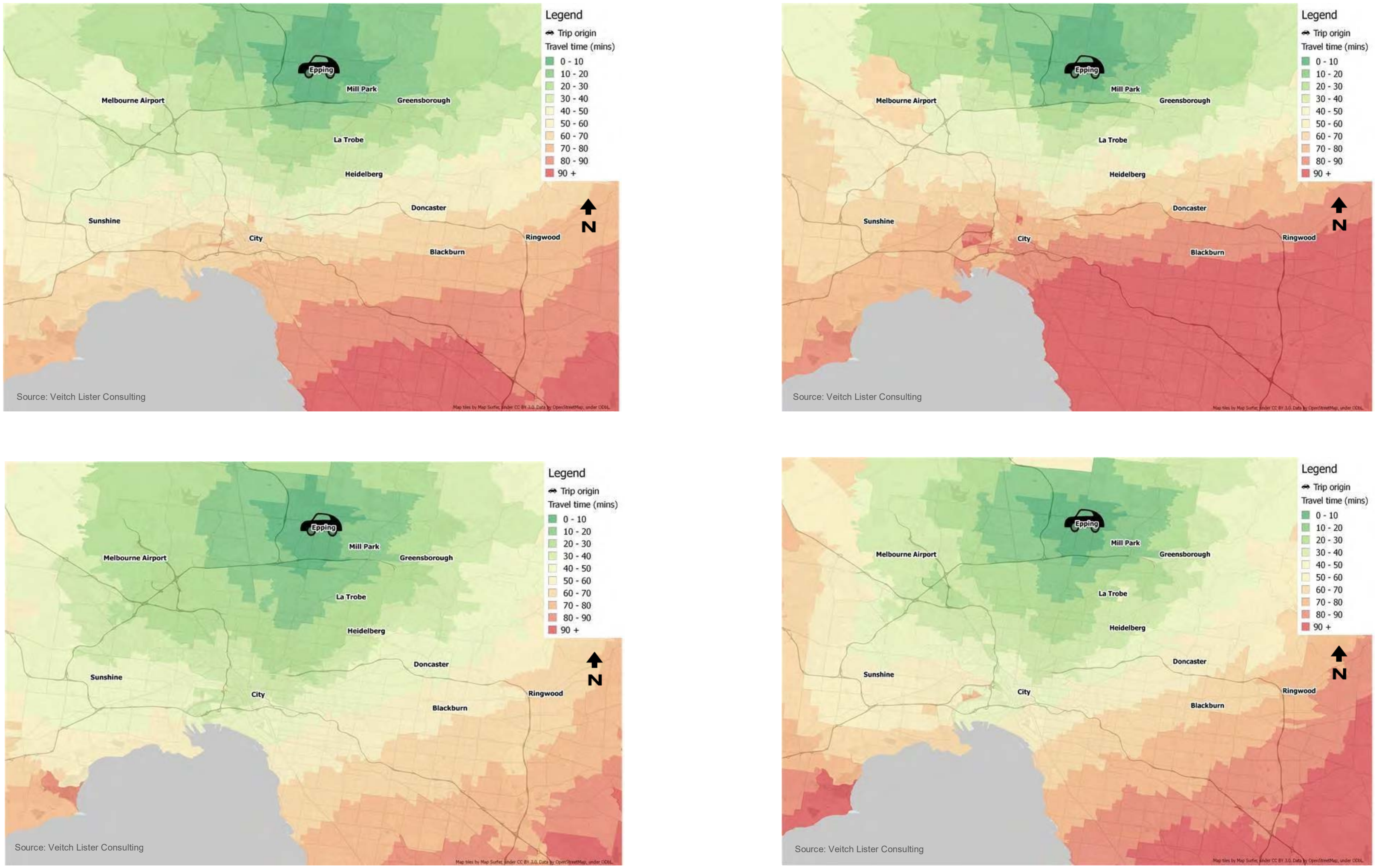


Figure 8-58 – Comparison of average AM and PM peak travel times from Epping, modelled 2036 'no project' vs modelled 2016

2016 | **2036 'no project'**

AM Peak

PM Peak



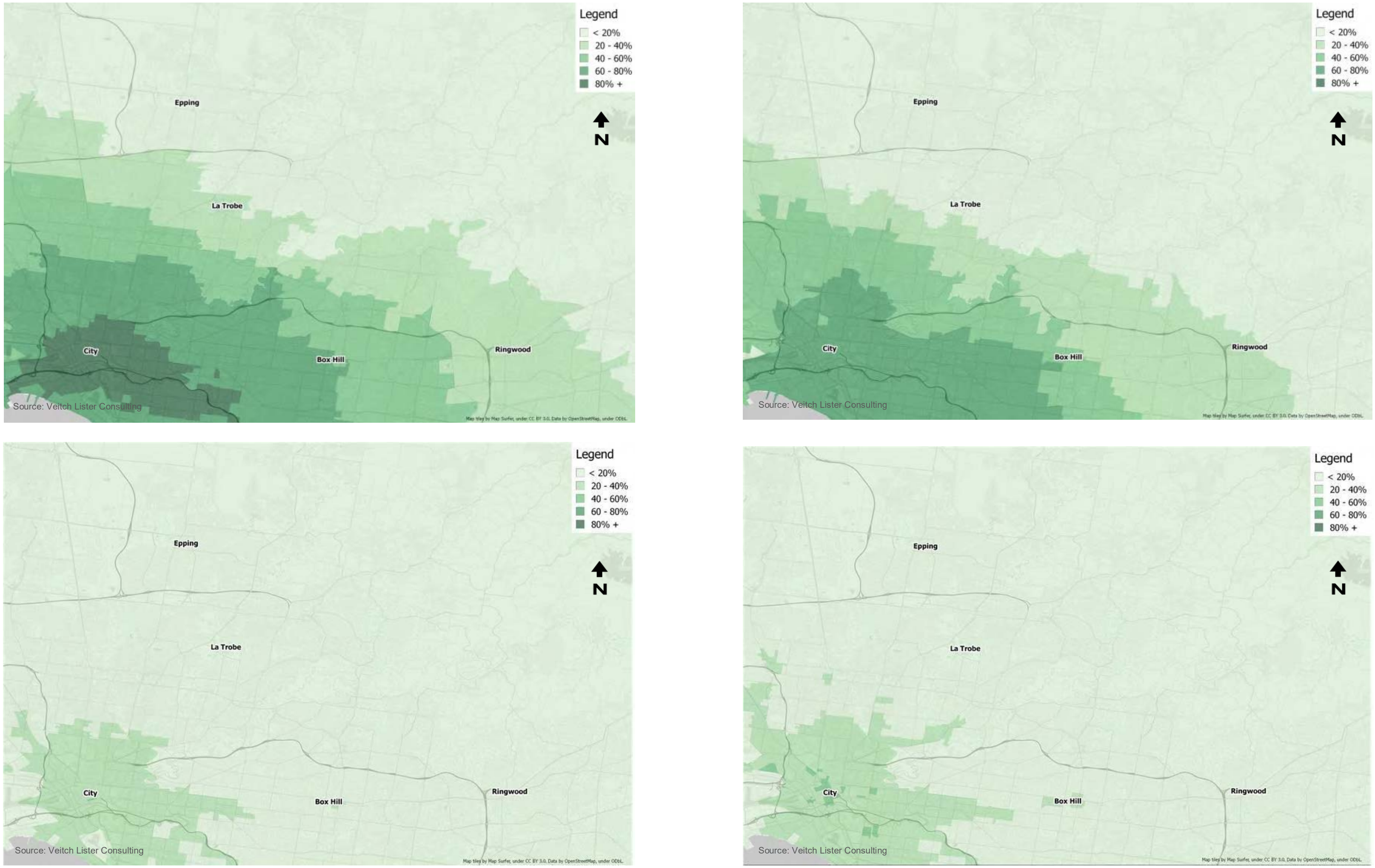
Contour plots illustrating modelled accessibility to employment by origin are presented in Figure 8-59. The charts indicate what proportion of Melbourne’s total employment is accessible within a 45-minute car or public transport trip in the AM peak. The 2016 and 2036 ‘no project’ scenarios have been included as a comparison.

As an example, in the 2016 model residents of the CBD have access to over 80 per cent of Melbourne’s total employment within a 45-minute car trip, or 20 to 40 per cent by public transport. Further away from the inner suburbs this accessibility generally falls away, to lower than 20 per cent in the outer suburbs. Accessibility by public transport is much lower than that of cars, generally due to slower travel times and a lack of orbital connections.

By 2036 job accessibility by car is predicted to decrease particularly in the inner city and outer eastern suburbs. This is due to forecast deterioration in travel times and road network speeds, which increases journey times for commuters in the AM peak. Accessibility by public transport is predicted to increase through the inner city, which is likely due to the assumed completion of network upgrades such as the Metro Tunnel.

Figure 8-59 – Comparison of accessibility to employment within a 45-minute car or public transport trip in the AM peak, modelled 2036 'no project' vs modelled 2016

	2016	2036 'no project'
Car		
Public Transport		



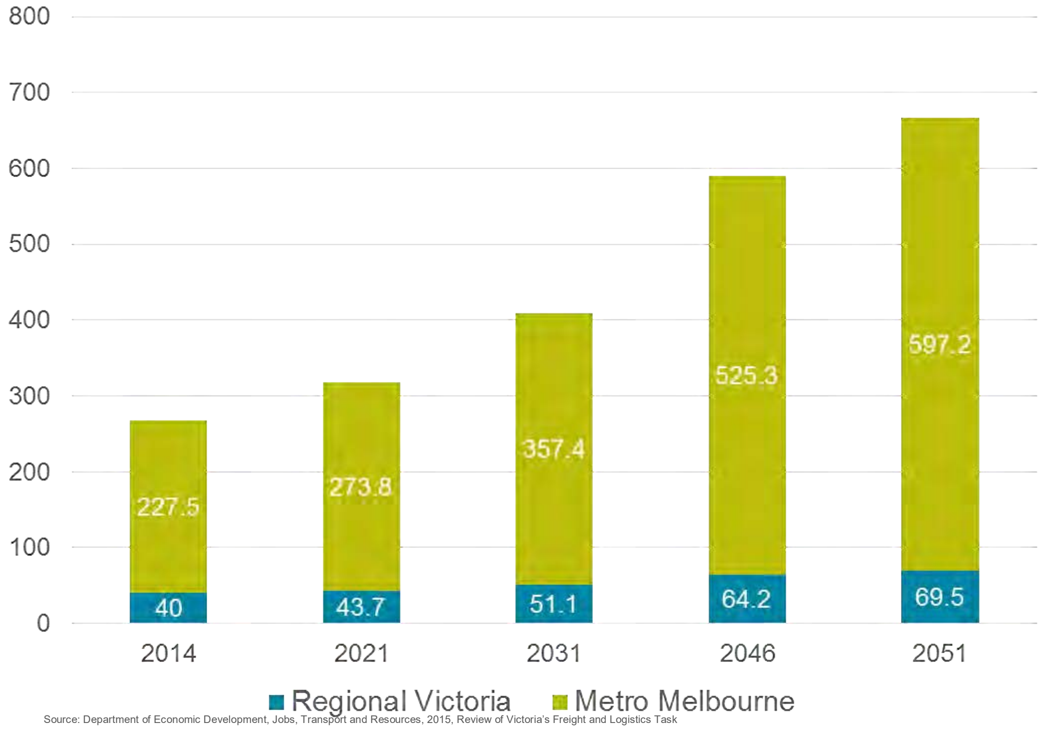
8.5 Freight

8.5.1 Growth in the movement of freight

The Port of Melbourne is anticipated to remain the largest container port in Australia, which will continue to expand Melbourne's freight task in the coming decades. Freight activity will be centred around the Port of Melbourne, with significant expansion works planned and the construction of a second container port deferred in the near- to medium-term future.

The metropolitan freight task currently makes up around 85 per cent of total Victorian freight volumes, at nearly 230 million tonnes in 2014. That number is forecast to more than double over the next 30 years, growing at approximately 3 per cent per annum, as shown in Figure 8-60.

Figure 8-60 – Victorian freight task 2014 to 2051

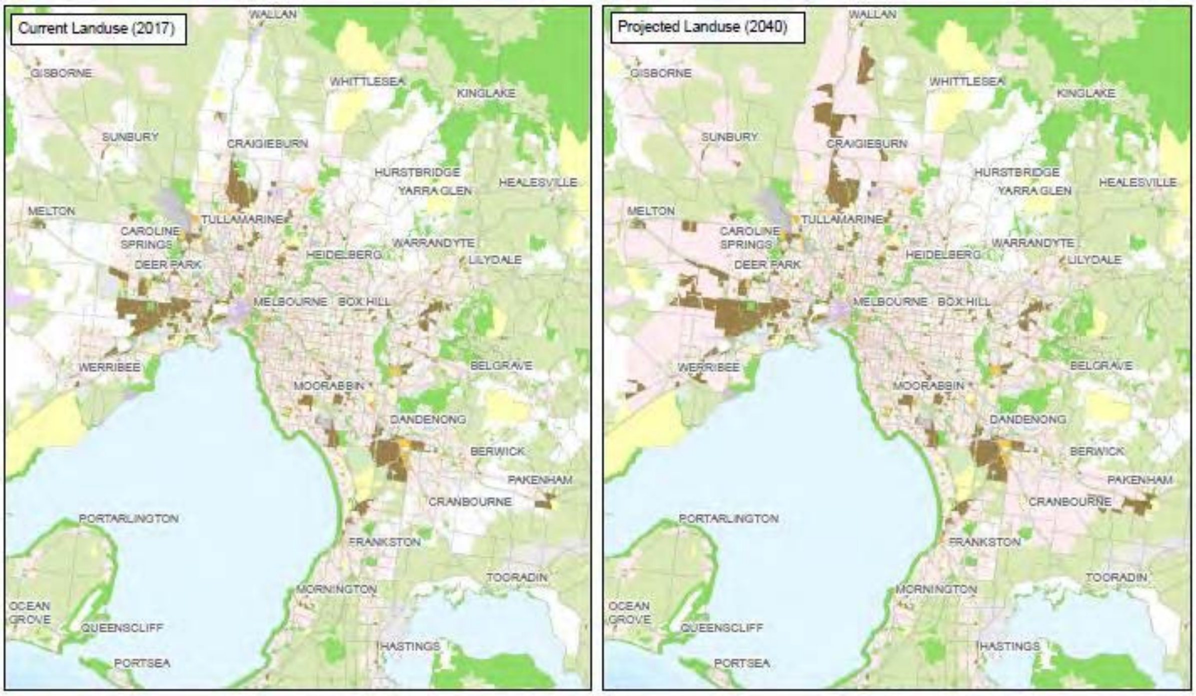


Source: Department of Economic Development, Jobs, Transport and Resources, 2015, Review of Victoria's Freight and Logistics Task

By 2036 it is anticipated that freight will continue to be distributed primarily via trucks and commercial vehicles. This assumption is inherent within the Port of Melbourne container throughput and resultant truck movement forecasts, which have been prepared by the Victorian Government for transport modelling purposes.

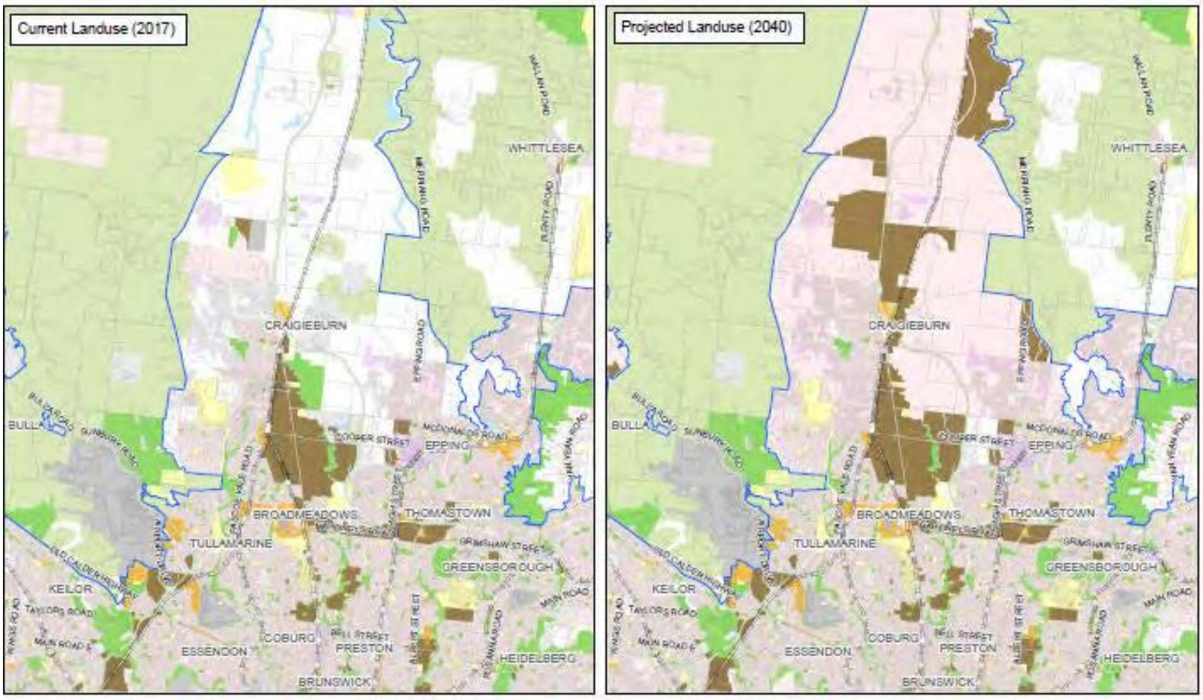
Melbourne's industrial precincts provide the basis for freight activity throughout the city. Industrial areas are projected to expand over the next 25 years with significant changes predicted in the north, south-east and western precincts, as shown in Figure 8-61. The growth in the northern and south-eastern precincts (highlighted in brown) are likely to impact traffic performance within the north-east due to the movement of freight between these locations.

Figure 8-61 – Projected land use change 2017 to 2040



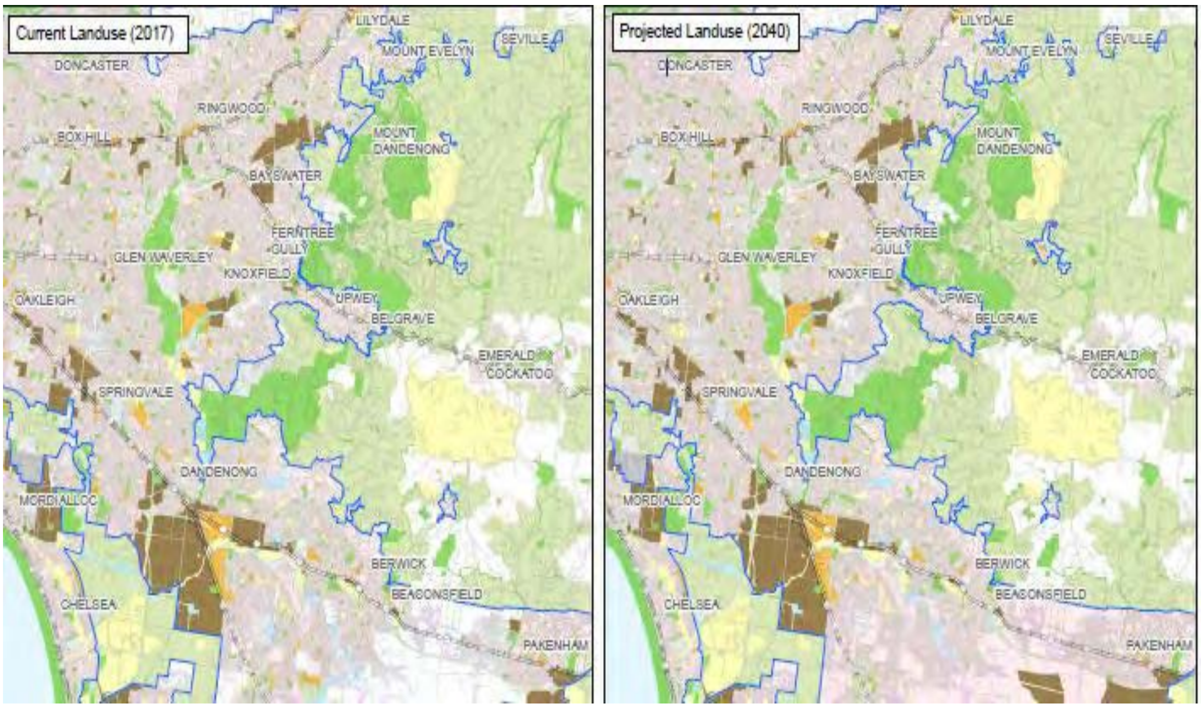
Northern industrial precincts are planned to expand from the existing Somerton and Campbellfield areas to the north of the Craigieburn commercial centre, beyond the current Epping and Melbourne Market area and ultimately into the Beveridge area. This expansion is presented in Figure 8-62. The northern precincts provide benefits of direct access to regional and interstate markets.

Figure 8-62 – Northern land use precinct planning – 2017 to 2040



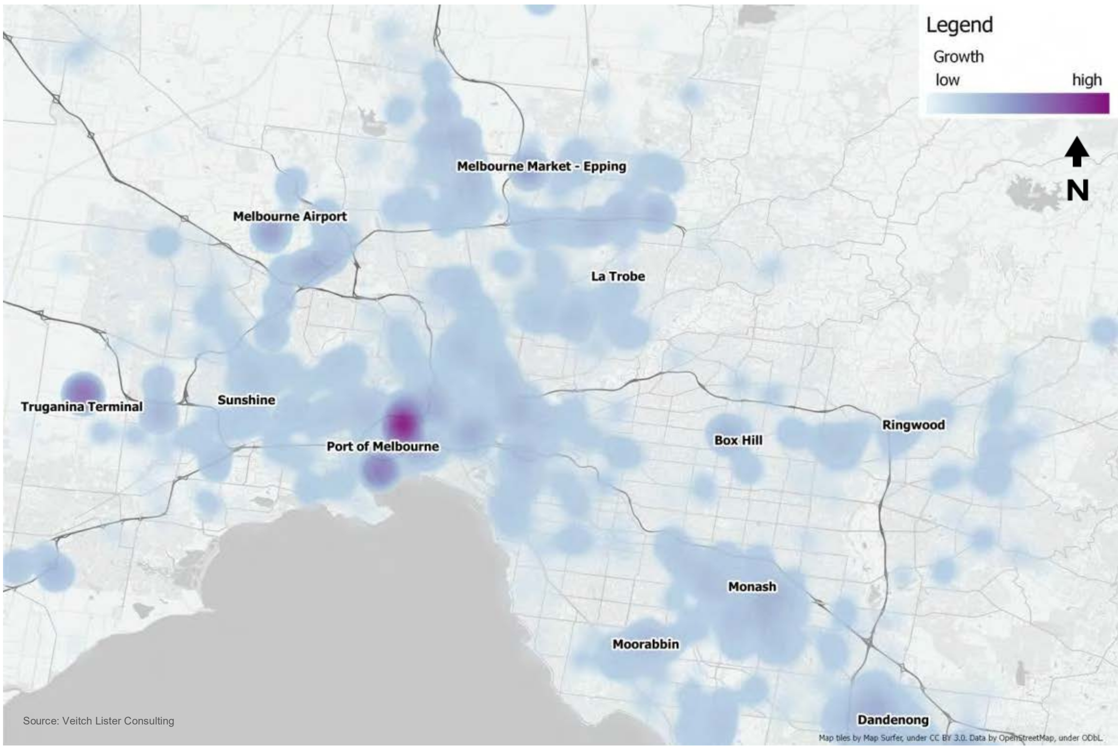
South-eastern industrial precincts are also predicted to expand, extending the current Dandenong cluster further south to Lyndhurst. Further development of the Pakenham and Officer areas is anticipated as well as the development of Cranbourne East and Casey east of Thompson Road. This growth is shown in Figure 8-63.

Figure 8-63 – South eastern land use precinct planning 2017–2040



The resultant growth in modelled truck trips by origin is presented in Figure 8-64. The chart shows the additional truck trips occurring in the 2036 ‘no project’ scenario over and above modelled 2016 levels. The modelling indicates that truck trip growth would be concentrated in industrial precincts including the Port of Melbourne, Dandenong, Monash, Tullamarine, Epping and Truganina.

Figure 8-64 – Growth in freight trips by origin, modelled 2036 ‘no project’ vs modelled 2016



Growth in truck trips for the north-eastern municipalities is presented in Table 8-9. Truck trips across these municipalities are forecast to increase by 40 per cent on average, which is faster than total vehicle trip growth for the north-east (+25 per cent). The largest growth is predicted to occur from the City of Whittlesea, where truck trips are forecast to increase by 57 per cent. This will likely be due to the Melbourne Market and the development of surrounding industrial and commercial precincts.

Table 8-9 – Growth in truck trips by origin LGA in the north-east – modelled 2036 'no project' vs modelled 2016

LGA	Growth in truck trips, 2036 'no project' vs 2016
Banyule (C)	+36%
Boroondara (C)	+30%
Darebin (C)	+35%
Manningham (C)	+34%
Maroondah (C)	+35%
Nillumbik (S)	+40%
Whitehorse (C)	+39%
Whittlesea (C)	+57%
Yarra (C)	+45%
All north-eastern LGAs	+40%

Heavy vehicle kilometres travelled for trucks across metropolitan Melbourne and the north-east are presented in Table 8-10. The percentage growth relative to the 2016 model is provided for each metric in brackets. Heavy vehicle travel is forecast to grow faster than private vehicle travel, and the growth in heavy vehicle travel along non-freeway links (that is, arterials and local roads) is faster than along freeways.

Table 8-10 – Forecast changes to heavy vehicle kilometres travelled, modelled 2036 'no project' vs modelled 2016

Heavy vehicle kilometres travelled	Metropolitan Melbourne	North-east
Total	15,209,000 (+49%)	2,191,000 (+46%)
Freeway	6,462,000 (+46%)	623,000 (+39%)
Non-freeway	8,748,000 (+51%)	1,568,000 (+49%)

Truck travel in the north-east would continue to primarily be conducted on arterial and local roads, as presented in Table 8-11. Approximately 28 per cent of heavy vehicle kilometres travelled in the north-east are predicted to occur on freeways by 2036, which is significantly lower than the metropolitan Melbourne average.

Table 8-11 – Heavy vehicle kilometres travelled, with freeway and non-freeway proportions, 2036 'no project'

Metric	Metropolitan Melbourne		North-east	
	2016	2036 'no project'	2016	2036 'no project'
Total Heavy vehicle kilometres travelled	10,205,000	15,209,000	1,502,000	2,191,000
Freeway proportion	43%	42%	30%	28%
Non-freeway proportion	57%	58%	70%	72%

8.5.2 Forecast freight volumes

Forecast changes to average weekday truck volumes between 2017 and the 2036 'no project' scenario are presented in Figure 8-65 to Figure 8-67. As per the total traffic assessment, almost all roads in the study area are predicted to experience an increase in truck volumes by 2036.

Key observations include:

- Forecast truck volume growth is concentrated along the freeway corridors, with the largest increases anticipated along the M80 Ring Road and the Eastern Freeway.
- The largest increase predicted along the Eastern Freeway is between Blackburn Road and Middleborough Road, with an additional 3,200 trucks anticipated per day. Forecast increases along the freeway generally range from approximately 2,300 to 2,800 trucks per day.
- Truck volumes on the M80 Ring Road west of the Hume Freeway are anticipated to increase by approximately 5,500 per day. This is likely to be influenced by growing truck movements from the Melbourne Market in Epping, which sits adjacent to the Hume Freeway.
- Truck volume growth is generally anticipated to be more concentrated in the outer northern suburbs. These include Edgars Road (+1,400), High Street (+2,100), Plenty Road (+1,500) and Yan Yean Road (+1,200).
- The Yarra River crossings at Chandler Highway, Manningham Road and Fitzsimons Lane are also forecast to increase significantly, with an additional 2,400, 1,700 and 1,900 trucks per day respectively.

Absolute truck volumes for an average weekday in the 2036 'no project' scenario are presented in Figure 8-68 to Figure 8-70.

Figure 8-65 – Change in average weekday truck volumes (AWDT), 2036 'no project' versus 2017 – study area north

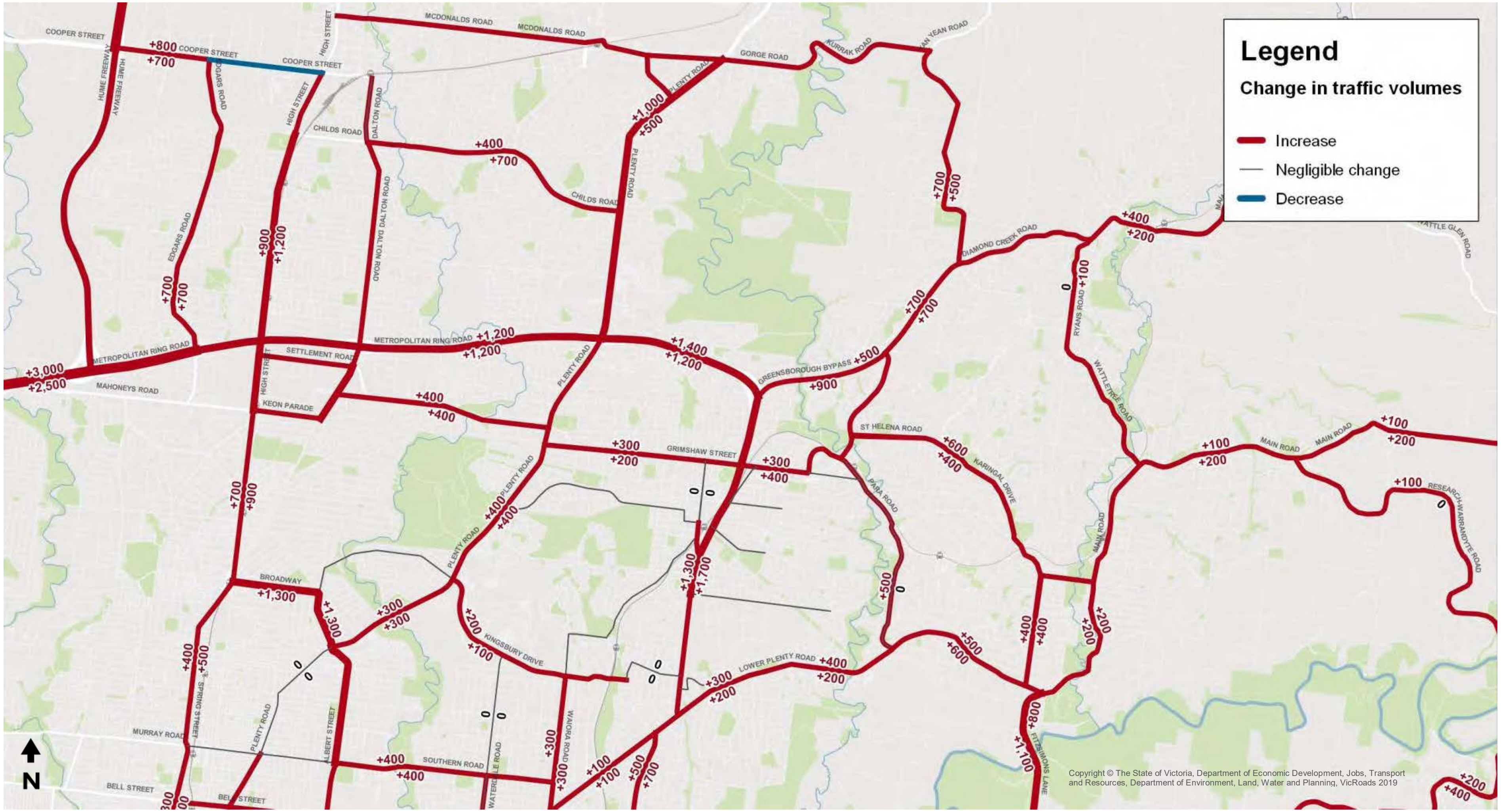


Figure 8-66 – Change in average weekday truck volumes (AWDT), 2036 'no project' versus 2017 – study area south

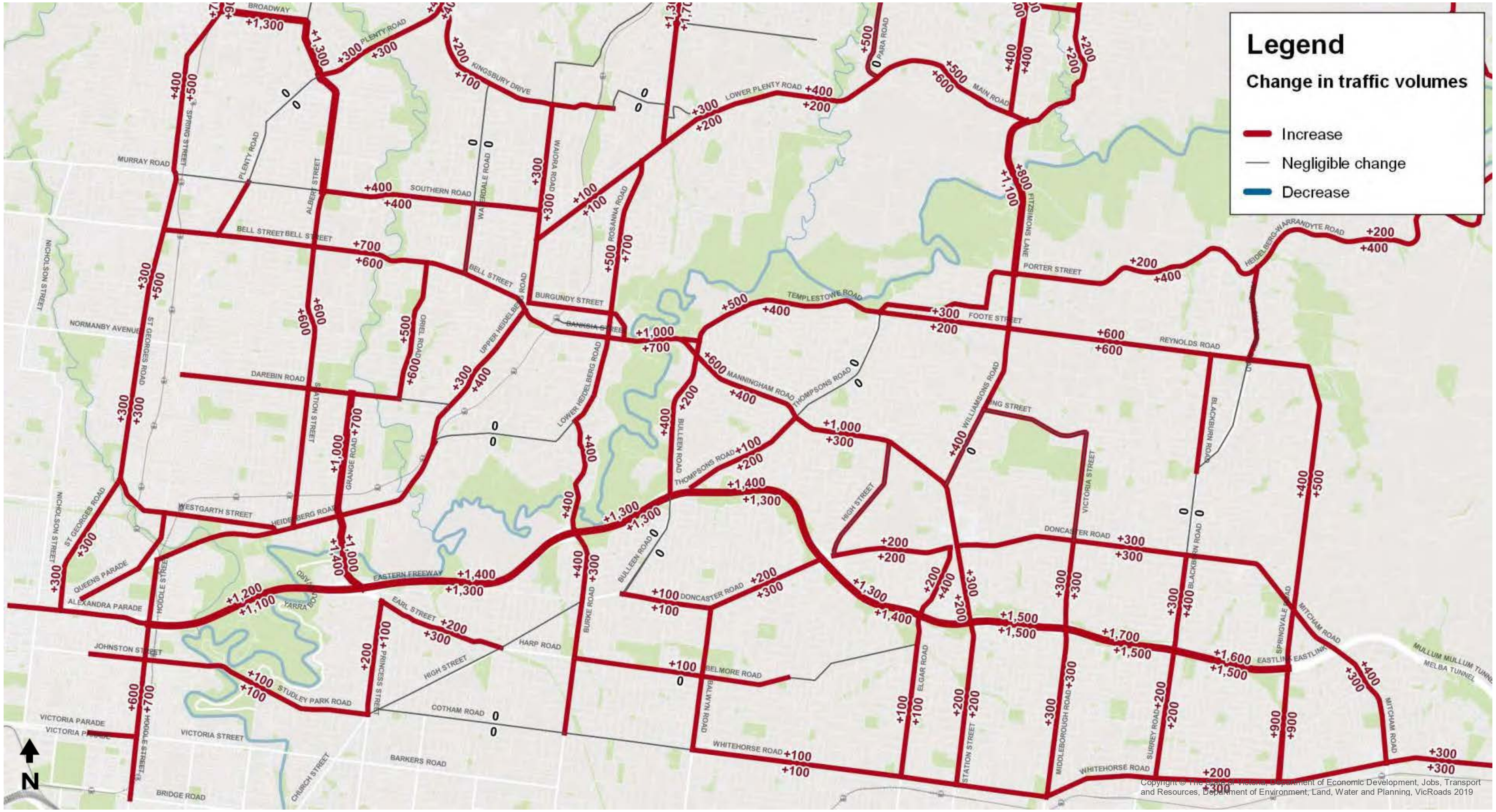


Figure 8-67 – Total average weekday truck volumes (AWDT), 2036 'no project' versus 2017 – study area east

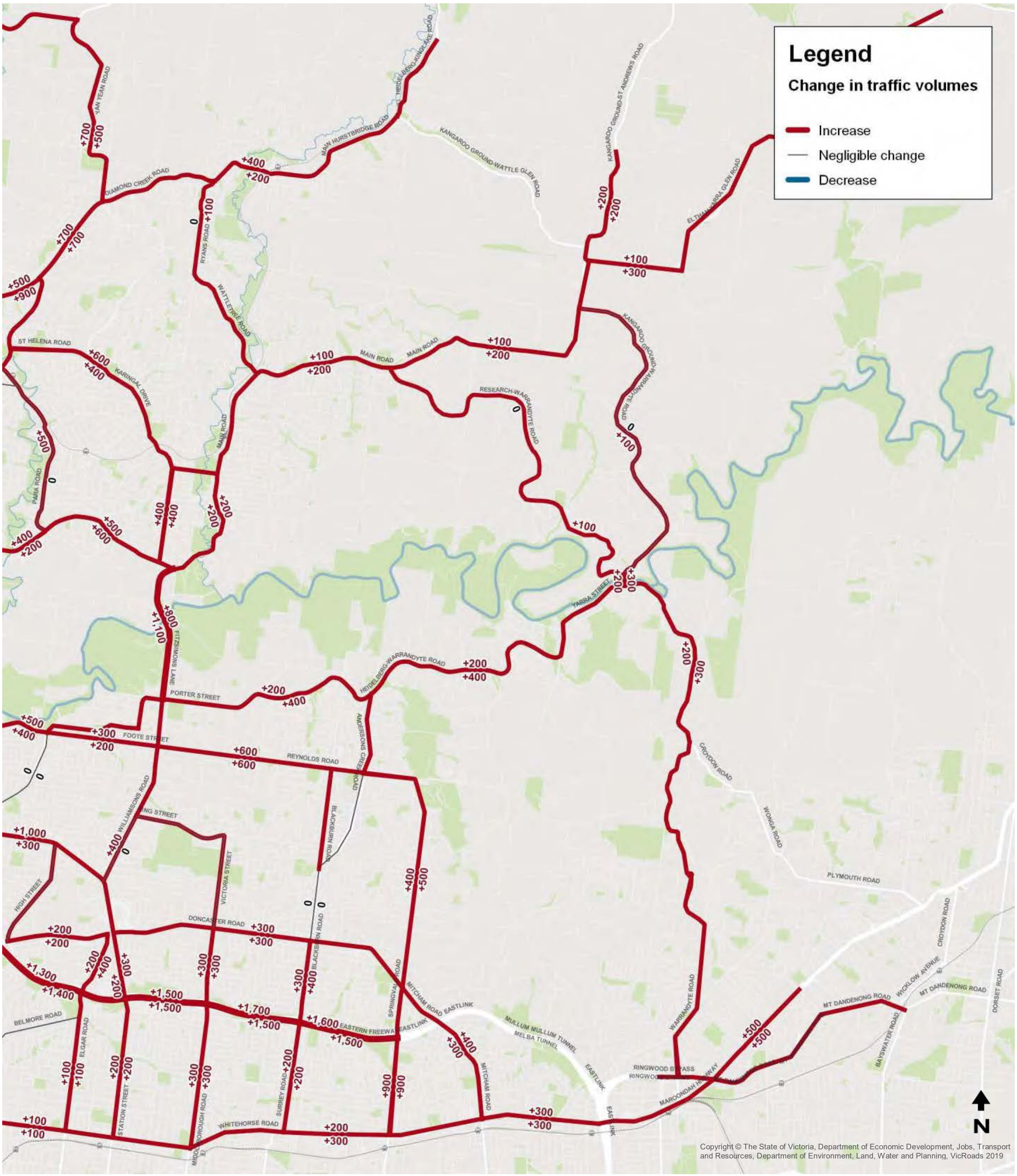


Figure 8-68 – Total average weekday truck volumes (AWDT), 2036 'no project'– study area north

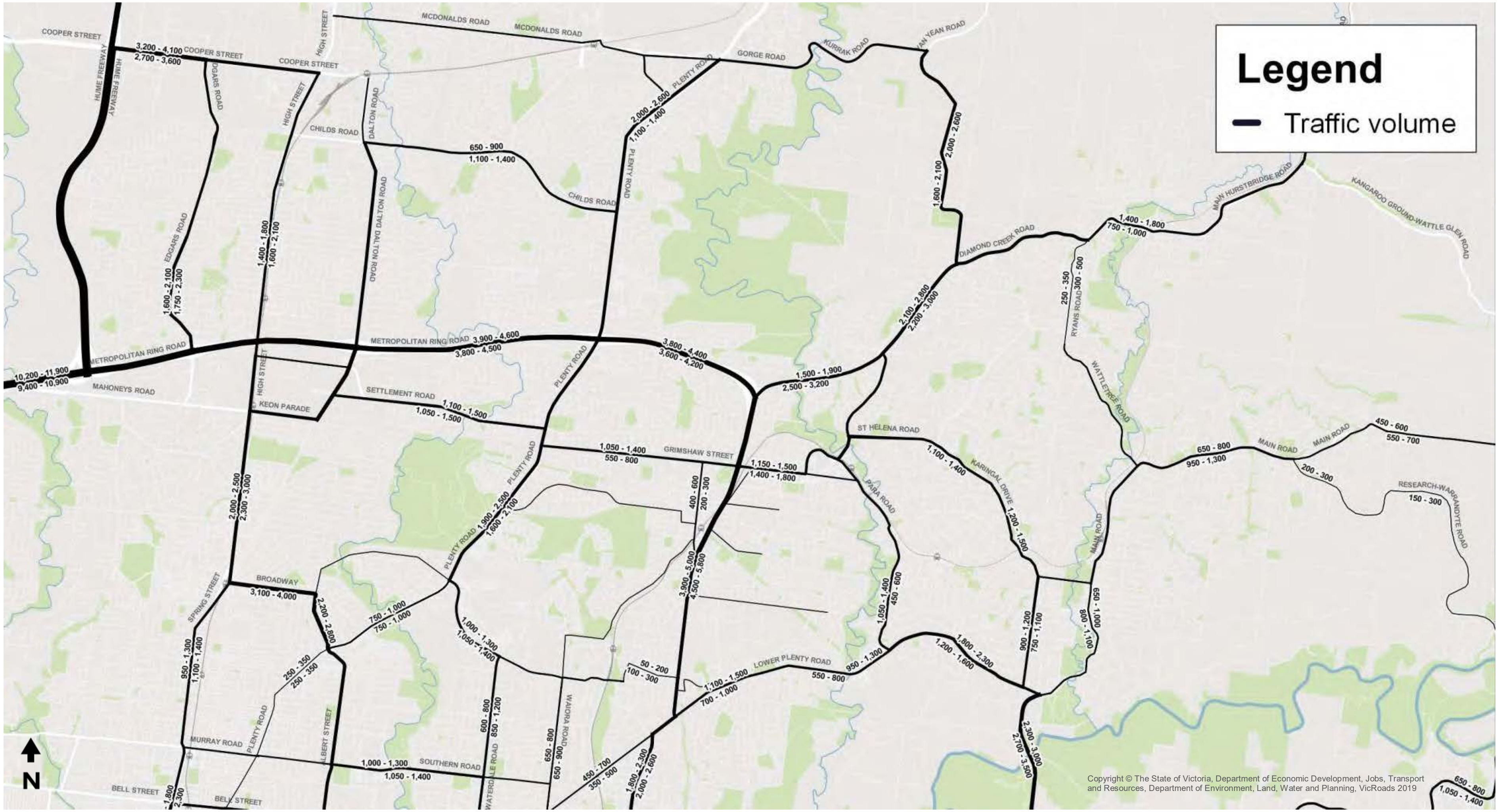
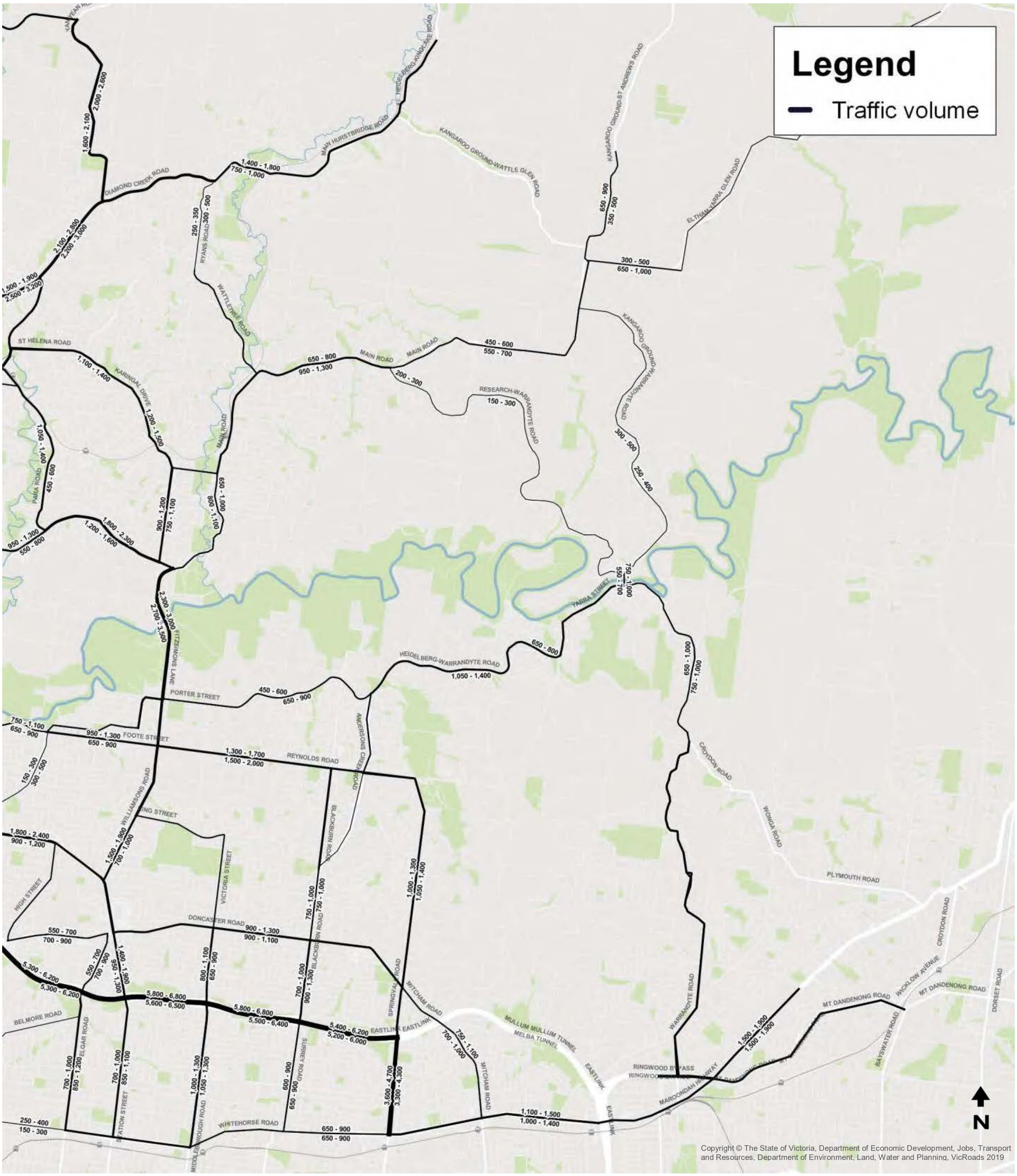


Figure 8-69 – Total average weekday truck volumes (AWDT), 2036 'no project' – study area south

Figure 8-70 – Total average weekday truck volumes (AWDT), 2036 'no project' – study area east



Statistics for the Rosanna Road corridor are presented in Table 8-12. Total truck volumes across the day are forecast to increase by approximately 37 per cent between 2017 and the 2036 ‘no project’ scenario. The proportion of daily truck traffic is also forecast to increase from 7 to 9 per cent.

Rosanna Road would also increasingly be relied upon for longer, non-local trips. The proportion of local trips forecast to use the road in the 2036 ‘no project’ scenario is forecast to decrease from 57 per cent to 51 per cent across the day.

Table 8-12 – Rosanna Road truck statistics, 2036 ‘no project’ vs 2017

Metric	2017	2036 ‘no project’
Total volumes (daily, two-way)	39,000 – 50,000	41,000 – 54,000
Percentage trucks	7%	9%
Proportion of local trips (daily)	57%	51%

8.6 Public transport

By 2036, the number of trips completed by public transport across metropolitan Melbourne is forecast to double to approximately 3.1 million per day. The proportion of all trips completed by public transport is expected to increase from 9 to 14 per cent. This increase in demand is supported by a number of assumed upgrades to the public transport network as discussed in Section 8.1.2 including the Metro Tunnel, Mernda rail extension and Hurstbridge Stage 2 upgrades.

The forecast increase in traffic volumes throughout the study area are predicted to increase delays for on-road public transport services. The predicted changes to bus and tram travel speeds relative to the 2016 model are summarised in Table 8-13. Travel speeds across the bus and tram network in the north-east are forecast to decrease by approximately 12 per cent in the AM and PM peaks, and by 9 per cent across the day.

Table 8-13 – Changes to public transport speeds and travel times, modelled 2036 ‘no project’ vs modelled 2016

Metric	AM peak	PM peak	Daily
Average speed	-12%	-12%	-9%

8.6.1 Impacts to tram services

Forecast travel time changes inbound in the AM peak for tram routes in the study area is presented in Table 8-14. Tram travel times are not predicted to change significantly (typically between 0 to 5 per cent slower) as some sections of their routes are separated from general traffic. Along these sections trams can operate at a free-flow speed independently of traffic congestion levels.

Table 8-14 – Travel time changes inbound tram routes in the north-east, 2036 'no project' vs 2016

Route	Description	AM peak inbound travel time change
11	West Preston – Victoria Harbour Docklands	+0% to +5%
48	North Balwyn – Victoria Harbour Docklands	+0% to +5%
86	Bundoora RMIT – Waterfront City Docklands	+0% to +5%
109	Box Hill – Port Melbourne	+0% to +5%

8.6.2 Impacts to bus services

Forecast travel time changes inbound in the AM peak for key bus routes in the study area are presented in Table 8-15. The travel times presented relate to time spent within the study area only (for routes which travel outside the study area). Travel times across the bus routes are predicted to generally increase by up to 20 per cent. The largest increase is predicted for the 548 bus between La Trobe University and Kew.

Table 8-15 – Travel time changes for a sample of inbound bus routes in the north-east, 2036 'no project' vs 2016

Route	Description	AM peak inbound travel time change
200	Bulleen – City (Queen Street)	+10% to +15%
207	Doncaster SC – City (Queen Street)	+5% to +10%
250	La Trobe University – City (Queen Street)	+10% to +15%
302	Box Hill – City (Lonsdale Street)	+10% to +15%
508	Alphington – Moonee Ponds	+10% to +15%
513	Eltham – Glenroy via Lower Plenty	+10% to +15%
548	La Trobe University – Kew	+40% to +45%
550	La Trobe University – Northland SC	+20% to +25%
551	La Trobe University – Heidelberg	+15% to +20%
561	Macleod – Pascoe Vale	+15% to +20%

8.6.3 SmartBus services

Forecast travel time changes inbound in the AM and PM peaks for non-DART SmartBuses in the study area are presented in Table 8-16. The buses presented are orbital routes with a broad catchment across Melbourne, and as such the travel time impacts have been restricted to that within the study area only. Travel times on SmartBus routes 901, 902 and 903 within the north-east are generally predicted to be 15 to 20 per cent slower by 2036. This is due to growing congestion levels along the arterial road network which increases travel times for buses and general traffic.

Table 8-16 – Travel time changes for inbound SmartBus (non-DART) routes in the north-east, 2036 'no project' vs 2016

Route	Description	AM peak inbound travel time change	PM peak inbound travel time change
901	Frankston – Melbourne Airport	+15% to +20%	+15% to +20%
902	Chelsea – Airport West	+15% to +20%	+15% to +20%
903	Altona – Mordialloc	+15% to +20%	+15% to +20%

8.6.4 DART services

Travel times for the 905, 906, 907 and 908 DART bus routes along the Eastern Freeway between Doncaster Road and Hoddle Street are generally predicted to be approximately 5 to 10 per cent slower by 2036. The reduction in travel speeds for these buses along the Eastern Freeway is less severe than that of general traffic due to the provision of separated bus lanes in peak periods. The travel time changes for inbound DART routes is presented in Table 8-17 and Table 8-18 for the AM and PM peaks respectively.

Table 8-17 – DART bus routes change in inbound travel times, AM peak, 2036 'no project' vs 2016

Route	Eastern Freeway segment	Non-Eastern Freeway segment
905	+10% to +15%	+5 to +10%
906	+5 to +10%	+5 to +10%
907	Approx. +5%	+5 to +10%
908	Approx. +5%	+5 to +10%

Table 8-18 – DART bus routes change in inbound travel times, PM peak, 2036 'no project' vs 2016

Route	Eastern Freeway segment	Non-Eastern Freeway segment
905	Approx. +5%	+10 to +15%
906	+5 to +10 %	+5 to +10%
907	Approx. +5%	+10 to +15%
908	Approx. +5%	+10 to +15%

8.6.5 Train services

Travel times for train services are not anticipated to change materially in the future, as they are separated from the road network and take priority at level crossings.

8.7 Walking and cycling

Overall mode share for active transport is forecast to remain approximately static (approximately 13 per cent of all trips across Melbourne) between 2016 and 2036. As the transport model is not able to forecast pedestrian or cyclist volumes for individual roads or paths, a quantitative impact assessment for these modes cannot be undertaken.

The net increase in traffic volumes throughout the study area may however have a negative impact on active travel in the due to the increase in interactions between vehicles, pedestrians and cyclists. Note that the crash assessment presented in Section 8.2.3 includes crashes affecting pedestrians and cyclists.

9 2036 'with project' scenario

This section evaluates the impacts of North East Link in 2036. It examines the impacts on the surrounding road network, the performance of the project corridor and the anticipated changes to travel behaviour and trip patterns across the study area. Impacts to freight movements, public transport and walking and cycling are also assessed.

All comparisons with respect to traffic performance and changes in volumes are compared with the 2036 'no project' scenario. A North East Link 'reference project' has been considered as part of this assessment which is described in the following sections.

9.1 Project overview

North East Link is a proposed 11-kilometre freeway linking the Eastern Freeway and the M80 Ring Road which would complete the missing link in Melbourne's orbital network. The project reference project broadly involves:

- A new freeway link between the Eastern Freeway and M80 Ring Road with interchanges at the Eastern Freeway (near Bulleen Road), Manningham Road, Lower Plenty Road (with south-facing ramps at Greensborough Road), Grimshaw Street and the M80 Ring Road (at Greensborough Bypass)
- An upgrade of the Eastern Freeway to a managed motorway with additional lanes between Springvale Road and Chandler Highway
- An upgrade of the M80 Ring Road between Plenty Road and the Greensborough Bypass
- A new Doncaster Busway system consisting of dedicated bus lanes and priority treatments on the Eastern Freeway
- A program of new and upgraded shared use paths across the north-east.

The project has been designed to meet a performance target of Level of Service D for general traffic on the freeway and arterial network. Bus priority facilities have been provided where possible and the walking and cycling network has been developed to close existing gaps and provide a continuous connection between the M80 Ring Road and Eastern Freeway.

North East Link also provides the opportunity to optimise elements of the existing transport network in the north-east. For example, in parallel to the design and development of the Doncaster Busway project, Transport for Victoria is undertaking a review of bus routes across the north-east to integrate the new project scope with the broader public transport network. VicRoads will also review traffic signals and operations between North East Link and the balance of the freeway and arterial road networks to support project integration.

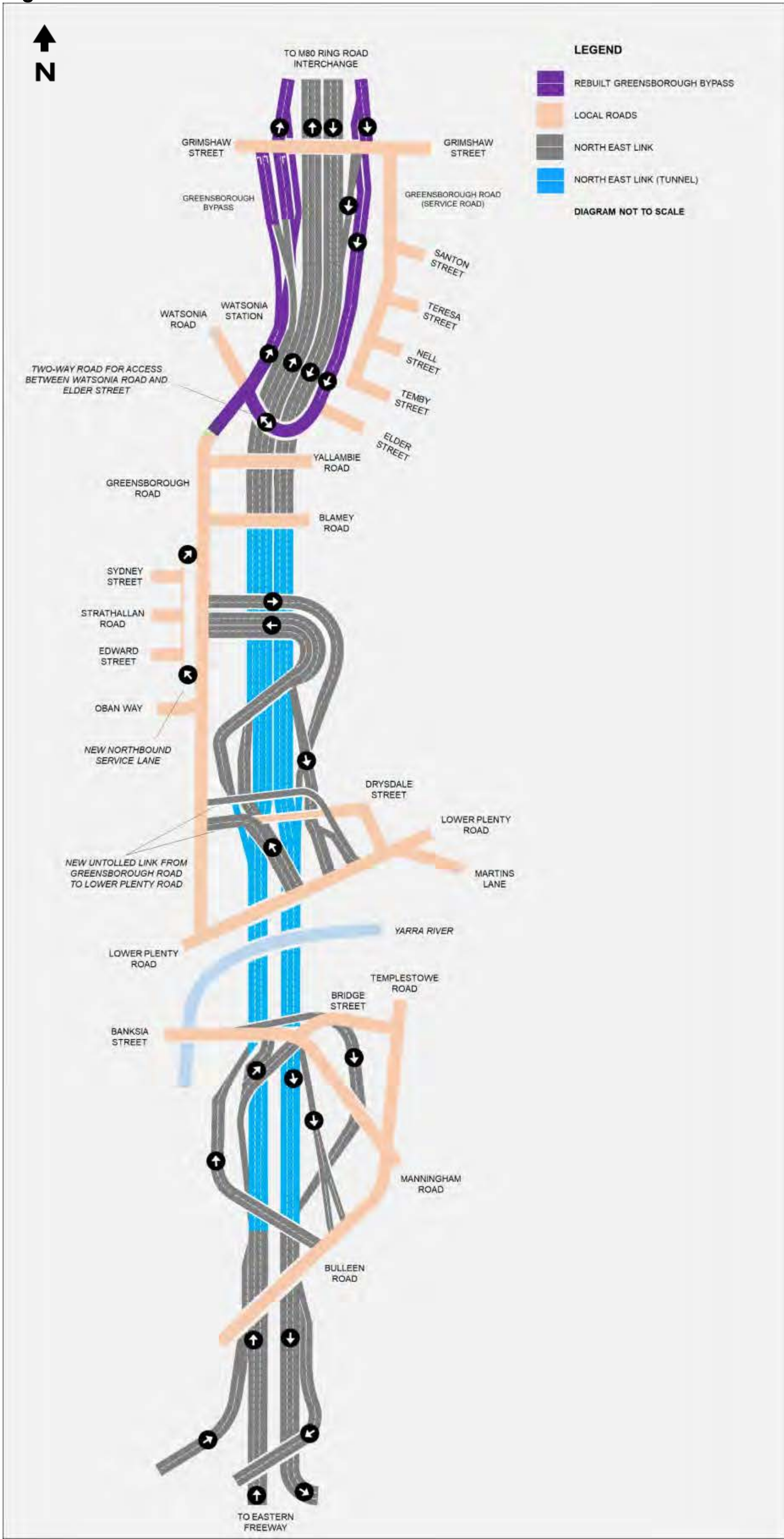
9.1.1 New freeway link

The new freeway link between the Eastern Freeway and the M80 Ring Road is presented in Figure 9-1. A summary of the proposed scope is as follows:

- Ramps connecting North East Link to the Eastern Freeway allowing eastbound and westbound travel
- Twin three-lane tunnels with a southern tunnel portal north of the Eastern Freeway near Bulleen Road, running north-south under the Yarra River, and a northern tunnel portal north of Lower Plenty Road
- Grade-separated interchanges at Manningham Road, Lower Plenty Road (with south-facing ramps at Greensborough Road) and Grimshaw Street
- A lowered freeway in a trench parallel to Greensborough Road, north of Lower Plenty Road
- Realignment of Greensborough Bypass either side of North East Link near Watsonia railway station to allow for un-tolled local movements between Watsonia Road and the M80 Ring Road
- A grade-separated connection to the M80 Ring Road with full connectivity to the Greensborough Bypass and the M80 Ring Road
- Grade separation of Drysdale Street, Yallambie Road, Blamey Road and Kempston Street either over or under North East Link.

There are two options for the Manningham Road interchange, which are referred to as the 'reference project' and 'alternative design'. This assessment considers the reference project for the Manningham Road interchange. The alternative design for the interchange features only small changes which are typically localised around the interchange itself. The alternative design has been assessed as a sensitivity test with results presented in Section 11.

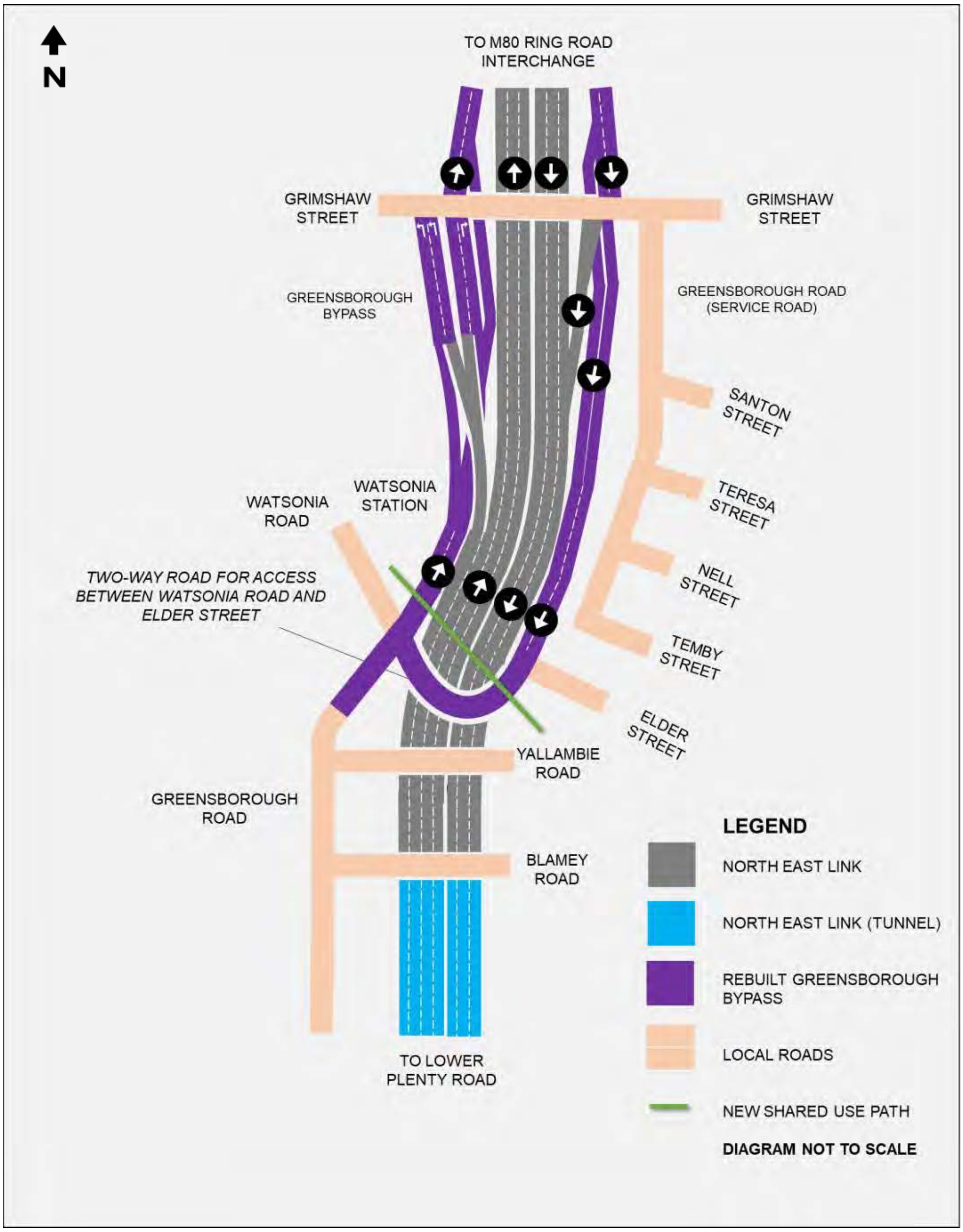
Figure 9-1 – North East Link overview



North East Link will provide an un-tolled access route between Grimshaw Street and Watsonia Road by realigning the local road network as presented in Figure 9-2. Northbound traffic will travel along the rebuilt Greensborough Bypass on the western side of North East Link, while southbound travel will occur on the eastern side. The two roads will combine at Watsonia Road and connect to Greensborough Road to the south.

Separate carriageways will be provided between Grimshaw Street and the M80 Ring Road interchange and Greensborough Bypass to allow for un-tolled travel.

Figure 9-2 – Realignment of Greensborough Bypass

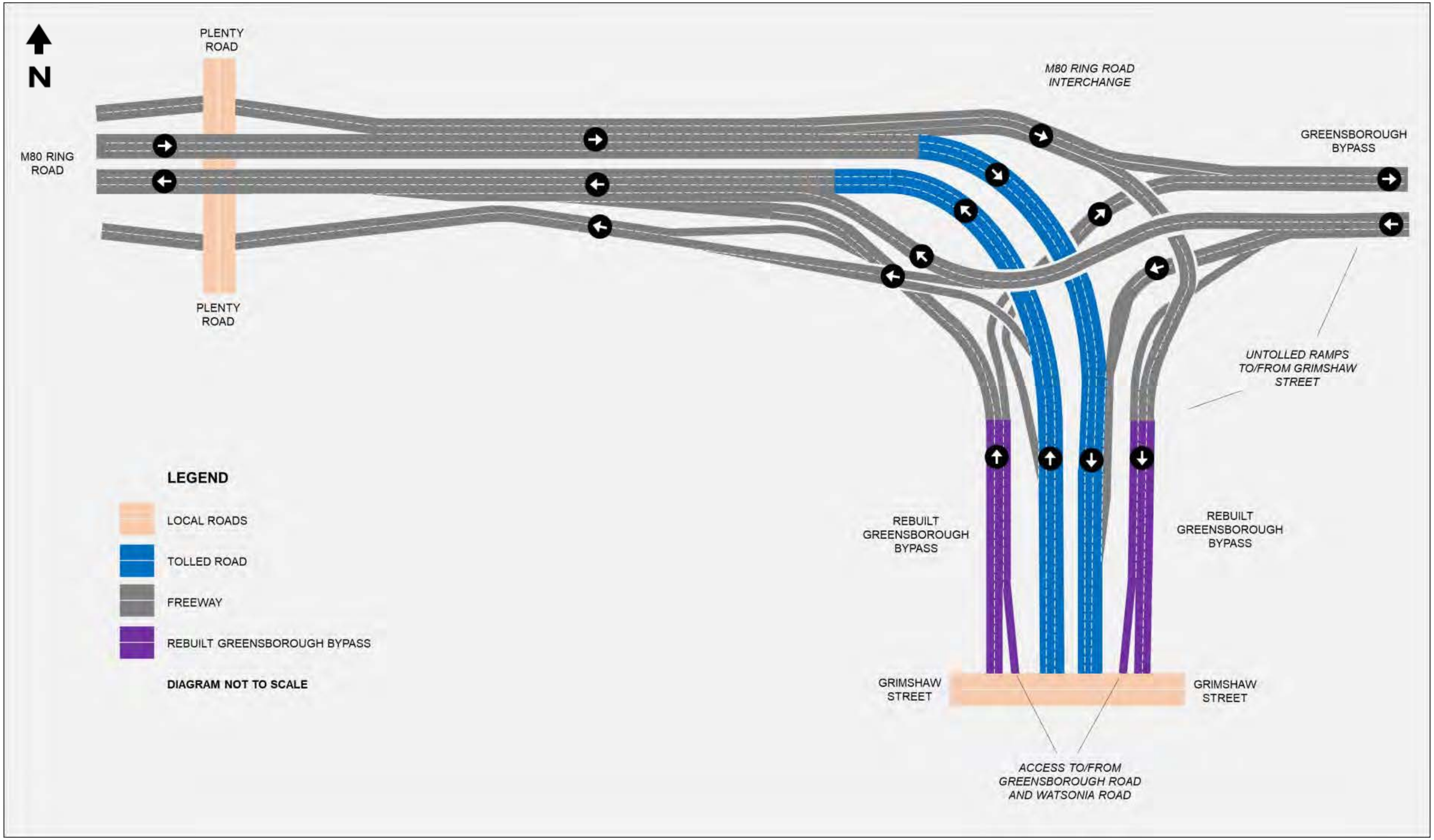


9.1.2 M80 Ring Road and Greensborough Bypass upgrade

North East Link will also include widening of the M80 Ring Road as well as upgrades to the interchange at Greensborough Bypass. The upgrades along this section are presented in Figure 9-3 and can be summarised as:

- Greensborough Bypass will be rebuilt between Grimshaw Street and the M80 Ring Road, including connections either side of North East Link to maintain existing un-tolled access
- Upgrades to the M80 Ring Road interchange including full grade separation for all movements
- Additional capacity on the M80 Ring Road between Greensborough Bypass and Plenty Road – this will be over and above the widening works that VicRoads is expected to start in 2019
- Additional capacity on the Greensborough Bypass between the M80 Ring Road and Diamond Creek Road.

Figure 9-3 – M80 Ring Road and interchange upgrades

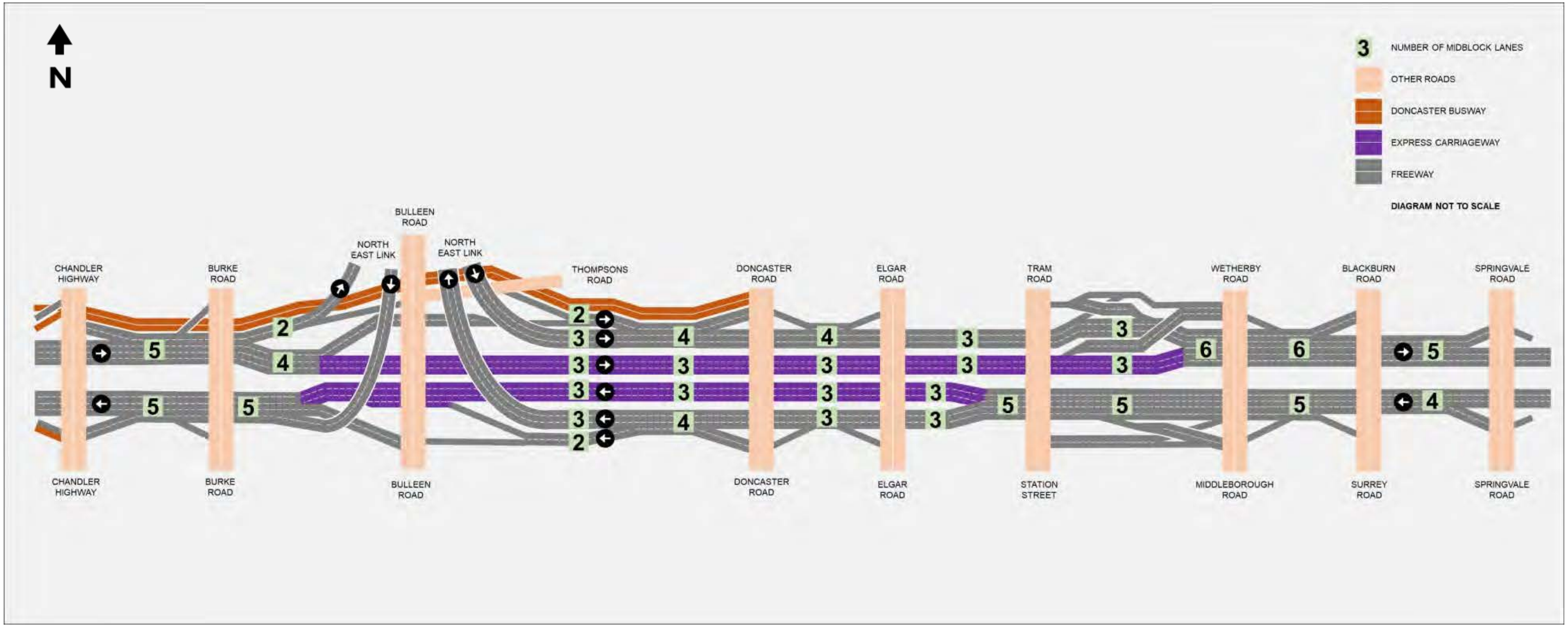


9.1.3 Eastern Freeway and the Doncaster Busway

North East Link will include upgrades to 15 kilometres of the Eastern Freeway between Springvale Road and Chandler Highway. An overview of the Eastern Freeway upgrades is presented in Figure 9-4. The freeway upgrades can be summarised as:

- Modernisation of the freeway to a fully managed motorway including ramp-metering, lane use management signs (LUMS), incident detection, variable message signs (VMS) and improved closed-circuit television (CCTV) coverage
- Additional lanes between Springvale Road and Chandler Highway including the separation of traffic into an express carriageway and collector-distributor carriageway – the collector-distributor carriageway will provide access to North East Link and the interchanges between Bulleen Road and Middleborough Road
- A new Doncaster Busway system – a dedicated bus-only carriageway between Hoddle Street and Doncaster Road
- Ramp connections between the Eastern Freeway and North East Link near Bulleen Road
- Upgrading of the structures along the Eastern Freeway to cater for heavy vehicles.

Figure 9-4 – Eastern Freeway upgrades



9.1.4 Walking and cycling

North East Link will provide a series of shared use path upgrades, which can be summarised as:

- Upgrades to cycling infrastructure along Greensborough Bypass/Greensborough Road and Bulleen Road, to create an entirely off-road cycling corridor linking the M80 Ring Road and the Eastern Freeway
- An additional 2.5 kilometres of cycling paths along the Eastern Freeway, known as the North East Bicycle Corridor – this path will provide a more direct alternative to the Main Yarra Trail linking existing track near Chandler Highway and re-joining the trail at the Merri Creek
- New east-west bridges for pedestrians and cyclists over North East Link, connecting Hakea Street with Yando Street, Kempston Street with Grimshaw Street and Nell Street east and west of the Greensborough Bypass
- Additional pedestrian crossings along Greensborough Road near Wattle Drive, Strathallan Road and Drysdale Street
- An upgraded pedestrian bridge over the M80 Ring Road near Macorna Street, linking into the existing Western Ring Road Trail.

Further detail regarding the North East Link walking and cycling infrastructure upgrades is provided in Section 9.7.

9.1.5 Tolling structure

Toll pricing and structure is based on the 2017 North East Link Business Case. The transport modelling has assumed toll gantries in the following locations:

- Between the M80 Ring Road and Grimshaw Street (main line only, not applicable to the rebuilt Greensborough Bypass)
- Between Grimshaw Street and Lower Plenty Road
- Between Lower Plenty Road and Manningham Road
- Between Manningham Road and the Eastern Freeway.

An assumed toll rate has been applied to the project which is similar to CityLink and EastLink pricing, with the final toll prices and structure being subject to change. No combined toll caps have been applied across the North East Link and EastLink toll roads. Sensitivity testing of the toll rate has been performed with the results presented in Section 11.

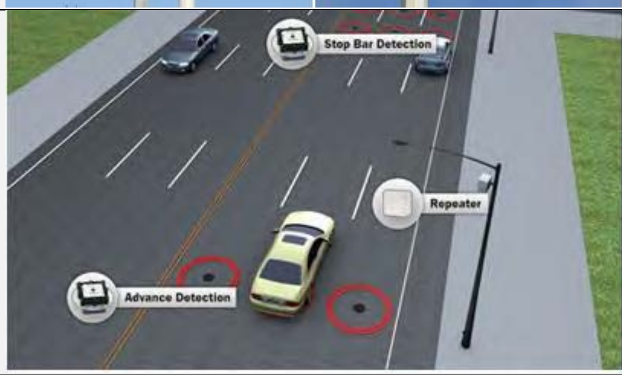
9.1.6 Managed motorways

Melbourne's freeway network is gradually being upgraded to a fully managed motorway system, installing a range of technologies such as LUMS, ramp-metering, VMS, CCTV cameras and in-pavement detection studs. Examples of each technology are provided in Table 9-1.

North East Link will be a fully managed motorway with ramp-metering at all entry ramps. The city-facing ramps connecting North East Link and the Eastern Freeway will also be metered. LUMS, VMS and CCTV will also be installed along the North East Link corridor.

The Eastern Freeway from Springvale Road to Hoddle Street and the M80 Ring Road from Plenty Road to Greensborough Bypass (currently being upgraded by VicRoads) will be also upgraded to a managed motorway. This will include ramp-metering, LMS, VMS and CCTV along both corridors.

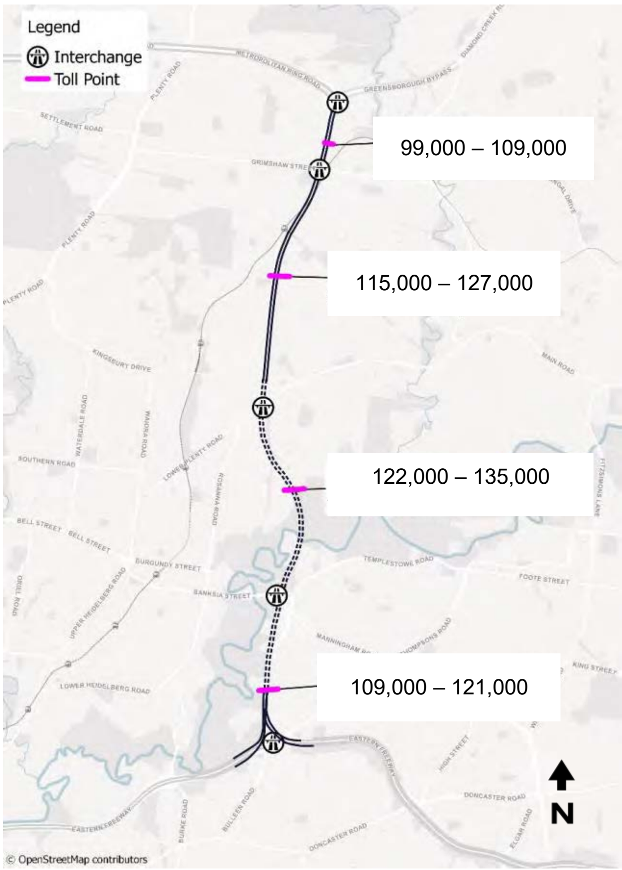
Table 9-1 – Elements of managed motorway technologies

Technology	Description	Example
LUMS	Allows variable speed limits depending on traffic conditions and closure of lanes during incidents or maintenance.	
Ramp-metering	Manages and optimises traffic flow on the motorway to minimise the likelihood of congestion.	
VMS	Provide a range of information to motorists including advice on delays, detours, travel times and traffic conditions.	
CCTV	For monitoring of traffic and road users, lane use management and incidents.	
Pavement detection studs	Can detect traffic volumes, speeds, queues and overall congestion.	

9.1.7 Traffic on North East Link

North East Link is estimated to carry up to 135,000 vehicles per day by 2036 as presented in Figure 9-5. Traffic would be split approximately 60 per cent southbound and 40 per cent northbound during the AM peak, and reversed in the PM peak, and evenly split during the interpeak and off-peak periods.

Figure 9-5 – Total daily traffic volumes on North East Link in 2036 (AWDT, two-way)



Of the traffic travelling southbound on North East Link from the M80 Ring Road, 45 to 55 per cent of this traffic is expected to travel the full corridor towards the Eastern Freeway. The majority of this traffic is then expected to continue east on Eastern Freeway. This is discussed in further detail in Section 9.2.3.

9.1.8 Project catchment

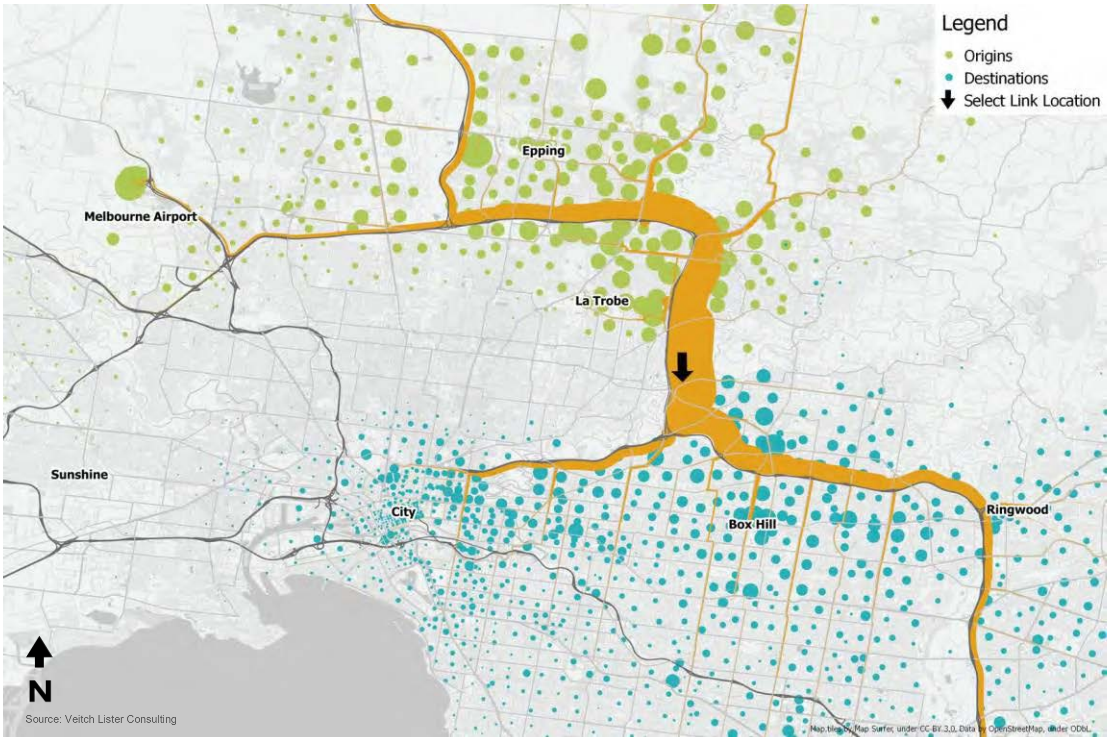
The arterial road network in the north-east currently facilitates a mix of:

- Local trips, which have both an origin and destination within the study area, typically by residents of the north-east
- Medium-length trips, which have either an origin or destination in the study area (such as travel between Watsonia and Clayton)
- Longer cross-city or ‘through’ trips which do not have either an origin or destination in the study area (such as travel between Dandenong and Mernda).

Currently, medium and longer cross-city trips compete with local trips for space on the arterial road network, which increases congestion and deteriorates travel times for residents.

A map of the forecast origins and destinations for southbound traffic on North East Link is presented in Figure 9-6. A large proportion of the catchment originates from the outer northern suburbs, beyond the M80 Ring Road, with trips from as far west as Melbourne Airport. Another large origin catchment exists within the study area, spanning the Watsonia, La Trobe and Greensborough precincts.
The destination catchment to the south has a very wide dispersal, with medium-length trips to areas such as Box Hill, Doncaster and Kew. A catchment also exists further to the south of the Monash Freeway, indicating further demand for longer, cross-city trips.

Figure 9-6 – Daily origins and destinations for all southbound vehicles using North East Link



The project catchment is forecast to be primarily medium and longer, cross-city trips which would divert away from the north-east's existing road network. As such, the total volume for many arterial roads are forecast to decrease in the 'with project' scenario, with their functionality changing to servicing more local trips. A reduction in congestion in the north-east would benefit the full spectrum of road users, including cars, trucks, buses and on-road trams.

Pedestrians and cyclists would also benefit from a general decrease in interactions with traffic, which would improve the comfort and amenity of these trips.

9.2 Local study area

9.2.1 Network performance

A chart comparing mode share between the 2036 'with project' and 'no project' scenarios is shown in Figure 9-7 and Figure 9-8, for metropolitan Melbourne and the north-east respectively. These mode share estimates have been forecast by the strategic transport model.

Forecast mode share across both regions is not anticipated to change materially as a result of the project. This means that travellers are largely anticipated to continue using their existing mode of travel following completion of the project. This is intuitive, given that North East Link would include upgrades across roads, public transport and walking and cycling infrastructure.

Figure 9-7 – Metropolitan Melbourne mode share 2036 'no project' vs 2036 'with project'

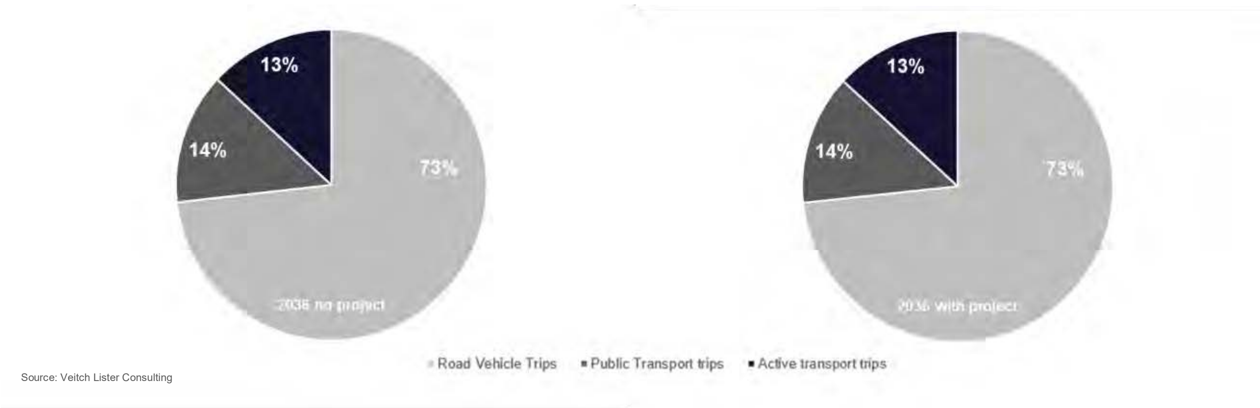
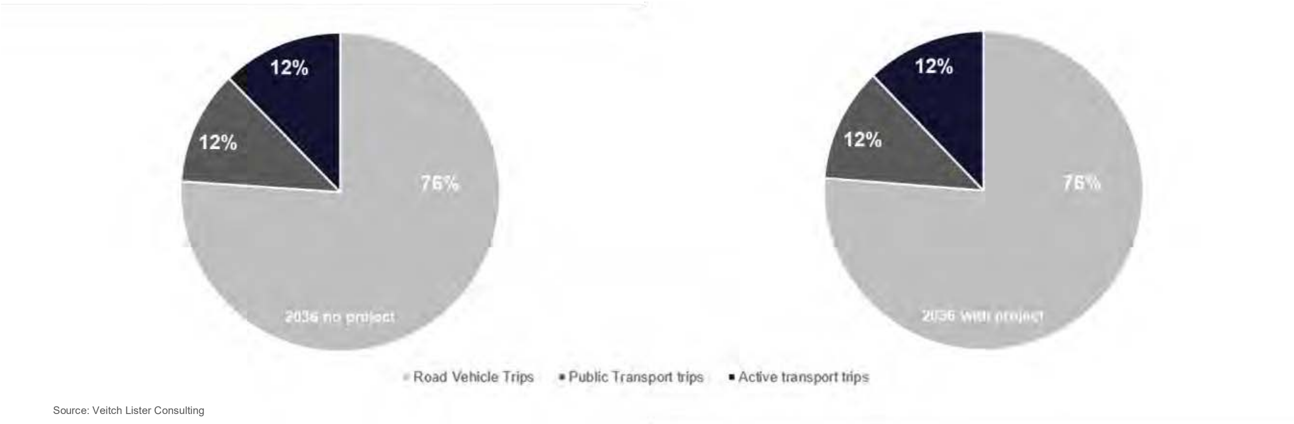


Figure 9-8 – North-east mode share 2036 'no project' vs 2036 'with project'



Network statistics for the 2036 'with project' scenario across metropolitan Melbourne and the north-east are presented in Table 9-2. The percentage change in each metric relative to the 2036 'no project' scenario is provided in brackets. Observations of note include:

- Total road vehicle trips are forecast to be static between the 'no project' and 'with project' cases. Total vehicle kilometres travelled across metropolitan Melbourne and the north-east are anticipated to increase slightly, at 1 per cent and 6 per cent respectively.
- Total vehicle hours travelled are anticipated to decrease very slightly, at approximately 1 per cent across metropolitan Melbourne and the north-east. This represents time savings afforded by North East Link itself, as well as arterial road decongestion.
- Time spent travelling in congested conditions is predicted to decrease by 2 per cent across metropolitan Melbourne and by 5 per cent across the day. The decreases are also similar in the AM and PM peaks.

- Average vehicle speeds across the north-east are forecast to improve by approximately 6 per cent. This is higher than the average improvement of 1 per cent across metropolitan Melbourne.
- Public transport trips are anticipated to remain approximately static between the 'with project' and 'no project' scenarios.

Table 9-2 – Network statistics, 2036 'with project' vs 2036 'no project' scenario

Metric	Time period	Metropolitan Melbourne	North-east
Road Vehicle Trips (Car + LCV + HCV)	Daily	16,794,000 (0% to +1%)	3,157,000 (0% to +1%)
	AM peak (2 hour)	2,578,000 (0% to +1%)	469,000 (0% to +1%)
	PM peak (2 hour)	2,603,000 (0% to +1%)	496,000 (0% to +1%)
Total vehicle kilometres travelled (km)	Daily	179,727,000 (0% to +1%)	30,493,000 (+6%)
	AM peak (2 hour)	27,443,000 (0% to +1%)	4,615,000 (+6%)
	PM peak (2 hour)	29,341,000 (0% to +1%)	4,892,000 (+7%)
Vehicle hours travelled due to congestion (hrs)	Daily	1,150,000 (-2%)	245,000 (-5%)
	AM peak (2 hour)	382,000 (-2%)	81,000 (-4%)
	PM peak (2 hour)	365,000 (-2%)	75,000 (-5%)
Total vehicle hours travelled (hrs)	Daily	4,338,000 (-1% to 0%)	845,000 (-1% to 0%)
	AM peak (2 hour)	888,000 (-1% to 0%)	176,000 (-1% to 0%)
	PM peak (2 hour)	902,000 (-1% to 0%)	174,000 (-1% to 0%)
Average speed (km/hr)	Daily	41 (+1%)	36 (+6%)
	AM peak (2 hour)	31 (+1%)	26 (+7%)
	PM peak (2 hour)	33 (+1%)	28 (+8%)
Public transport trips	Daily	3,102,000 (-1% to 0%)	478,000 (-1% to 0%)

Source: VLC Zenith Model

The growth in vehicle kilometres travelled was also analysed separately for freeways and non-freeways, with the results presented in Table 9-3. The percentage change in vehicle kilometres travelled compared with the 2036 ‘no project’ scenario is provided in brackets.

Across metropolitan Melbourne, freeway vehicle kilometres travelled is forecast to increase by approximately 5 per cent. This reflects the inclusion of approximately 135 lane-kilometres of additional freeway including the new North East Link as well as widening works along the Eastern Freeway and M80 Ring Road. This percentage change is magnified when examining the north-east in isolation, where freeway vehicle kilometres are forecast to increase by 44 per cent.

Non-freeway vehicle kilometres travelled are forecast to decrease for the metropolitan Melbourne and north-east regions. This reflects trips generally diverting away from arterial roads and onto the freeway network as a result of North East Link.

Table 9-3 – Vehicle kilometres travelled for freeways and non-freeways, 2036 ‘with project’ versus 2036 ‘no project’

Metric	Time period	Metropolitan Melbourne	North-east
Freeway vehicle kilometres travelled (km)	Daily	55,315,000 (+5%)	8,573,000 (+44%)
	AM peak (2 hour)	7,319,000 (+6%)	1,152,000 (+53%)
	PM peak (2 hour)	7,943,000 (+6%)	1,253,000 (+54%)
Non-freeway vehicle kilometres travelled (km)	Daily	124,413,000 (-1%)	21,920,000 (-4%)
	AM peak (2 hour)	20,124,000 (-1%)	3,463,000 (-3%)
	PM peak (2 hour)	21,398,000 (-1%)	3,639,000 (-4%)

9.2.2 Traffic volumes

Forecast changes to average weekday traffic volumes between the 2036 ‘no project’ and ‘with project’ scenarios are presented in Figure 9-9 to Figure 9-14, with key roads summarised in Table 9-4. Note that EastLink has not been included in the traffic volume assessment as this data is commercially sensitive. The EastLink tunnels have been assessed for performance in the 2036 ‘with project’ scenario through microsimulation modelling, as outlined in Section 9.3.

A summary of the key observations from these forecasts is provided below.

Predicted decreases in traffic volumes:

- Traffic volumes would decrease on almost every road between the M80 Ring Road and Eastern Freeway, as traffic diverts to North East Link. This alleviates congestion for road users in the region, including cars, trucks and bus users, and also improves amenity for pedestrians and cyclists.
- The largest reductions are anticipated on the parallel routes of Rosanna Road (-11,600) and Greensborough Road (reduction of approximately 19,000 vehicles per day).

- The project would provide an additional Yarra River crossing and is therefore predicted to reduce traffic significantly across the five existing crossings at Chandler Highway (-6,100), Burke Road (-7,900), Banksia Street/Manningham Road (-13,300), Fitzsimons Lane (-16,600) and Warrandyte Bridge (-6,200), as well as their feeder routes. This is because a significant proportion of medium and cross-city trips are redistributed away from the arterial road network and onto the freeway network, as North East Link would provide a faster and more direct route to complete these trips. As a result, traffic volumes on a number of roads are predicted to decrease to approximately 2017 levels.
- Traffic volumes are predicted to decrease along feeder routes to the Yarra River crossings, including on Main Road (-4,600), Rosanna Road (-11,600) and Manningham Road east of the Yarra River (-9,000).
- The project is anticipated to remove traffic on roads servicing the La Trobe precinct, including Plenty Road (-9,900), Waiora Road (-7,600), Upper Heidelberg Road (-3,300), Waterdale Road (-3,000) and Kingsbury Drive (-2,600).

Predicted increases in traffic volumes

- Traffic volumes are predicted to increase on some feeder routes to North East Link. Traffic on the M80 Ring Road is predicted to increase by up to 72,000 vehicles per day between Plenty Road and the Greensborough Bypass. The Eastern Freeway is predicted to increase by approximately 10,000 to 95,000 vehicles per day, with the largest increase between Bulleen Road and Doncaster Road. The increase in demand along these two freeways would be accommodated by ITS upgrades and widening works as part of North East Link.
- Traffic volumes are projected to increase near the North East Link interchanges, due to traffic accessing and exiting the project at these locations. These include Grimshaw Street between Watsonia Road and North East Link (+2,700), Greensborough Bypass east of the M80 Ring Road (+10,500) and Watsonia Road (+4,000). The impacts of these changes are discussed further in Section 9.2.3.
- North-south arterial roads just south of the Eastern Freeway are also anticipated to increase. This includes Bulleen Road south of the Eastern Freeway (+4,900), Elgar Road (+3,600), Surrey Road (+2,600) and Springvale Road (+5,700). The impacts of these increases are discussed further in Section 9.2.3.
- Traffic volumes on Hoddle Street are predicted to increase only very slightly (2 per cent) across the day. This is deemed to be a negligible impact, as this falls well within the typical day-to-day fluctuations of general traffic.

Traffic volumes for the AM and PM peaks are provided in Appendix D – Forecast traffic volumes.

Figure 9-9 – Change in total average weekday traffic volumes (AWDT), 2036 'with project' versus 2036 'no project' – study area north

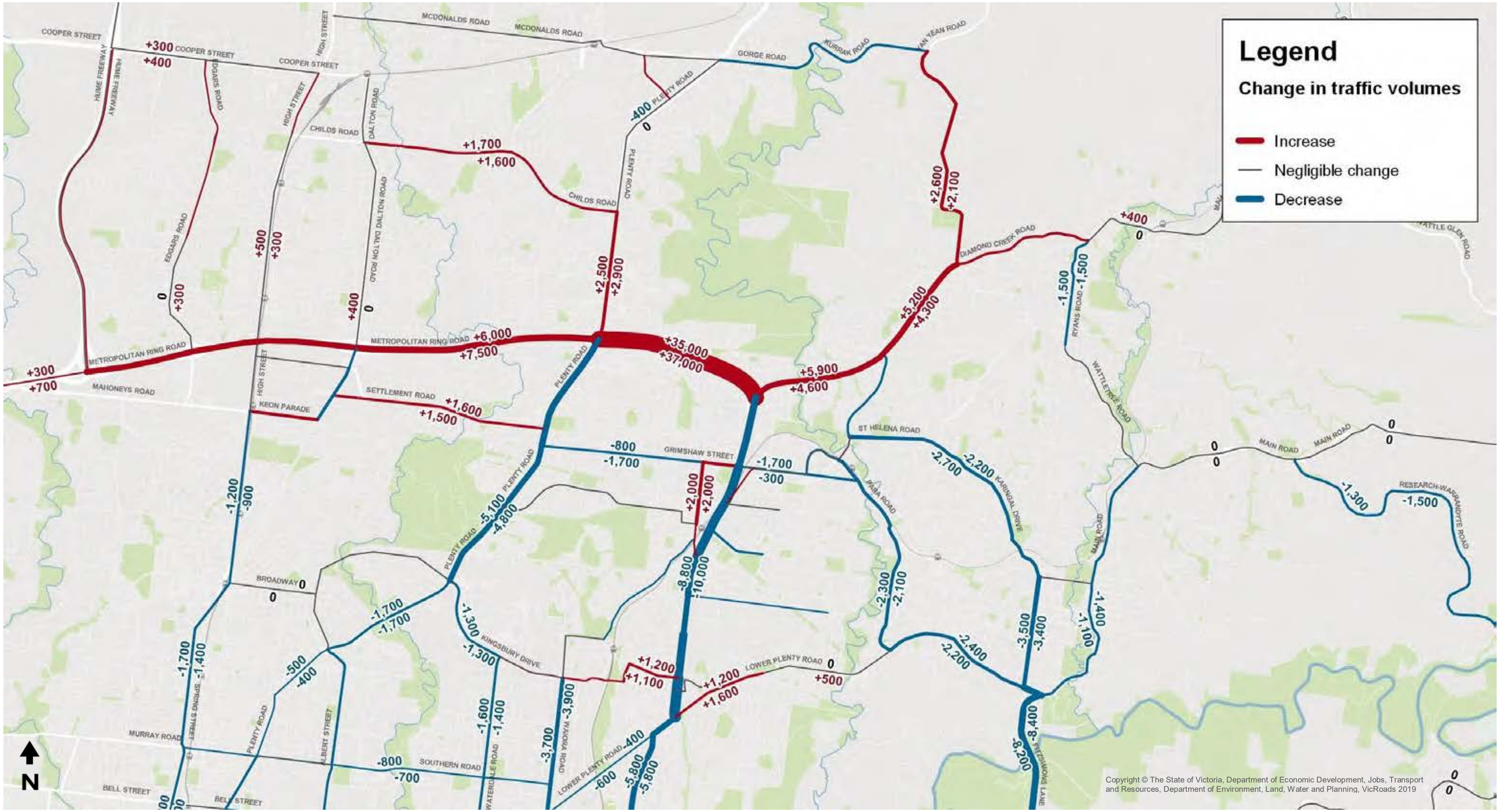


Figure 9-10 – Change in total average weekday traffic volumes (AWDT), 2036 'with project' versus 2036 'no project' – study area south

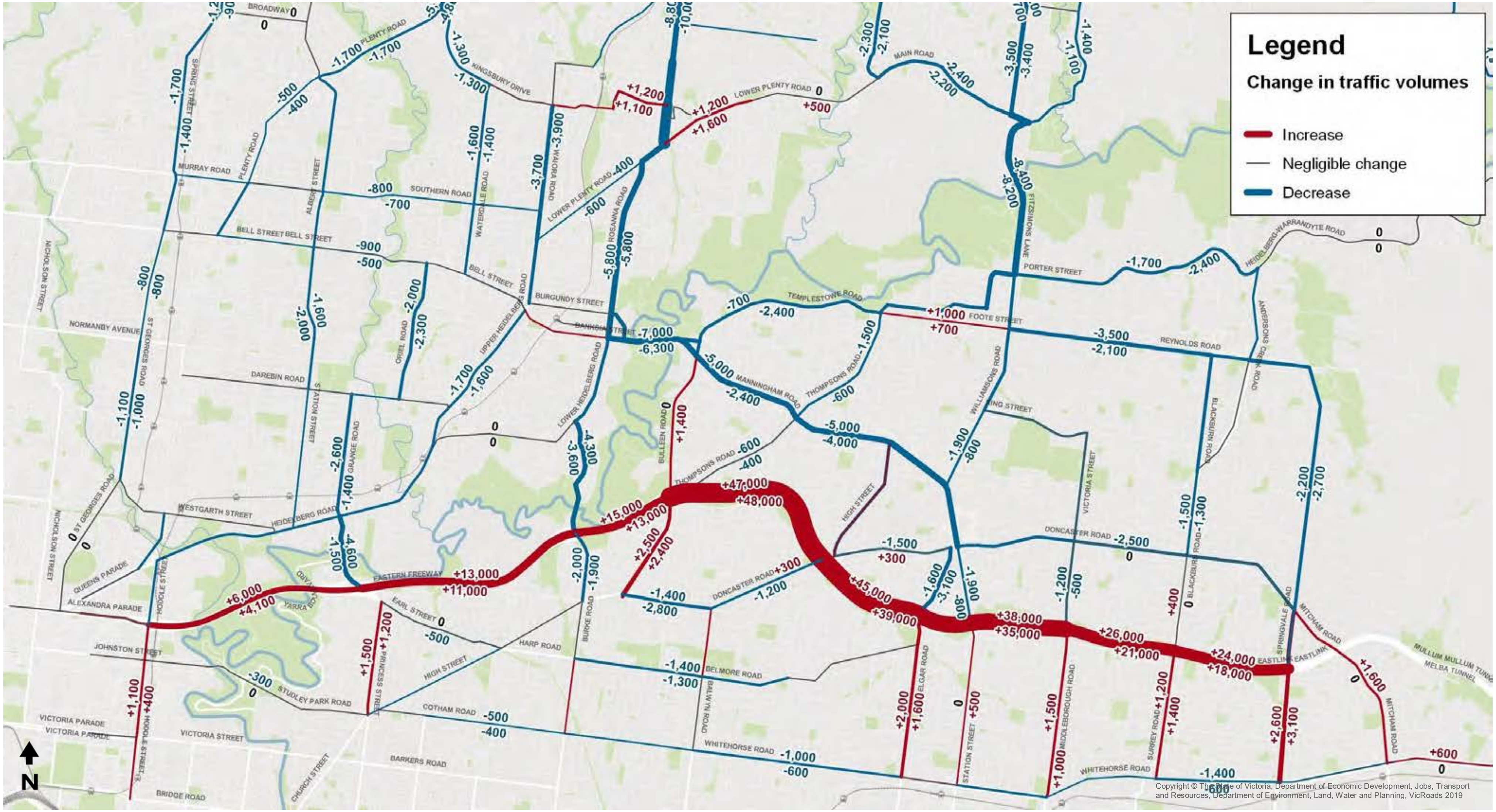


Figure 9-11 – Total average weekday traffic volumes (AWDT), 2036 'with project' versus 2036 'no project' – study area east

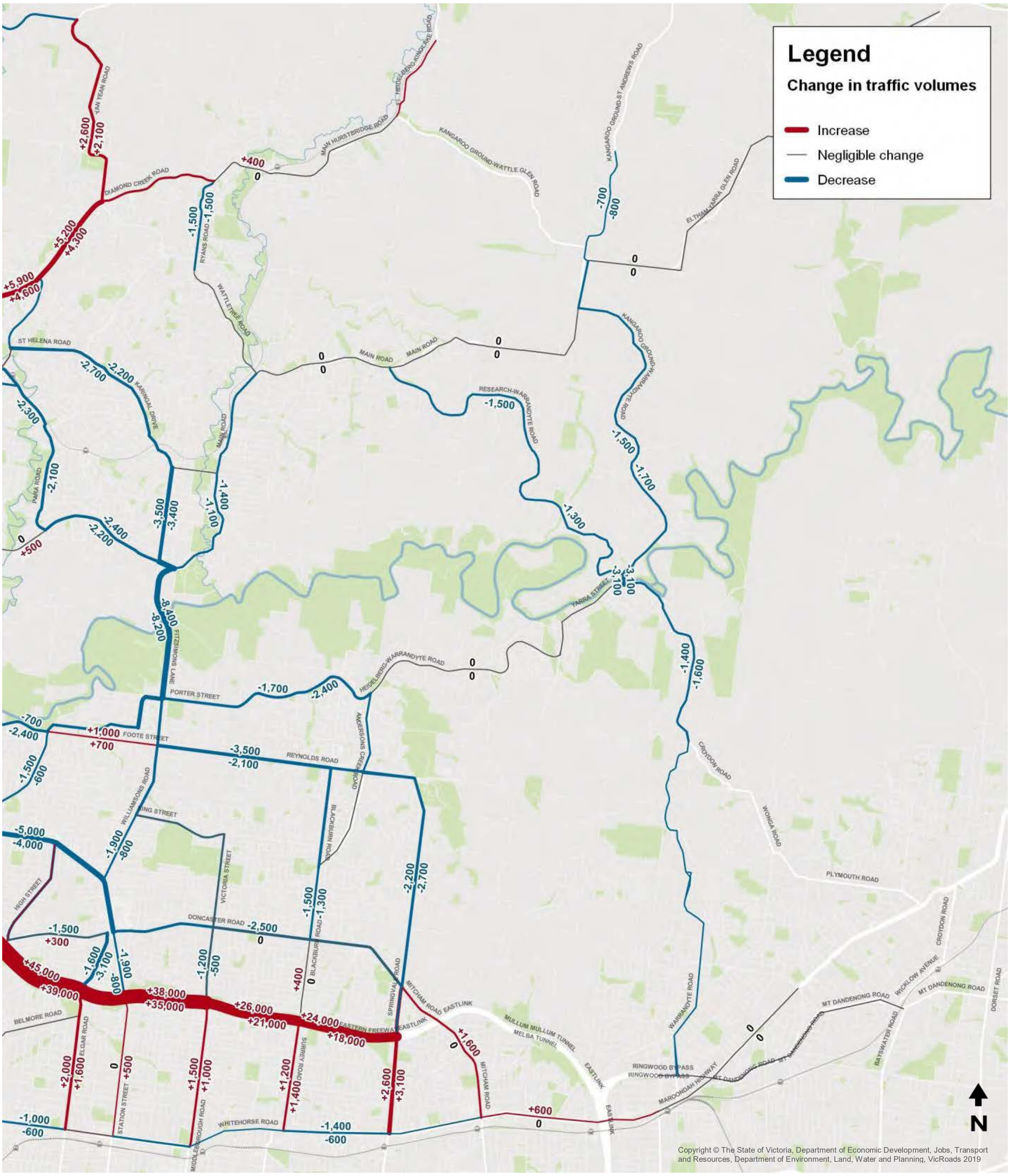


Figure 9-12 – Total average weekday traffic volumes (AWDT), 2036 'with project' – study area north

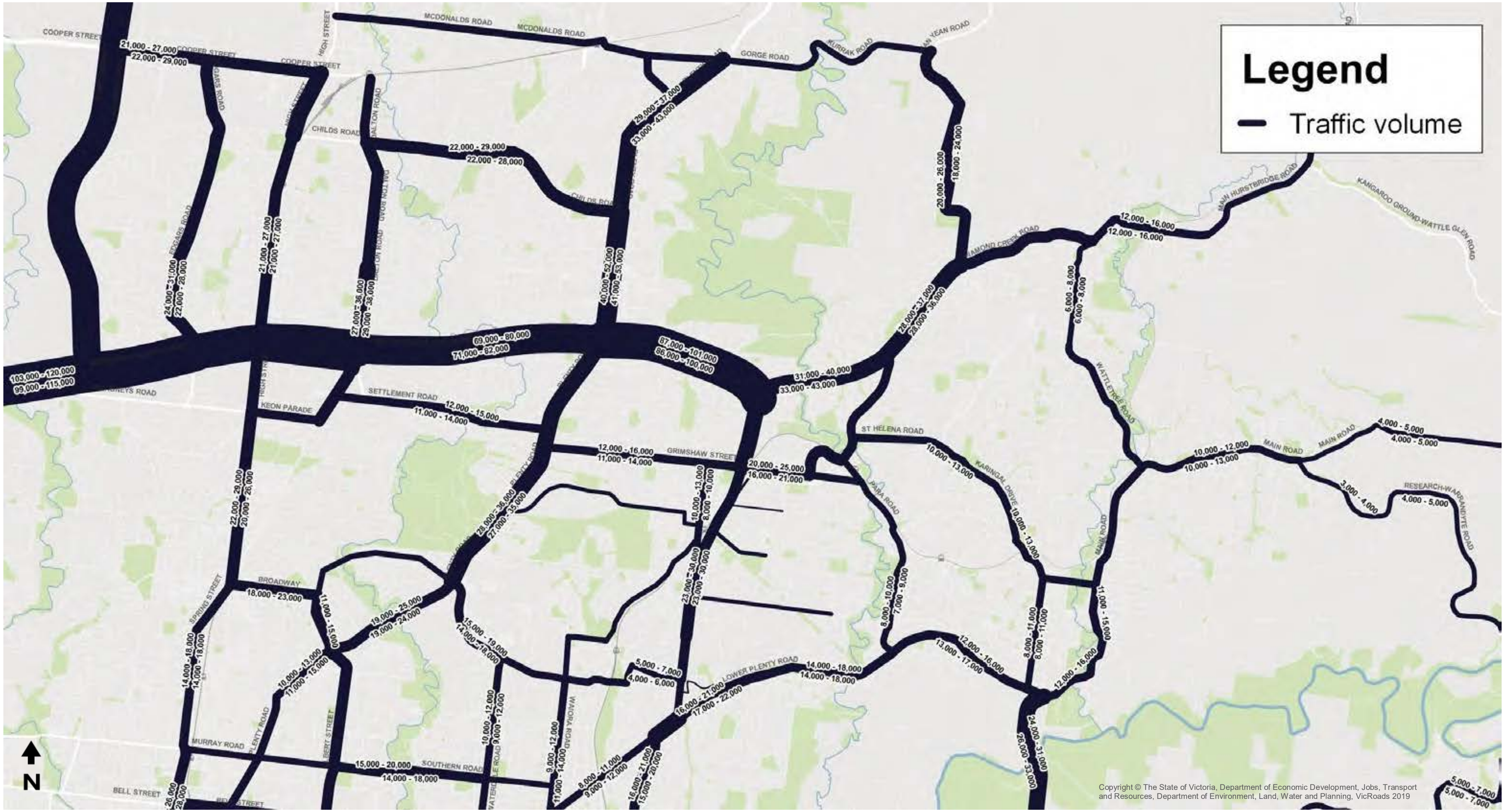


Figure 9-13 – Total average weekday traffic volumes (AWDT), 2036 'with project' – study area south

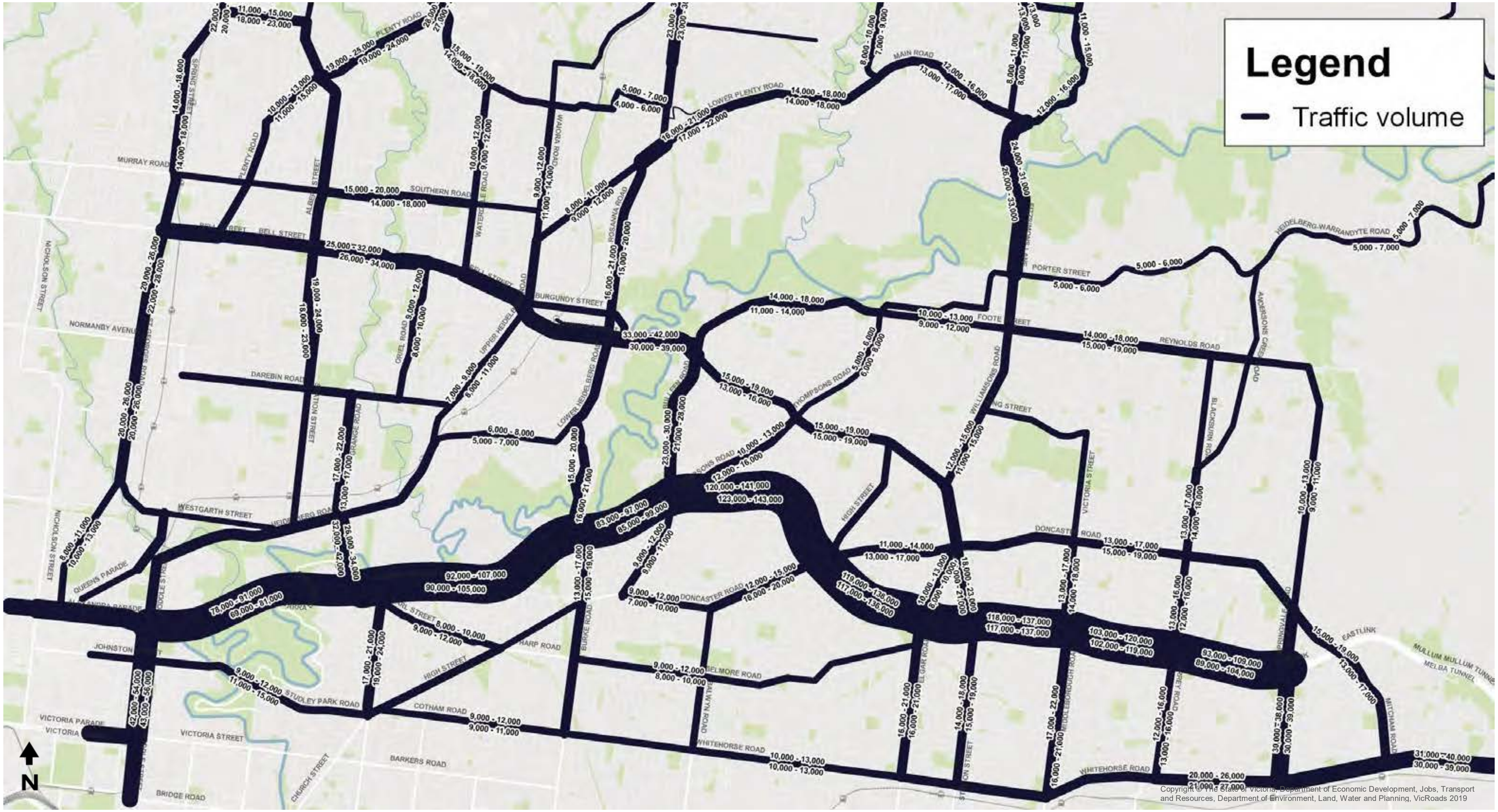


Figure 9-14 – Total average weekday traffic volumes (AWDT), 2036 'with project' – study area east

Table 9-4 – Total traffic volumes (average weekday), 2036 ‘with project’

Name	Location	Direction	2036 ‘with project’ daily volume – one way (24 hour)	2036 ‘with project’ versus 2036 ‘no project’
Banksia St/Manningham Rd	At Yarra River	Eastbound	33,000–42,000	-7,000
Banksia St/Manningham Rd	At Yarra River	Westbound	30,000–39,000	-6,300
Bell St	Station St to Oriel Rd	Eastbound	25,000–32,000	-900
Bell St	Station St to Oriel Rd	Westbound	26,000–34,000	-500
Belmore Rd	Burke Rd to Balwyn Rd	Eastbound	9,000–12,000	-1,400
Belmore Rd	Burke Rd to Balwyn Rd	Westbound	8,000–10,000	-1,300
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Northbound	13,000–17,000	-1,500
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Southbound	14,000–18,000	-1,300
Blackburn Rd	Eastern Fwy to Doncaster Rd	Northbound	13,000–16,000	+400
Blackburn Rd	Eastern Fwy to Doncaster Rd	Southbound	12,000–16,000	Minor change
Bolton St	Bridge St to Main Rd	Northbound	8,000–11,000	-3,500
Bolton St	Bridge St to Main Rd	Southbound	8,000–11,000	-3,400
Broadway	High St to Boldrewood Pde	Eastbound	11,000–15,000	Minor change
Broadway	High St to Boldrewood Pde	Westbound	18,000–23,000	Minor change
Bulleen Rd	Doncaster Rd to Eastern Fwy	Northbound	9,000–12,000	+2,500
Bulleen Rd	Doncaster Rd to Eastern Fwy	Southbound	9,000–11,000	+2,400
Bulleen Rd	Eastern Fwy to Manningham Rd	Northbound	23,000–30,000	Minor change
Bulleen Rd	Eastern Fwy to Manningham Rd	Southbound	21,000–28,000	+1,400
Burke Rd	Doncaster Rd to Eastern Fwy	Northbound	13,000–17,000	-2,000
Burke Rd	Doncaster Rd to Eastern Fwy	Southbound	15,000–19,000	-1,900
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Northbound	15,000–20,000	-3,600
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Southbound	16,000–21,000	-4,300
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Northbound	32,000–42,000	-1,500
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Southbound	26,000–34,000	-4,600
Childs Rd	Dalton Rd to Plenty Rd	Eastbound	22,000–29,000	+1,700
Childs Rd	Dalton Rd to Plenty Rd	Westbound	22,000–28,000	+1,600
Cooper St	Hume Fwy to Edgars Rd	Eastbound	21,000–27,000	+300
Cooper St	Hume Fwy to Edgars Rd	Westbound	22,000–29,000	+400
Cotham Rd	Glenferrie Rd to Burke Rd	Eastbound	9,000–12,000	-500
Cotham Rd	Glenferrie Rd to Burke Rd	Westbound	9,000–11,000	-400
Dalton Rd	North of M80 Ring Road	Northbound	27,000–36,000	+400
Dalton Rd	North of M80 Ring Road	Southbound	29,000–38,000	Minor change
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Eastbound	28,000–37,000	+5,200
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Westbound	28,000–36,000	+4,300
Doncaster Rd	Balwyn Rd to Bulleen Rd	Eastbound	9,000–12,000	-1,400
Doncaster Rd	Balwyn Rd to Bulleen Rd	Westbound	7,000–10,000	-2,800
Doncaster Rd	Balwyn Rd to Eastern Fwy	Eastbound	12,000–15,000	+300
Doncaster Rd	Balwyn Rd to Eastern Fwy	Westbound	16,000–20,000	-1,200
Doncaster Rd	Blackburn Rd to Wetherby Rd	Eastbound	13,000–17,000	-2,500

Name	Location	Direction	2036 ‘with project’ daily volume – one way (24 hour)	2036 ‘with project’ versus 2036 ‘no project’
Doncaster Rd	Blackburn Rd to Wetherby Rd	Westbound	15,000–19,000	Minor change
Doncaster Rd	East of Eastern Fwy	Eastbound	11,000–14,000	-1,500
Doncaster Rd	East of Eastern Fwy	Westbound	13,000–17,000	+300
Earl St	Princess St to Willsmere Rd	Northbound	8,000–10,000	Minor change
Earl St	Princess St to Willsmere Rd	Southbound	9,000–12,000	-500
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Eastbound	103,000–120,000	+26,000
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Westbound	102,000–119,000	+21,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Eastbound	83,000–97,000	+15,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Westbound	85,000–99,000	+13,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Eastbound	92,000–107,000	+13,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Westbound	90,000–105,000	+11,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Eastbound	78,000–91,000	+6,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Westbound	69,000–81,000	+4,100
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Eastbound	120,000–141,000	+47,000
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Westbound	123,000–143,000	+48,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Eastbound	119,000–138,000	+45,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Westbound	117,000–136,000	+39,000
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Eastbound	118,000–137,000	+38,000
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Westbound	117,000–137,000	+35,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Eastbound	93,000–109,000	+24,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Westbound	89,000–104,000	+18,000
Edgars Rd	North of M80 Ring Road	Northbound	24,000–31,000	Minor change
Edgars Rd	North of M80 Ring Road	Southbound	22,000–28,000	+300
Elgar Rd	Belmore Rd to Whitehorse Rd	Northbound	16,000–21,000	+2,000
Elgar Rd	Belmore Rd to Whitehorse Rd	Southbound	16,000–21,000	+1,600
Elgar Rd	North of Eastern Fwy	Northbound	10,000–13,000	-1,600
Elgar Rd	North of Eastern Fwy	Southbound	8,000–10,000	-3,100
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Eastbound	3,000–4,000	Minor change
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Westbound	2,500–3,500	Minor change
Erskine Rd	Ferguson St to Argyle St	Eastbound	5,000–7,000	+1,200
Erskine Rd	Ferguson St to Argyle St	Westbound	4,000–6,000	+1,100
Fitzsimons Ln	At Yarra River	Northbound	26,000–33,000	-8,200
Fitzsimons Ln	At Yarra River	Southbound	24,000–31,000	-8,400
Foote St	West of Fitzsimons Ln	Eastbound	10,000–13,000	+1,000
Foote St	West of Fitzsimons Ln	Westbound	9,000–12,000	+700
Grange Rd	Darebin Rd to Heidelberg Rd	Northbound	17,000–22,000	-2,600
Grange Rd	Darebin Rd to Heidelberg Rd	Southbound	13,000–17,000	-1,400
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Eastbound	31,000–40,000	+5,900

Name	Location	Direction	2036 'with project' daily volume – one way (24 hour)	2036 'with project' versus 2036 'no project'
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Westbound	33,000–43,000	+4,600
Greensborough Rd	South of Watsonia Rd	Northbound	23,000–30,000	-8,800
Greensborough Rd	South of Watsonia Rd	Southbound	23,000–30,000	-10,000
Grimshaw St	Greensborough Hwy to The Circuit	Eastbound	20,000–25,000	-1,700
Grimshaw St	Greensborough Hwy to The Circuit	Westbound	16,000–21,000	-300
Grimshaw St	Plenty Rd to Watsonia Rd	Eastbound	12,000–16,000	-800
Grimshaw St	Plenty Rd to Watsonia Rd	Westbound	11,000–14,000	-1,700
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Northbound	5,000–7,000	Minor change
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Southbound	5,000–7,000	Minor change
High St	Keon Pde to Broadway	Northbound	22,000–29,000	-1,200
High St	Keon Pde to Broadway	Southbound	20,000–26,000	-900
High St	North of Settlement Rd	Northbound	21,000–27,000	+500
High St	North of Settlement Rd	Southbound	21,000–27,000	+300
Hoddle St	Johnston St to Victoria St	Northbound	42,000–54,000	+1,100
Hoddle St	Johnston St to Victoria St	Southbound	43,000–56,000	+400
Hume Fwy	M80 Ring Road to Cooper St	Northbound	60,000–70,000	+700
Hume Fwy	M80 Ring Road to Cooper St	Southbound	60,000–70,000	+500
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Northbound	2,000–3,000	-700
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Southbound	2,000–3,000	-800
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Northbound	8,000–11,000	-3,100
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Southbound	8,000–10,000	-3,100
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Northbound	3,000–4,000	-1,500
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Southbound	3,000–4,000	-1,700
Karingal Drive	East of St Helena Rd	Northbound	10,000–13,000	-2,700
Karingal Drive	East of St Helena Rd	Southbound	10,000–13,000	-2,200
Kingsbury Drive	West of Waterdale Rd	Eastbound	15,000–19,000	-1,300
Kingsbury Drive	West of Waterdale Rd	Westbound	14,000–18,000	-1,300
Lower Heidelberg Rd	Near Ivanhoe Park	Eastbound	6,000–8,000	Minor change
Lower Heidelberg Rd	Near Ivanhoe Park	Westbound	5,000–7,000	Minor change
Lower Plenty Rd	Greensborough Rd to Para Rd	Eastbound	16,000–21,000	+1,200
Lower Plenty Rd	Greensborough Rd to Para Rd	Westbound	17,000–22,000	+1,600
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Eastbound	8,000–11,000	-400
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Westbound	9,000–12,000	-600
M80 Ring Road	Dalton Rd to Plenty Rd	Eastbound	69,000–80,000	+6,000
M80 Ring Road	Dalton Rd to Plenty Rd	Westbound	71,000–82,000	+7,500
M80 Ring Road	Hume Fwy to Sydney Rd	Eastbound	103,000–120,000	+300

Name	Location	Direction	2036 'with project' daily volume – one way (24 hour)	2036 'with project' versus 2036 'no project'
M80 Ring Road	Hume Fwy to Sydney Rd	Westbound	99,000–115,000	+700
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Eastbound	87,000–101,000	+35,000
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Westbound	86,000–100,000	+37,000
Main Hurstbridge Rd	At Diamond Creek	Eastbound	12,000–16,000	+400
Main Hurstbridge Rd	At Diamond Creek	Westbound	12,000–16,000	Minor change
Main Rd	At Diamond Creek	Northbound	12,000–16,000	Minor change
Main Rd	At Diamond Creek	Southbound	11,000–15,000	-1,400
Main Rd	At Plenty River	Eastbound	14,000–18,000	Minor change
Main Rd	At Plenty River	Westbound	14,000–18,000	Minor change
Main Rd	Para Rd to Bolton St	Eastbound	12,000–16,000	-2,400
Main Rd	Para Rd to Bolton St	Westbound	13,000–17,000	-2,200
Main Rd	East of Ingrams Rd	Eastbound	4,000–5,000	Minor change
Main Rd	East of Ingrams Rd	Westbound	4,000–5,000	Minor change
Main Rd	East of Wattletree Rd	Eastbound	10,000–12,000	Minor change
Main Rd	East of Wattletree Rd	Westbound	10,000–13,000	Minor change
Manningham Rd	Bulleen Rd to Thompsons Rd	Eastbound	15,000–19,000	-5,000
Manningham Rd	Bulleen Rd to Thompsons Rd	Westbound	13,000–16,000	-2,400
Manningham Rd	Thompsons Rd to High St	Eastbound	15,000–19,000	-5,000
Manningham Rd	Thompsons Rd to High St	Westbound	15,000–19,000	-4,000
Maroondah Hwy	Mitcham Rd to Eastlink	Eastbound	31,000–40,000	+600
Maroondah Hwy	Mitcham Rd to Eastlink	Westbound	30,000–39,000	Minor change
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Northbound	30,000–39,000	Minor change
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Southbound	31,000–40,000	Minor change
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Northbound	17,000–22,000	+1,500
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Southbound	16,000–21,000	+1,000
Middleborough Rd	North of Eastern Fwy	Northbound	13,000–17,000	-1,200
Middleborough Rd	North of Eastern Fwy	Southbound	14,000–18,000	-500
Mitcham Rd	At Eastern Fwy	Northbound	13,000–17,000	Minor change
Mitcham Rd	At Eastern Fwy	Southbound	15,000–19,000	+1,600
Murray Rd	At Darebin Creek	Eastbound	15,000–20,000	-800
Murray Rd	At Darebin Creek	Westbound	14,000–18,000	-700
Oriel Rd	Bell St to Livingston St	Northbound	9,000–12,000	-2,000
Oriel Rd	Bell St to Livingston St	Southbound	8,000–10,000	-2,300
Para Rd	Rattray Rd to Main Rd	Northbound	8,000–10,000	-2,300
Para Rd	Rattray Rd to Main Rd	Southbound	7,000–9,000	-2,100
Plenty Rd	At Darebin Creek	Eastbound	19,000–25,000	-1,700
Plenty Rd	At Darebin Creek	Westbound	19,000–24,000	-1,700
Plenty Rd	Albert St to Murray Rd	Northbound	10,000–13,000	-500
Plenty Rd	Albert St to Murray Rd	Southbound	11,000–15,000	-400
Plenty Rd	Main Dr to Greenwood Dr	Northbound	28,000–36,000	-5,100

Name	Location	Direction	2036 'with project' daily volume – one way (24 hour)	2036 'with project' versus 2036 'no project'
Plenty Rd	Main Dr to Greenwood Dr	Southbound	27,000–35,000	-4,800
Plenty Rd	McDonalds Rd to Bush Blvd	Northbound	29,000–37,000	-400
Plenty Rd	McDonalds Rd to Bush Blvd	Southbound	33,000–43,000	Minor change
Plenty Rd	North of Mckimmies Rd	Northbound	40,000–52,000	+2,500
Plenty Rd	North of Mckimmies Rd	Southbound	41,000–53,000	+2,900
Princess St	Duke St to Wills St	Northbound	17,000–21,000	+1,500
Princess St	Duke St to Wills St	Southbound	19,000–24,000	+1,200
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Northbound	4,000–5,000	-1,500
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Southbound	3,000–4,000	-1,300
Reynolds Rd	Blackburn Rd to Williamsons Rd	Eastbound	14,000–18,000	-3,500
Reynolds Rd	Blackburn Rd to Williamsons Rd	Westbound	15,000–19,000	-2,100
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Northbound	7,000–9,000	-1,400
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Southbound	6,000–8,000	-1,600
Rosanna Rd	Brown St to Reid St	Northbound	16,000–21,000	-5,800
Rosanna Rd	Brown St to Reid St	Southbound	15,000–20,000	-5,800
Ryans Rd	Diamond Creek Rd to Allendale Rd	Northbound	6,000–8,000	-1,500
Ryans Rd	Diamond Creek Rd to Allendale Rd	Southbound	6,000–8,000	-1,500
Settlement Rd	At Darebin Creek	Eastbound	12,000–15,000	+1,600
Settlement Rd	At Darebin Creek	Westbound	11,000–14,000	+1,500
Spring St	Broadway to Murray Rd	Northbound	14,000–18,000	-1,700
Spring St	Broadway to Murray Rd	Southbound	14,000–18,000	-1,400
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Northbound	10,000–13,000	-2,200
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Southbound	9,000–11,000	-2,700
Springvale Rd	Whitehorse Rd to Eastern Fwy	Northbound	30,000–38,000	+2,600
Springvale Rd	Whitehorse Rd to Eastern Fwy	Southbound	30,000–39,000	+3,100
St Georges Rd	Bell St to Normanby Ave	Northbound	20,000–26,000	-800
St Georges Rd	Bell St to Normanby Ave	Southbound	22,000–28,000	-800
St Georges Rd	Holden St to Alexandra Pde	Northbound	8,000–11,000	Minor change
St Georges Rd	Holden St to Alexandra Pde	Southbound	10,000–13,000	Minor change
St Georges Rd	Normanby Ave to Merri Pde	Northbound	20,000–26,000	-1,100
St Georges Rd	Normanby Ave to Merri Pde	Southbound	20,000–26,000	-1,000
Station St	Bell St to Darebin Rd	Northbound	18,000–23,000	-2,000
Station St	Bell St to Darebin Rd	Southbound	19,000–24,000	-1,600
Station St	Whitehorse Rd to Eastern Fwy	Northbound	14,000–18,000	Minor change
Station St	Whitehorse Rd to Eastern Fwy	Southbound	15,000–19,000	+500
Studley Park Rd	At Yarra River	Eastbound	9,000–12,000	-300
Studley Park Rd	At Yarra River	Westbound	11,000–15,000	Minor change
Surrey Rd	Whitehorse Rd to Eastern Fwy	Northbound	12,000–16,000	+1,200
Surrey Rd	Whitehorse Rd to Eastern Fwy	Southbound	13,000–16,000	+1,400

Name	Location	Direction	2036 ‘with project’ daily volume – one way (24 hour)	2036 ‘with project’ versus 2036 ‘no project’
Templestowe Rd	Near Birrarrung Park	Eastbound	14,000–18,000	-700
Templestowe Rd	Near Birrarrung Park	Westbound	11,000–14,000	-2,400
Thompsons Rd	Manningham Rd to Foote St	Northbound	5,000–6,000	-1,500
Thompsons Rd	Manningham Rd to Foote St	Southbound	6,000–8,000	-600
Thompsons Rd	North-east of Eastern Fwy	Eastbound	10,000–13,000	-600
Thompsons Rd	North-east of Eastern Fwy	Westbound	12,000–16,000	-400
Tram Rd	North of Eastern Fwy	Northbound	16,000–21,000	-800
Tram Rd	North of Eastern Fwy	Southbound	18,000–23,000	-1,900
Upper Heidelberg Rd	Banksia St to Studley Rd	Northbound	7,000–9,000	-1,700
Upper Heidelberg Rd	Banksia St to Studley Rd	Southbound	8,000–11,000	-1,600
Waiora Rd	Southern Rd to Dougharty Rd	Northbound	9,000–12,000	-3,700
Waiora Rd	Southern Rd to Dougharty Rd	Southbound	11,000–14,000	-3,900
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Eastbound	5,000–6,000	-1,700
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Westbound	5,000–6,000	-2,400
Waterdale Rd	Southern Rd to Dougharty Rd	Northbound	10,000–12,000	-1,600
Waterdale Rd	Southern Rd to Dougharty Rd	Southbound	9,000–12,000	-1,400
Watsonia Rd	Princes St to Bungay St	Northbound	10,000–13,000	+2,000
Watsonia Rd	Princes St to Bungay St	Southbound	8,000–10,000	+2,000
Whitehorse Rd	Surrey Rd to Springvale Rd	Eastbound	20,000–26,000	-1,400
Whitehorse Rd	Surrey Rd to Springvale Rd	Westbound	21,000–27,000	-600
Whitehorse Rd	Union Rd to Elgar Rd	Eastbound	10,000–13,000	-1,000
Whitehorse Rd	Union Rd to Elgar Rd	Westbound	10,000–13,000	-600
Williamsons Rd	Manningham Rd to King St	Northbound	12,000–15,000	-1,900
Williamsons Rd	Manningham Rd to King St	Southbound	11,000–15,000	-800
Yan Yean Rd	North of Diamond Creek Rd	Northbound	20,000–26,000	+2,600
Yan Yean Rd	North of Diamond Creek Rd	Southbound	18,000–24,000	+2,100

9.2.3 Traffic impacts

This section summarises the key traffic impacts of North East Link. Ongoing traffic performance monitoring measures are discussed in Section 12.

Yarra River crossings

A comparison of the two-way daily traffic volumes along the existing Yarra River crossings for the 2036 'with project' and 'no project' scenarios is presented in Table 9-5. Total traffic volumes along these links are forecast to decrease by approximately 16 per cent across the day due to the project. The largest decreases in absolute terms are predicted to occur at Manningham Road and Fitzsimons Lane which are anticipated to decrease by approximately 15 per cent and 22 per cent respectively.

Table 9-5 – Daily two-way traffic crossing the Yarra River, 2036 'with project' vs 2036 'no project'

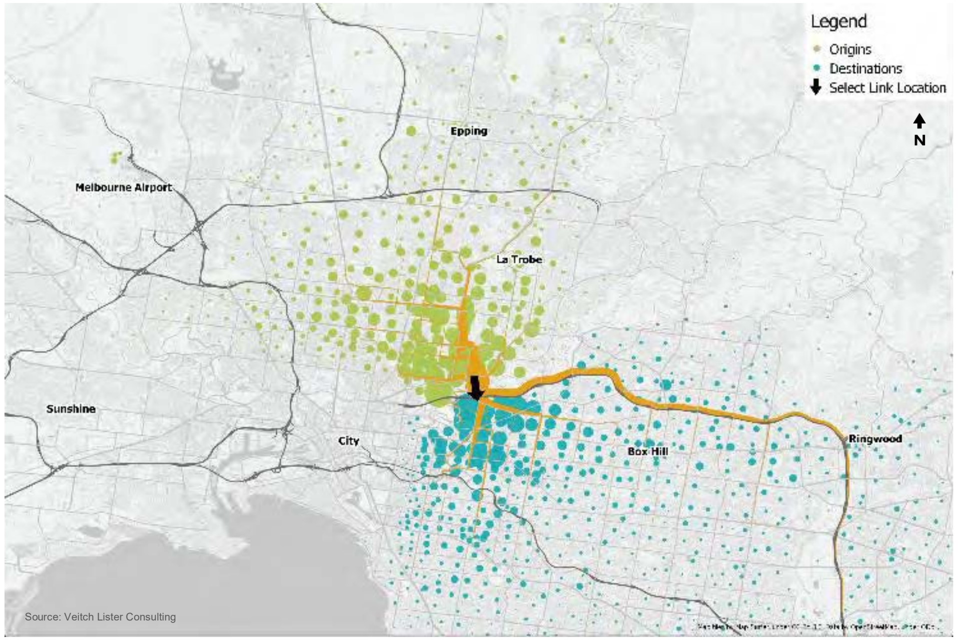
Location	2036 'no project'	2036 'with project'	Change in traffic volumes
Chandler Highway	64,000–82,000	58,000 – 76,000	-8%
Burke Road	38,000–49,000	31,000 – 41,000	-18%
Manningham Road	75,000–96,000	63,000 – 81,000	-15%
Fitzsimons Lane	64,000–83,000	50,000 – 64,000	-22%
Warrandyte Bridge	21,000–27,000	16,000 – 21,000	-25%
Total	**262,000–337,000**	**218,000 – 283,000**	**-16%**

A comparison of the origins and destinations for each river crossing between the 2036 'with project' and 'no project' scenarios is presented in Figure 9-15 to Figure 9-19. A summary is provided below:

- Overall traffic demand for existing river crossings is predicted to decrease, and in each case the demand catchments are anticipated to contract.
- Demand for the Chandler Highway from the outer north is predicted to decrease significantly. In this scenario, trips from north of the M80 Ring Road are less likely to use the arterial road network and Chandler Highway to cross the Yarra River, and more likely to use North East Link and connecting freeways.
- The Burke Road demand catchment generally contracts in the project scenario, with less demand from the areas of Greensborough, Watsonia and north of the M80 Ring Road. Burke Road is also less likely to be used as an access route to the CBD and is more likely to be used for local access towards the eastern suburbs of Balwyn and Kew.
- In the project scenario, the demand catchment for Manningham Road contracts significantly. Demand from the north is predicted to divert away from the Manningham Road corridor, and onto North East Link and its connecting freeways. A higher proportion of local trips are predicted to use Manningham Road in the 'with project' scenario.
- Similarly, demand for Fitzsimons Lane is projected to generally decrease with a reduced concentration of trips from the outer north. Traffic bound for the CBD is also less likely to use Fitzsimons Lane in the 'with project' scenario.
- The traffic demand catchment for the Warrandyte Bridge is predicted to decrease uniformly.

Figure 9-15 – Origins and destinations of southbound traffic using Chandler Highway during the AM peak, 2036 'with project' vs 2036 'no project'

2036 'no project'



2036 'with project'

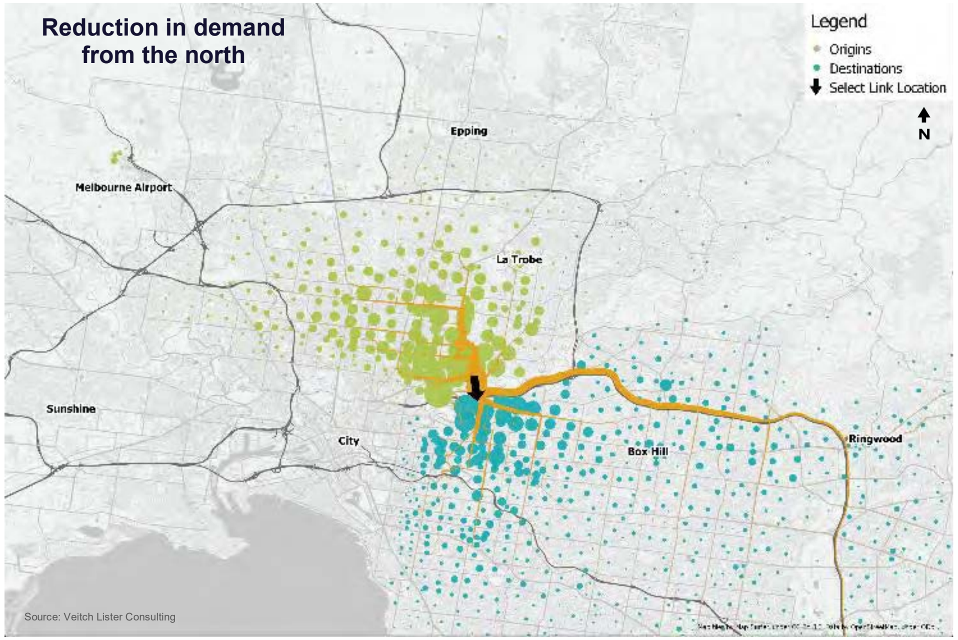
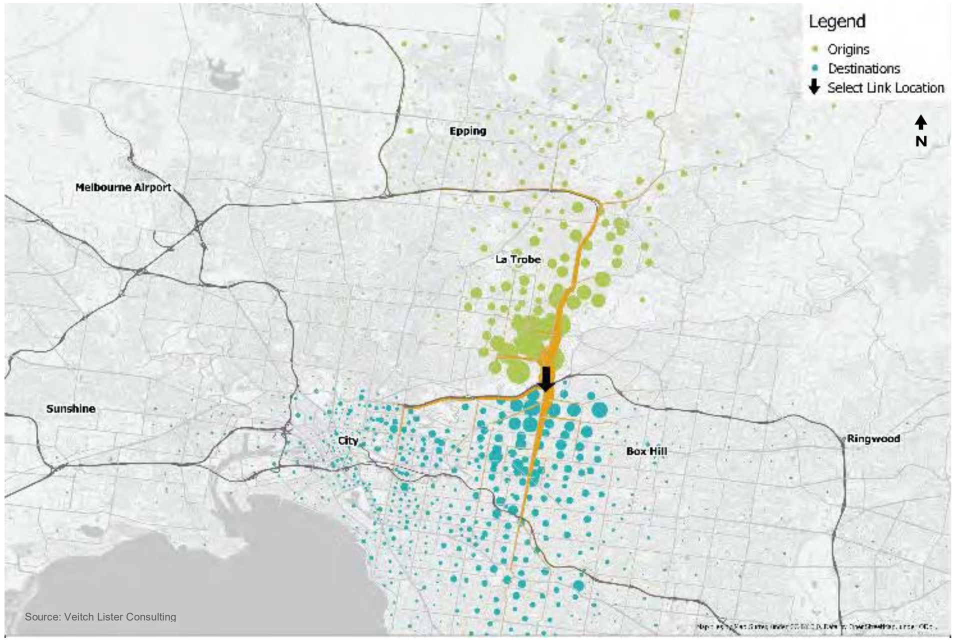


Figure 9-16 – Origins and destinations of southbound traffic using Burke Road during the AM peak, 2036 'with project' vs 2036 'no project'

2036 'no project'



2036 'with project'

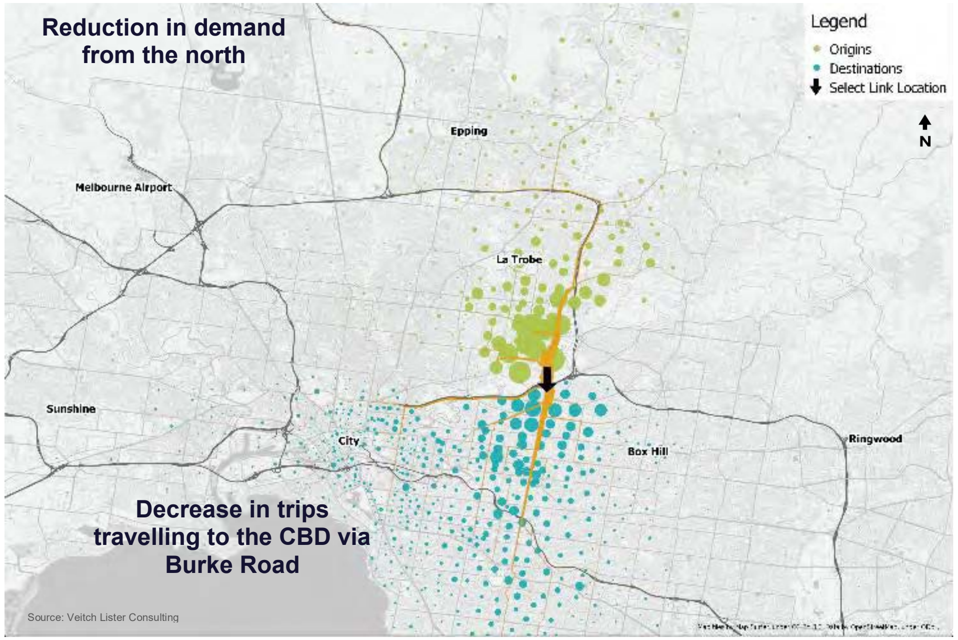
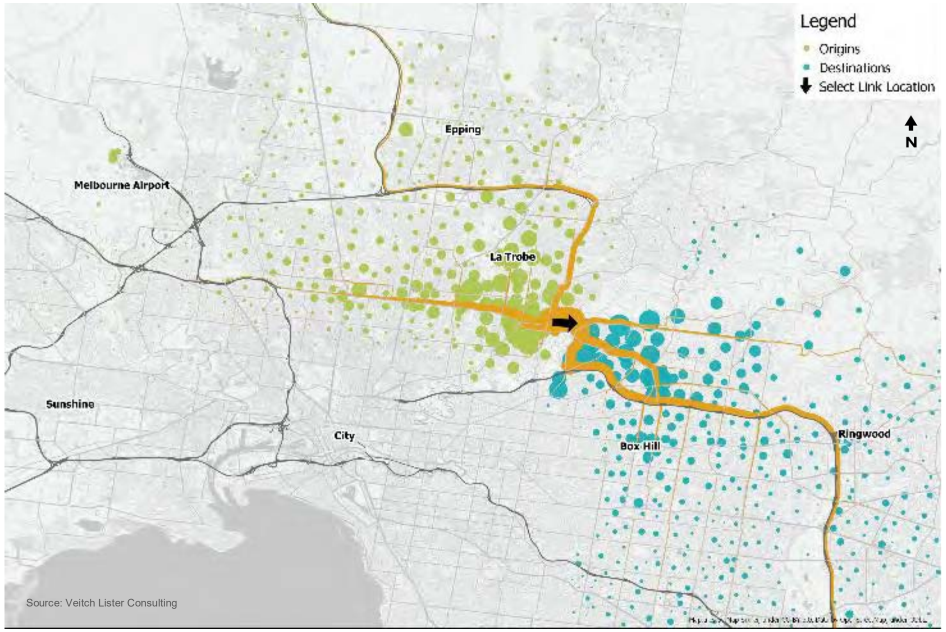


Figure 9-17 – Origins and destinations of southbound traffic using Manningham Road during the AM peak, 2036 'with project' vs 2036 'no project'

2036 'no project'



2036 'with project'

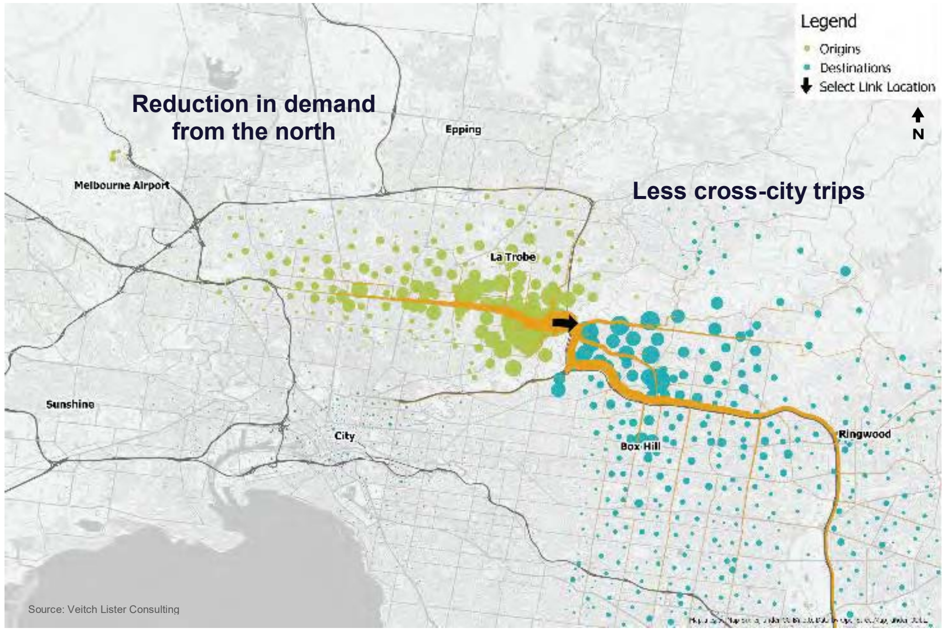
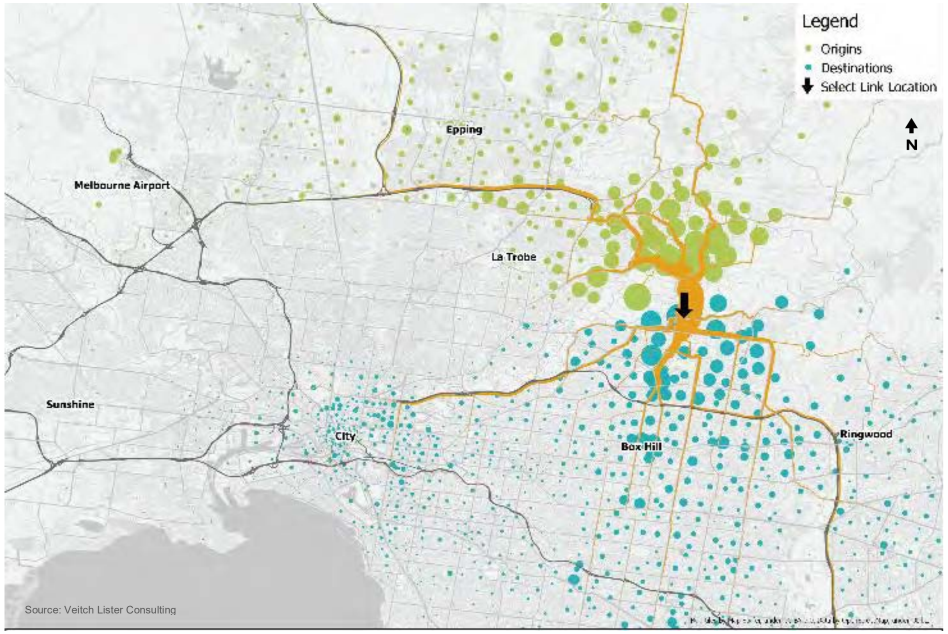


Figure 9-18 – Origins and destinations of southbound traffic using Fitzsimons Lane during the AM peak, 2036 ‘with project’ vs 2036 ‘no project’

2036 ‘no project’



2036 ‘with project’

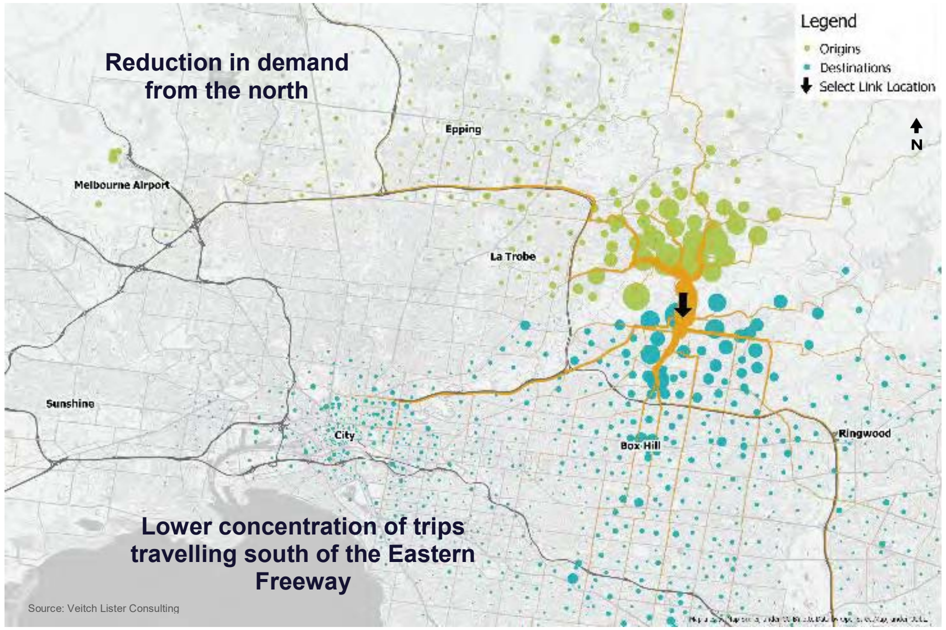
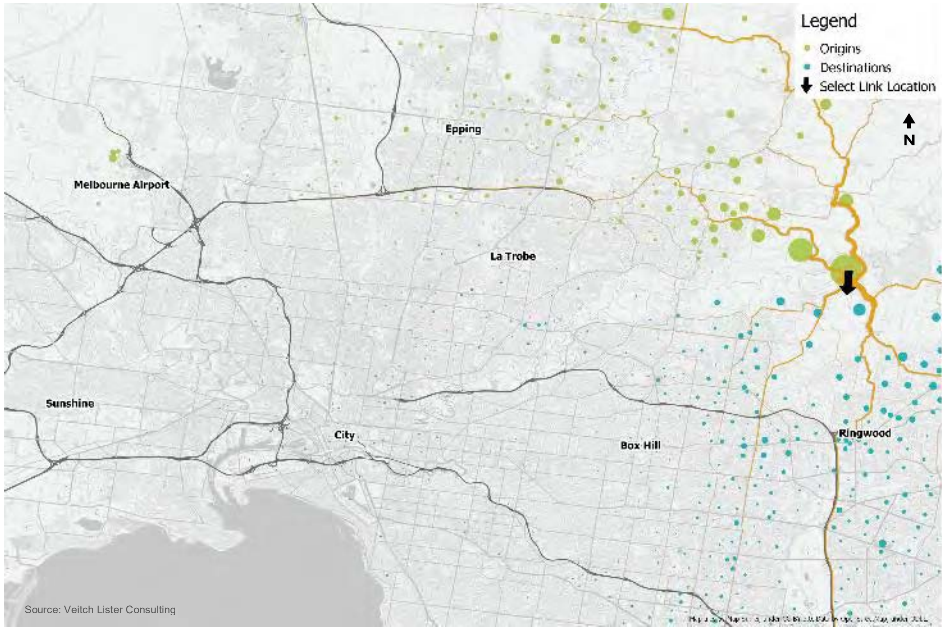
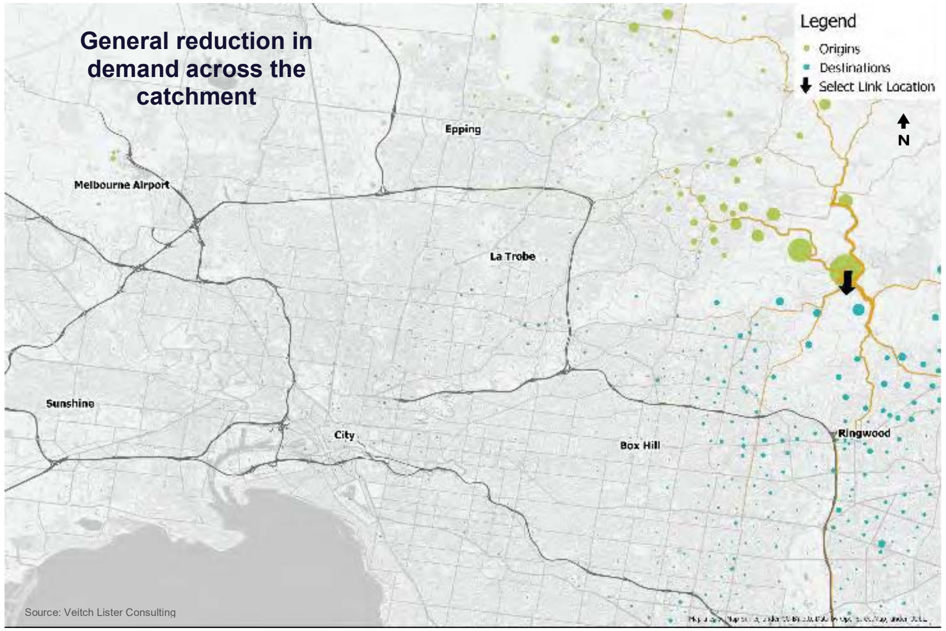


Figure 9-19 – Origins and destinations of southbound traffic using Warrandyte Bridge during the AM peak, 2036 ‘with project’ vs 2036 ‘no project’

2036 ‘no project’



2036 ‘with project’



Key northern impacts

Traffic volumes north of the Yarra River are generally forecast to decrease in the 2036 'with project' scenario. The projected change in vehicle kilometres travelled on arterial and local roads for municipalities in this region is presented in Table 9-6. North East Link is anticipated to decrease vehicle travel on arterial and local roads for the municipalities of Banyule (-14 per cent), Darebin (-5 per cent) and Nillumbik (-10 per cent). A negligible change is predicted for Whittlesea (+1 per cent). This small increase is due to traffic from the north using the arterial road network to access the M80 Ring Road and North East Link.

Table 9-6 – Change in daily vehicle kilometres travelled along arterial and local roads in northern LGAs – 2036 'with project' vs 2036 'no project'

LGA	Daily vehicle kilometres travelled – local and arterial roads
Banyule	-14%
Darebin	-5%
Nillumbik	-10%
Whittlesea	+1%

Due to the general diversion of traffic away from arterial and local roads, several are intended to receive a downgraded General Traffic category with the implementation of the project, as summarised in Table 9-7. Each of the listed roads are proposed to be downgraded from 'GT2' to 'GT3' category primarily due to the reduction in traffic demand and freight network functions. This change means there is a greater focus on servicing local municipalities in the 'with project' scenario.

Table 9-7 – General Traffic categories which change in the 'with project' scenario

		Proposed General Traffic category	
Name	Location	'No project' scenario	'With project' scenario
Bulleen Road	Manningham Road to Eastern Freeway	GT 2	GT 3
Greensborough Bypass	M80 Ring Road to Watsonia Road	GT 2	GT 3
Greensborough Road	Watsonia Road to Lower Plenty Road	GT 2	GT 3
Rosanna Road	Lower Plenty Road to Banksia Street	GT 2	GT 3

The projected two-way, daily volume changes near the M80 Ring Road and Grimshaw Street interchanges are presented in Table 9-8.

The M80 Ring Road between Plenty Road and the Greensborough Bypass is forecast to increase by approximately 72,000 vehicles per day, across both directions. This demand would be accommodated by additional lanes in both directions and the provision of a collector-distributor between Greensborough Bypass/North East Link and Plenty Road in the westbound direction.

The Greensborough Bypass is forecast to increase by approximately 10,500 vehicles per day, across both directions. This demand would be accommodated by widening and upgrades to the Greensborough Bypass, which would provide additional capacity between the M80 Ring Road and Diamond Creek Road.

Daily traffic volumes along Grimshaw Street (west of North East Link) and Watsonia Road are both predicted to increase, by 2,700 and 4,000 per day respectively. This additional demand would be generated by traffic bound for the Grimshaw Street interchange to access North East Link.

Table 9-8 – Change in total daily traffic volumes along the M80 Ring Road/North East Link corridor, 2036 'with project' vs 2036 'no project' (two-way)

Road Name	Location	Forecast change in daily total traffic volume, two-way
M80 Ring Road	Between Plenty Road and Greensborough Bypass	+72,000
Greensborough Bypass	East of M80 Ring Road	+10,500
Grimshaw Street	East of North East Link	-2,000
	West of North East Link	+2,700
Watsonia Road	Between Grimshaw Street and Greensborough Bypass	+4,000
Erskine Road	West of Greensborough Road	+2,300

Forecast traffic along the M80 Ring Road, Greensborough Bypass, Grimshaw Street and Watsonia Road are presented in Figure 9-20 to Figure 9-24. Each chart provides the 2017, 2036 'no project' and 2036 'with project' traffic volumes across the AM peak, PM peak, off-peak and across the day (24 hours). Key observations are:

- Traffic volumes on the M80 Ring Road are forecast to increase substantially in the 'with project' scenario due to the additional lanes provided as part of the project. Most of the additional traffic is anticipated to occur in the off-peak period.
- The Greensborough Bypass is also predicted to increase in the 'with project' scenario, due to the inclusion of an additional lane in each direction between the M80 Ring Road and Diamond Creek Road. Again, most of the additional traffic is anticipated to occur in the off-peak period.
- Forecast traffic volume growth along Grimshaw Street west of Greensborough Bypass is most concentrated in the off-peak. Traffic volumes along Grimshaw Street east of Greensborough Bypass are forecast to decrease slightly across the day in the 2036 'with project' scenario.
- The growth in traffic demand along Watsonia Road and Erskine Road are similarly forecast to mostly occur in the off-peak periods.
- Grimshaw Street and Watsonia Road are anticipated to operate without a material increase in congestion or delay in the peaks due to the limited volume increase predicted during these periods. However, signalised intersections may need to be re-phased to allow for the changes in traffic patterns and distributions. It is anticipated that VicRoads will undertake this as part of a network review when North East Link is opened.

Figure 9-20 – Traffic volumes by time period – M80 Ring Road, east of Plenty Road, eastbound

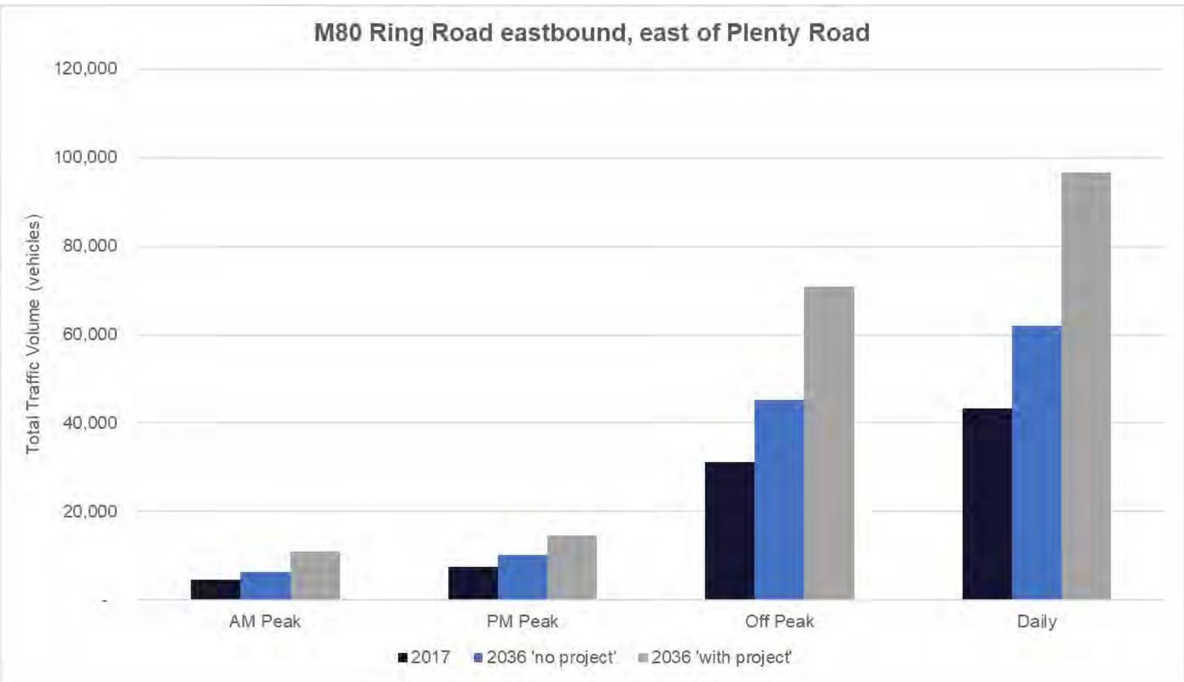


Figure 9-21 – Traffic volumes by time period – Greensborough Bypass, east of M80 Ring Road, westbound

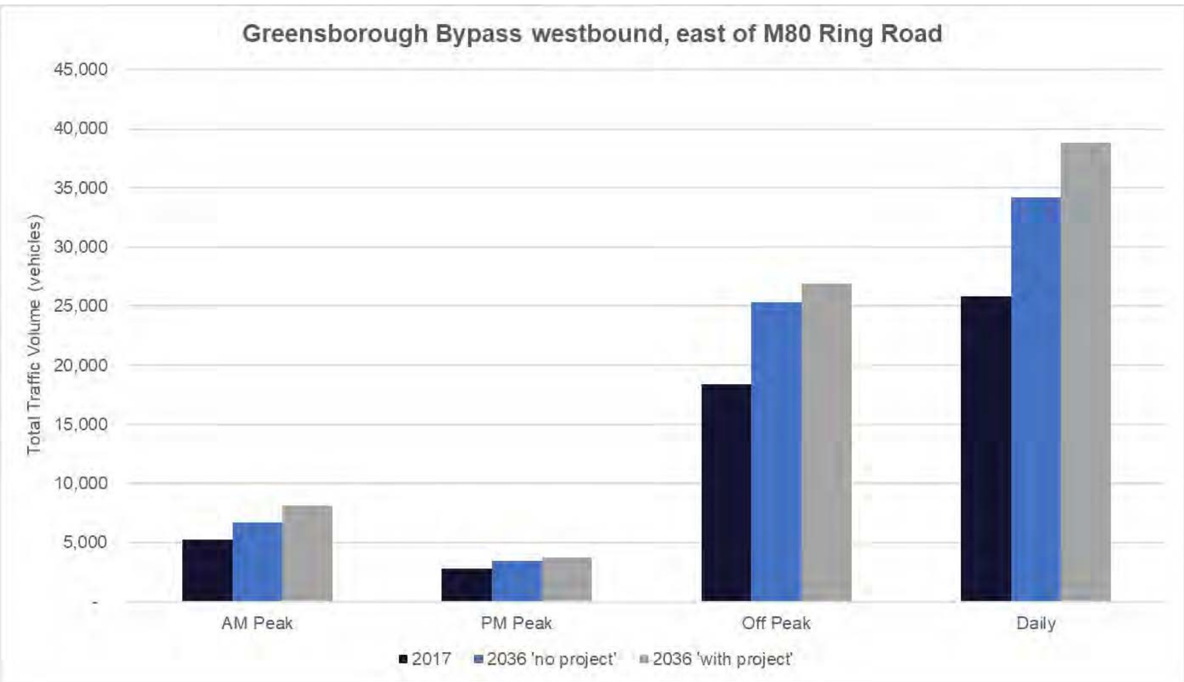


Figure 9-22 – Traffic volumes by time period – Grimshaw Street, west of Greensborough Bypass, eastbound

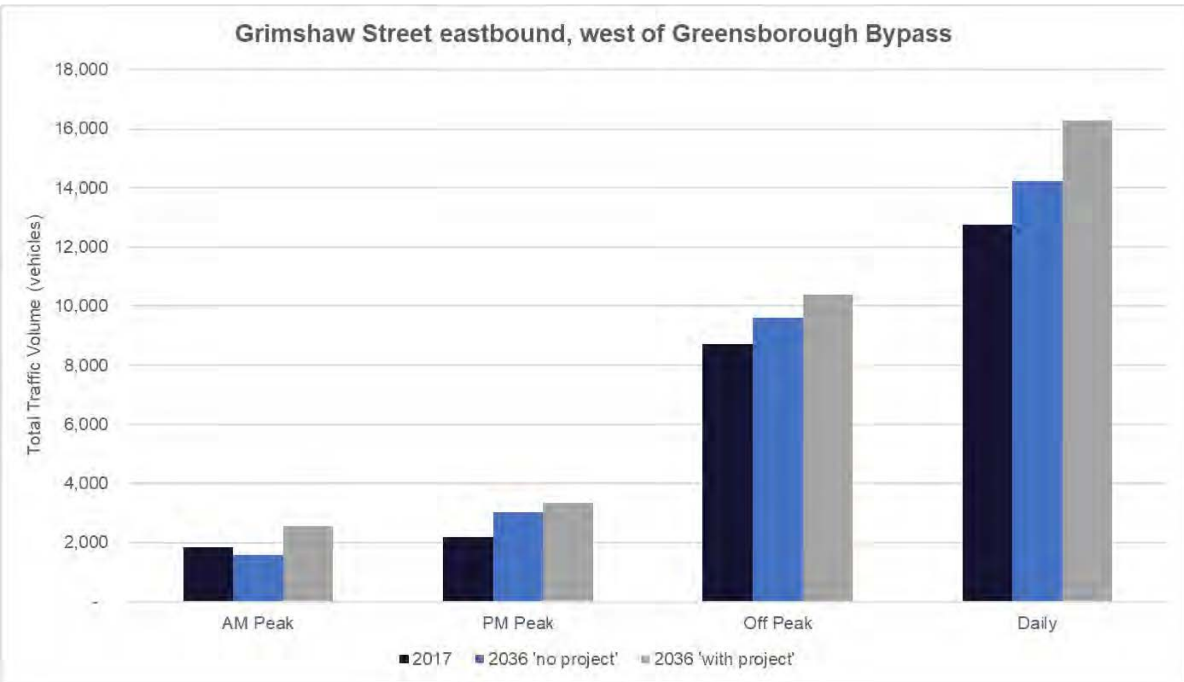


Figure 9-23 – Traffic volumes by time period – Grimshaw Street, east of Greensborough Bypass, westbound

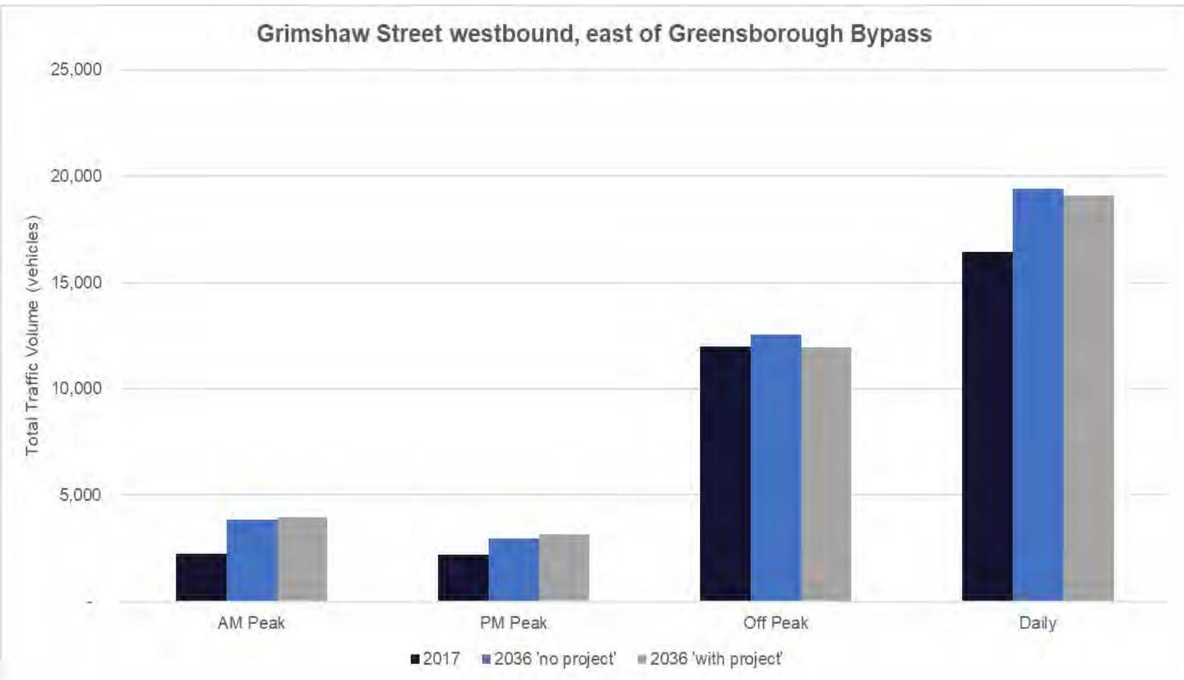


Figure 9-24 – Traffic volumes by time period – Watsonia Road, south of Grimshaw Street, northbound

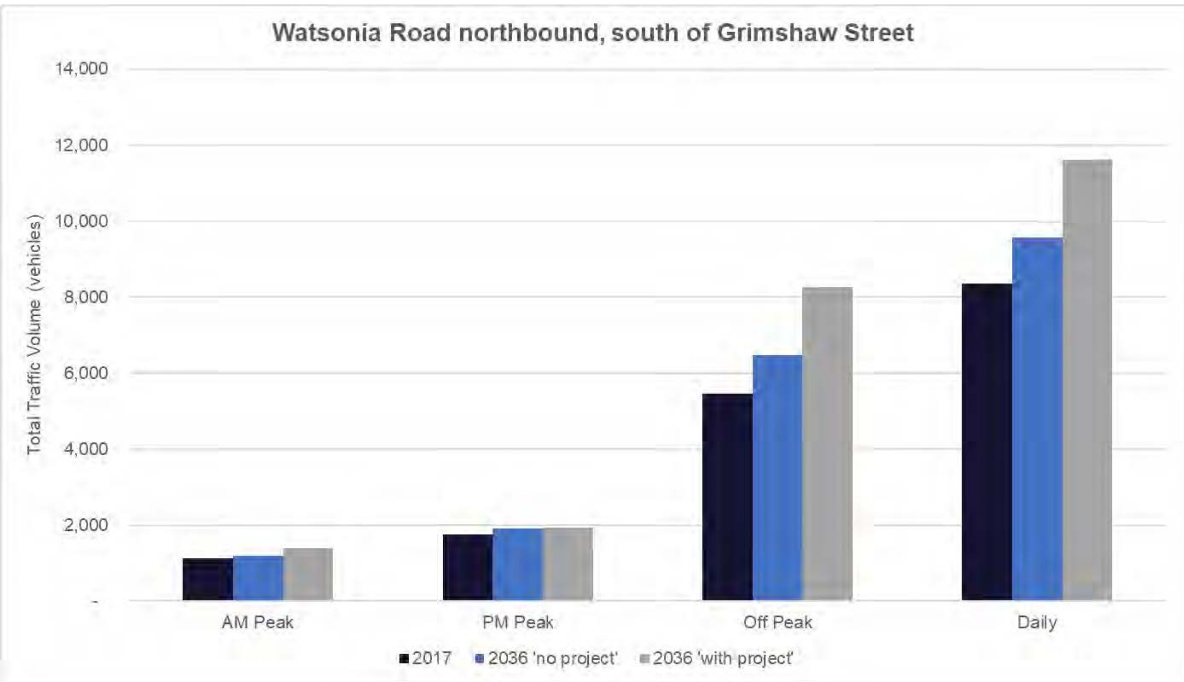
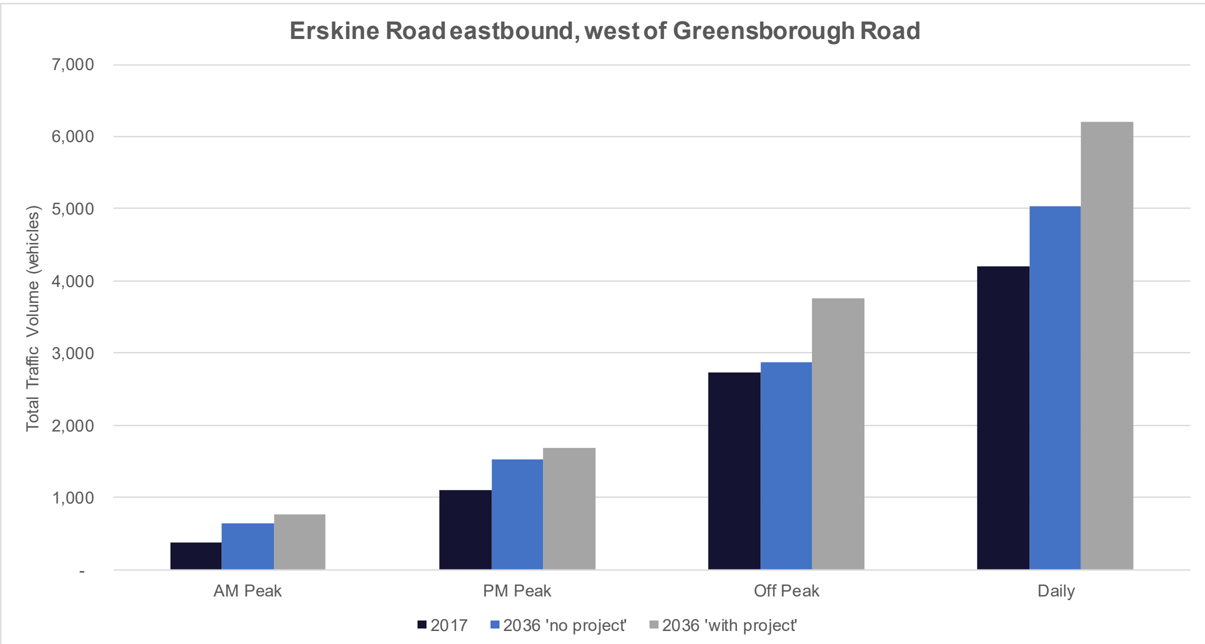


Figure 9-25 – Traffic volumes by time period – Erskine Road, west of Greensborough Road, eastbound



Erskine Road analysis

Additional analysis was undertaken along Erskine Road due to the predicted increases in traffic with North East Link. This analysis was prepared to determine if traffic from the side roads could still access Erskine Road in the peak periods with the increase in predicted traffic volumes. The Austroads Guide to Traffic Management Part 2 provides guidance on the assessment of the practical absorption capacity of a road, that is, how much traffic the road could accommodate turning out from a side road. The assessment undertaken considers the worst-case scenario, which is all vehicles from the side road attempting to turn right onto Erskine Road.

In the 2036 'no project' scenario, in the PM peak period (which is the critical peak at this location) the two-way volumes along Erskine Road are approximately 1,250 vehicles per hour. With this volume of traffic, Erskine Road could accommodate approximately 170 vehicles an hour turning right from a side road. In the 2036 'with project' scenario, two-way traffic volumes are predicted to increase to approximately 1,380 per hour. This reduces the amount of traffic that Erskine Road could accommodate turning into it from a side road to 120 vehicles an hour.

This assessment has been taken at the eastern end of Erskine Road and as such, the forecast volumes on Erskine Road already include those turning out of roads such as Carwarp Street, Argyle Street, Ferguson Street, Munro Street and Braid Hill Road. Given the limited catchment of the remaining roads, it is unlikely they would generate over 120 right turns per hour in the PM peak. As such, it is considered that the predicted increases along Erskine Road will not adversely impact the ability of vehicles to turn onto it from side roads.

M80 Ring Road redistribution

Further analysis was undertaken on the traffic movements along the M80 Ring Road interchanges at Plenty Road and Greensborough Bypass/North East Link. The analysis was undertaken to further understand the projected 72,000 increase in daily traffic volumes along the M80 Ring Road between Plenty Road and Greensborough Bypass (as per Figure 9-9). A summary of the changes between the 'with project' and 'no project' for each turning movement is presented in Figure 9-26.

At the M80 Ring Road/Greensborough Bypass/North East Link interchange, most movements are anticipated to increase due to the additional capacity along each of the intersecting roads. The exception to this is the M80 Ring Road/Greensborough Bypass movement which remains approximately static between the two scenarios. The largest increase is anticipated between the M80 Ring Road and North East Link, where the additional demand is attracted to the accessibility of the new project corridor.

A large decrease in traffic movements is predicted between Plenty Road (both north and south of the freeway) and the M80 Ring Road west of the Plenty Road interchange. Eastbound traffic along the M80 Ring Road approaching the interchange is less likely to exit at Plenty Road, and is more likely to continue travelling east towards North East Link and the Greensborough Bypass. Traffic volumes along Plenty Road are predicted to decrease overall, and the remaining traffic is more likely to use the M80 Ring Road east of the interchange. This reflects a general diversion of Plenty Road traffic to the North East Link corridor. Westbound traffic along the M80 Ring Road approaching the interchange is also predicted to increase overall, with the volumes to mostly continue along the freeway or exit at Plenty Road to travel north.

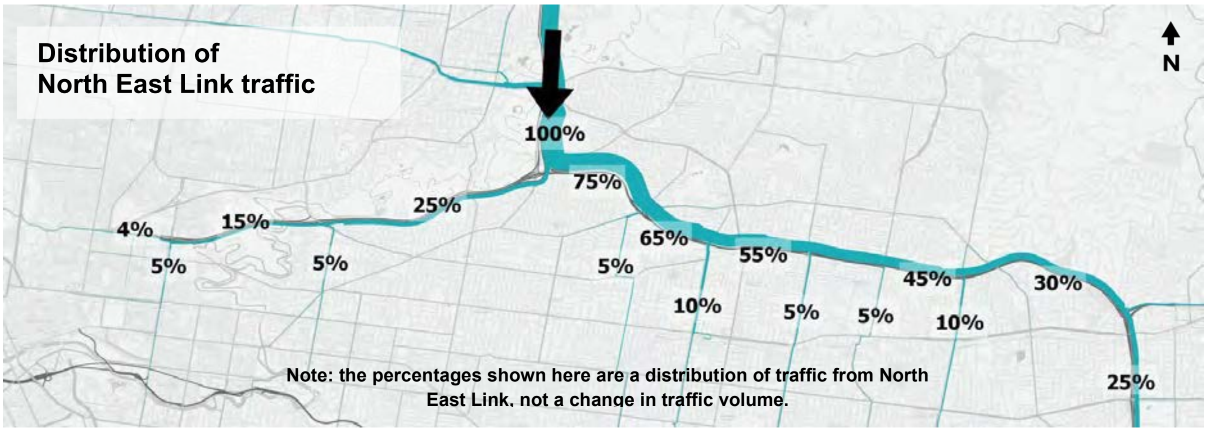
Figure 9-26 – Daily traffic movements between the M80 Ring Road Plenty Road and Greensborough Bypass interchanges

Key southern impacts

Further analysis of modelling results shows that traffic demand for North East Link south of the Yarra River would be primarily from the eastern suburbs. Approximately 75 per cent of southbound North East Link traffic is predicted to travel east along the Eastern Freeway. This is presented in Figure 9-27 which shows the predicted destinations for southbound North East Link traffic. Note the percentages show the distribution of traffic from North East Link, not a percentage change in traffic volume.

The figure shows that approximately 30 per cent of North East Link traffic would continue to the EastLink tunnels and 45 per cent would enter or exit the Eastern Freeway between Doncaster Road and Springvale Road. Only 5 per cent of traffic on North East Link would be destined for Hoddle Street.

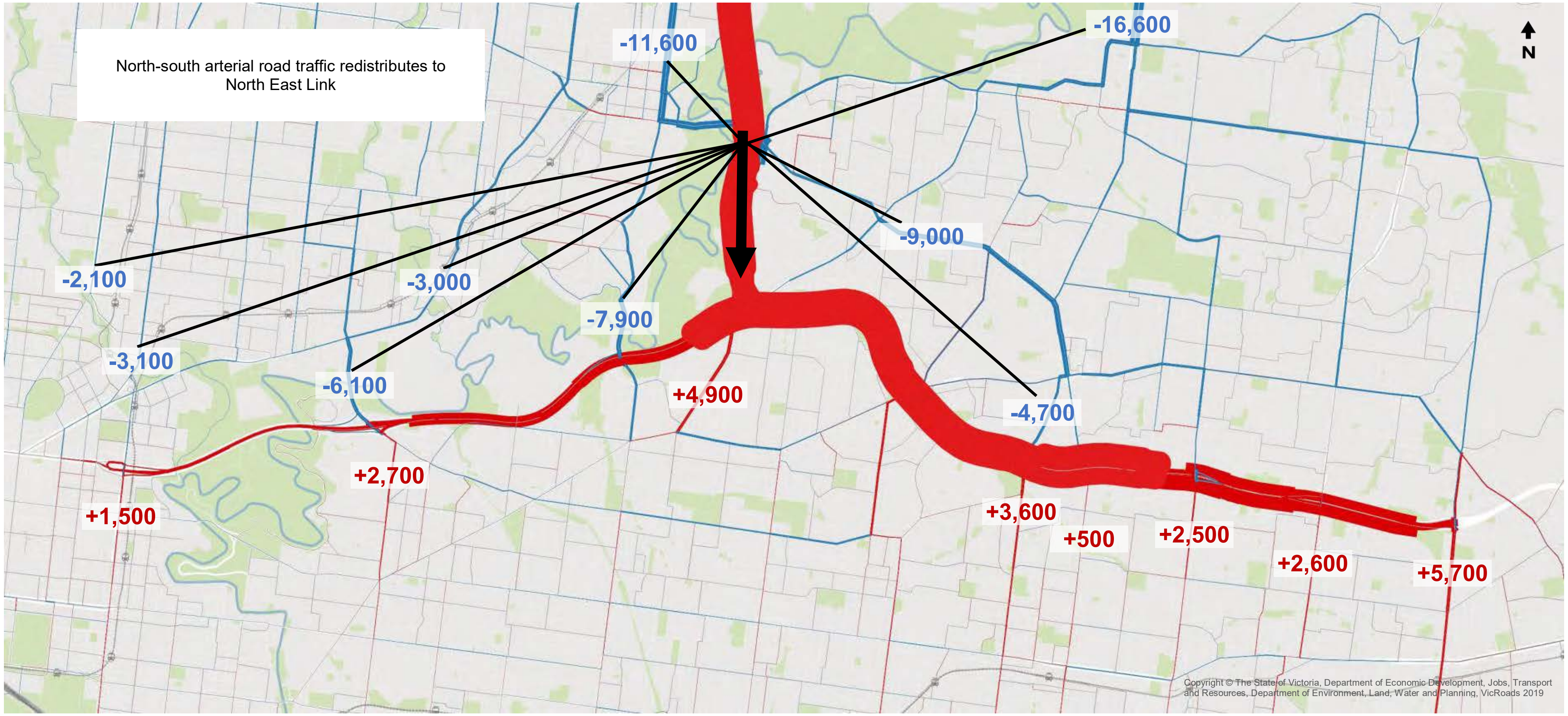
Figure 9-27 – Distribution of southbound North East Link traffic using the Eastern Freeway, 2036 'with project'



The resultant traffic changes in the vicinity of the Eastern Freeway are presented in Figure 9-28. Key observations include:

- In general, traffic volumes on north-south arterial roads north of the Eastern Freeway are projected to decrease as North East Link would provide an alternative crossing over the Yarra River.
- Traffic volumes at the western end of the Eastern Freeway (near Hoddle Street) are forecast to increase slightly with the project. This is due to traffic redistributing from arterial roads such as High Street and Rosanna Road to North East Link and the Eastern Freeway. As these trips already existed in the 'no project' scenario, there is only a very small net increase in traffic at the city end, with no change in the CBD. Hoddle Street just is forecast to increase by only 2 per cent across the day, which is within the margin of day-to-day traffic variability.
- The increases on the Eastern Freeway near Hoddle Street are occurring outside peak periods. In the inbound direction, the increases occur outside the AM peak when there is spare capacity. Likewise, in the outbound direction traffic volume increases occur outside the PM peak period.
- As a significant proportion of North East Link's traffic demand is to/from the eastern suburbs, there is an increase in traffic predicted on some arterial roads south of the Eastern Freeway. Traffic volumes along some east-west arterials in the Templestowe/Doncaster area are also predicted to decrease, such as Reynolds Road, Templestowe Road and Doncaster Road. This is likely due to traffic diverting away from arterials and onto the Eastern Freeway to access the region.

Figure 9-28 – Daily traffic redistribution near the Eastern Freeway, 2036 ‘with project’ vs 2036 ‘no project’



Further analysis was undertaken on the north-south arterial roads south of the Eastern Freeway, where traffic volumes are anticipated to increase.

Estimated changes to southbound traffic along Bulleen Road, Greythorn Road, Elgar Road, Station Street, Middleborough Road, Surrey Road and Springvale Road south of the Eastern Freeway are presented in Figure 9-29 to Figure 9-35. Each chart provides the 2017, 2036 ‘no project’ and 2036 ‘with project’ traffic volumes for the AM peak, PM peak, off-peak (outside the AM or PM peak), and across the day (24 hours).

The charts show that while daily volumes are forecast to increase across these roads, the growth in the peak periods is expected to be minimal. The majority of the growth in traffic is anticipated to occur in the off-peak period where there is spare capacity on the road network. As such, the roads are anticipated to operate without a material increase in congestion or delays in the peaks. However, signalised intersections may need to be re-phased to allow for the changes in traffic patterns and distributions. It is anticipated that VicRoads will undertake this network integration review.

Figure 9-29 – Traffic volumes by time period – Bulleen Road south of the Eastern Freeway, southbound

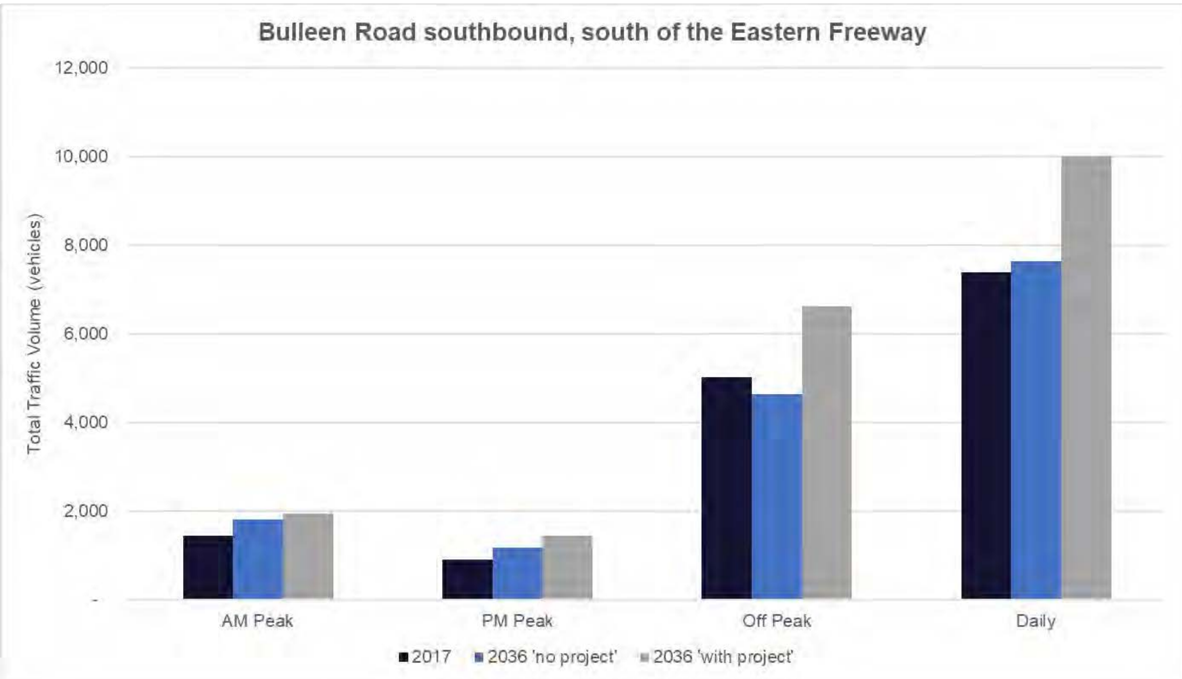


Figure 9-30 – Traffic volumes by time period – Greythorn Road approaching Belmore Road, southbound

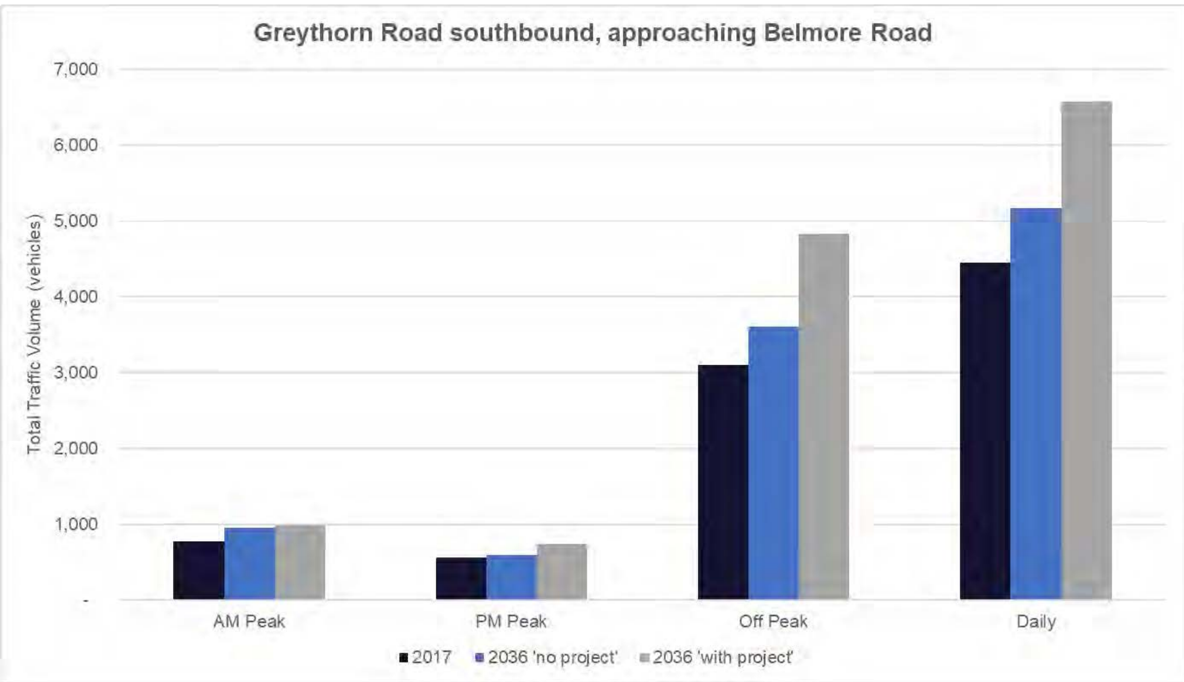


Figure 9-31 – Traffic volumes by time period – Elgar Road south of the Eastern Freeway, southbound

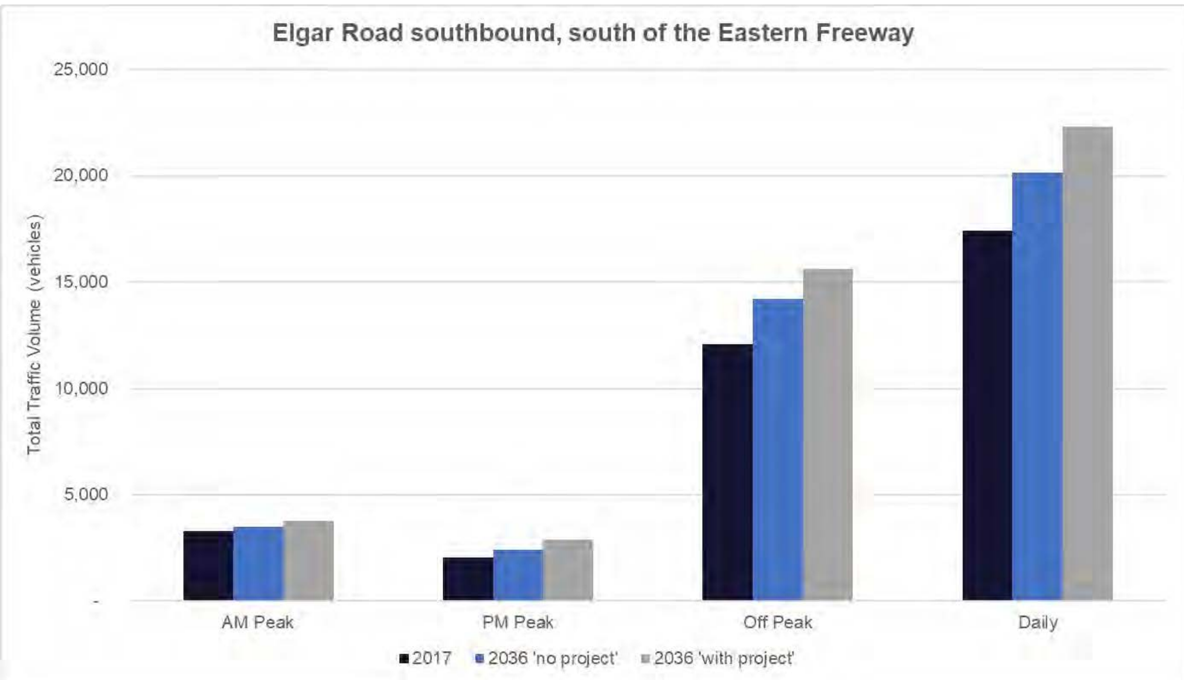


Figure 9-32 – Traffic volumes by time period – Station Street south of the Eastern Freeway, southbound

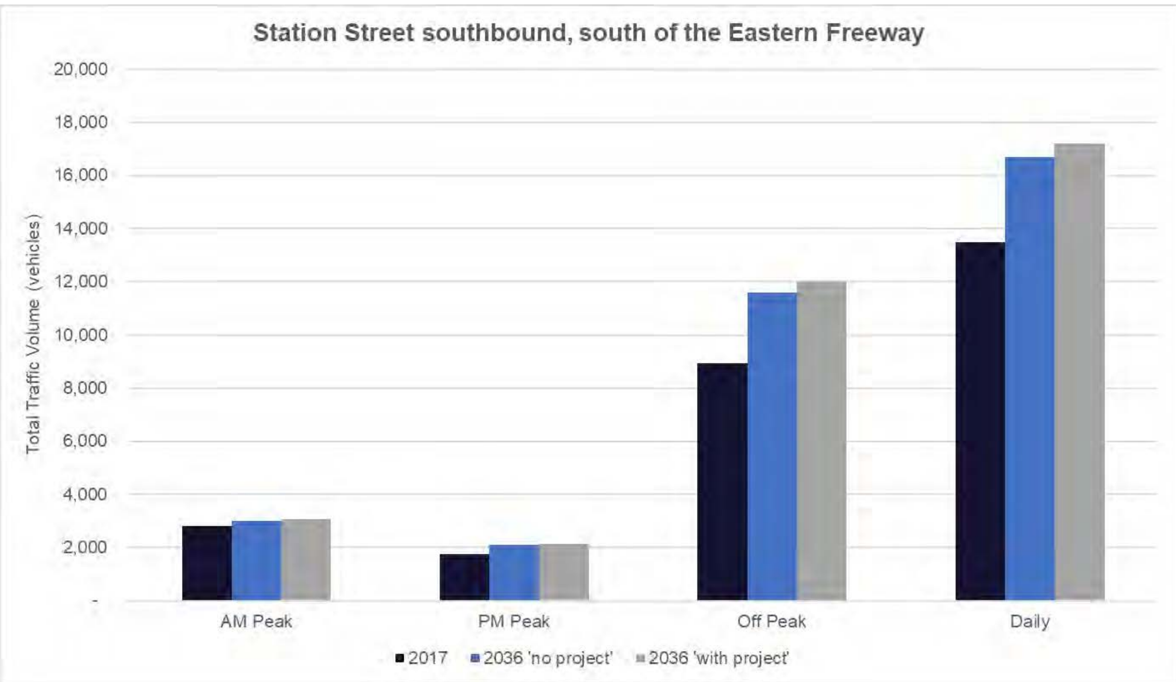


Figure 9-33 – Traffic volumes by time period – Middleborough Road south of the Eastern Freeway, southbound

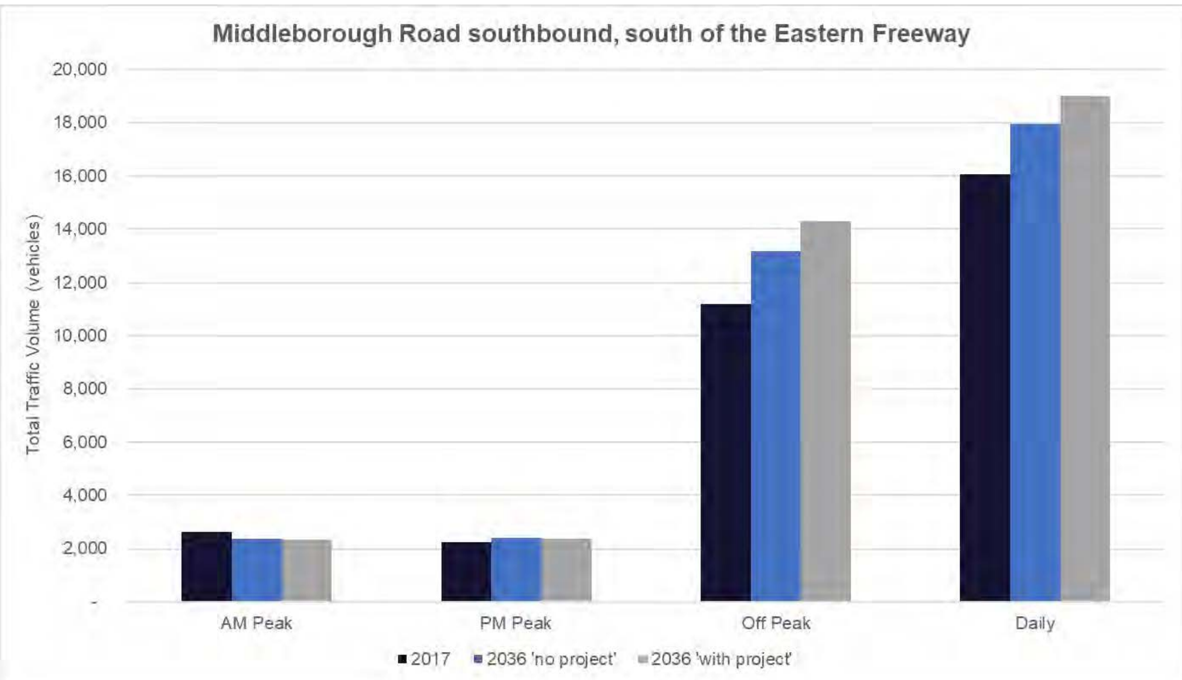


Figure 9-34 – Traffic volumes by time period – Surrey Road south of the Eastern Freeway, southbound

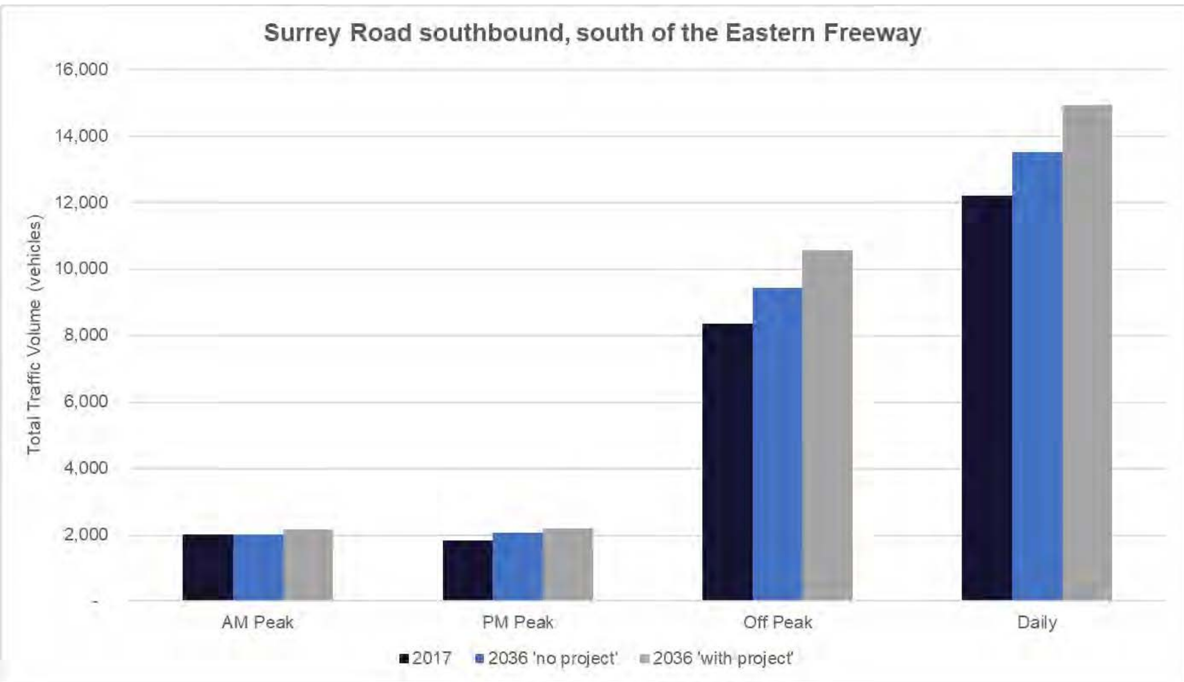
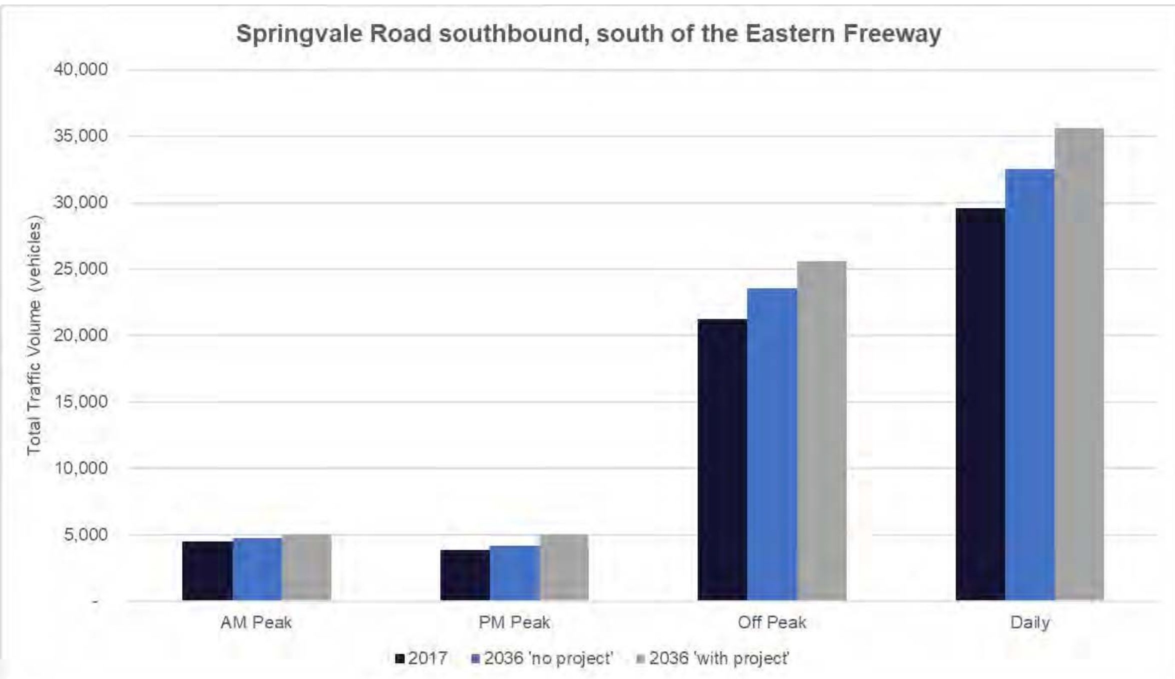


Figure 9-35 – Traffic volumes by time period – Springvale Road south of the Eastern Freeway, southbound



The change in forecast vehicle kilometres travelled on arterial and local roads for nearby municipalities is presented in Table 9-9. A net decrease or zero change in vehicle travel along arterial and local roads is forecast for the municipalities of Boroondara (-1 per cent), Manningham (-8 per cent), Maroondah (no change) and Yarra (no change). Whitehorse is predicted to experience a small net increase of approximately 1 per cent.

Table 9-9 – Change in daily vehicle kilometres travelled along arterial and local roads in southern LGAs – 2036 'with project' vs 2036 'no project'

LGA	Daily vehicle kilometres travelled – local and arterial roads
Boroondara	-1%
Manningham	-8%
Maroondah	0%
Whitehorse	+1%
Yarra	0%

Eastern Freeway interchange access

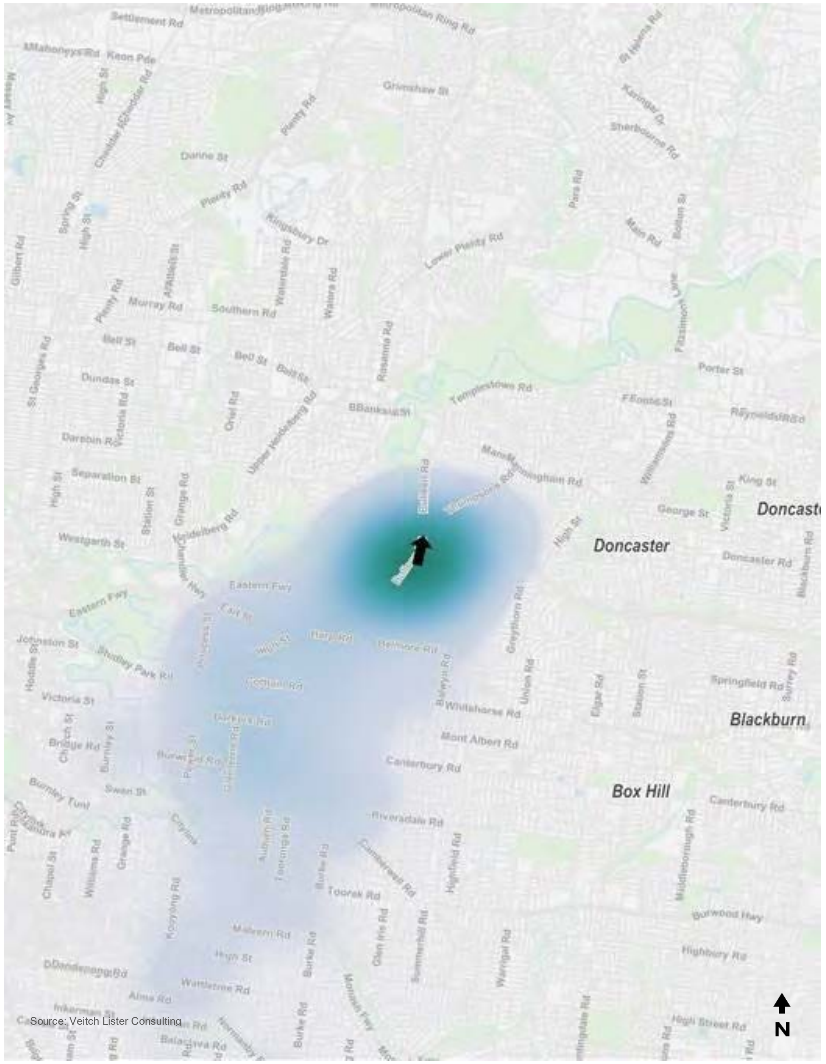
The origins of daily traffic along these arterials was analysed further, with the results presented in Figure 9-36 to Figure 9-42. The heatmaps show origins of traffic travelling northbound along each arterial for the 2036 'no project' and 'with project' scenarios, with red indicating a greater density of origins.

Key observations are:

- The majority of additional northbound traffic along Bulleen Road south of the Eastern Freeway originates from the Boroondara area, particularly the areas of Kew and Balwyn. These areas are predicted to utilise Bulleen Road south of the freeway to take advantage of decongestion north of the freeway, and to access North East Link. Approximately 34 per cent of traffic travelling northbound along Bulleen Road south of the Eastern Freeway is predicted to access North East Link at the Manningham Road interchange.
- Northbound traffic increases along Greythorn Road primarily originate from the Boroondara and Whitehorse areas, particularly from the suburbs of Camberwell and Surrey Hills. These trips are using Greythorn Road to access the Eastern Freeway and North East Link, and to a lesser extent, Doncaster Road and the Manningham area.
- The distribution of origins for the remaining arterial roads, including Elgar Road, Station Street, Middleborough Road, Surrey Road and Springvale Road, is not predicted to change materially in the 'with project' scenario. The majority of northbound traffic demand for these roads south of the Eastern Freeway would continue to be from suburbs immediately south of the freeway and generally from the Whitehorse area.

Figure 9-36 – Origins of daily traffic using Bulleen Road south of the Eastern Freeway, northbound

2036 ‘no project’



2036 ‘with project’

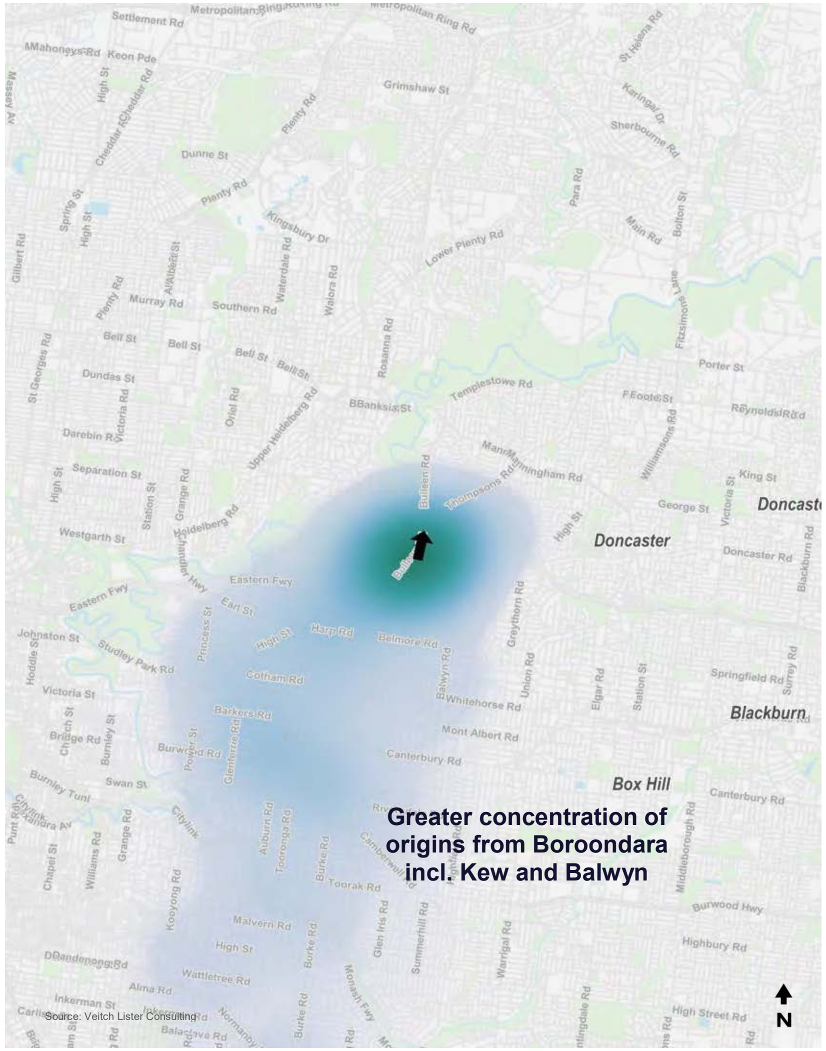


Figure 9-37 – Origins of daily traffic using Greythorn Road approaching Belmore Road, northbound

2036 'no project' **2036 'with project'**

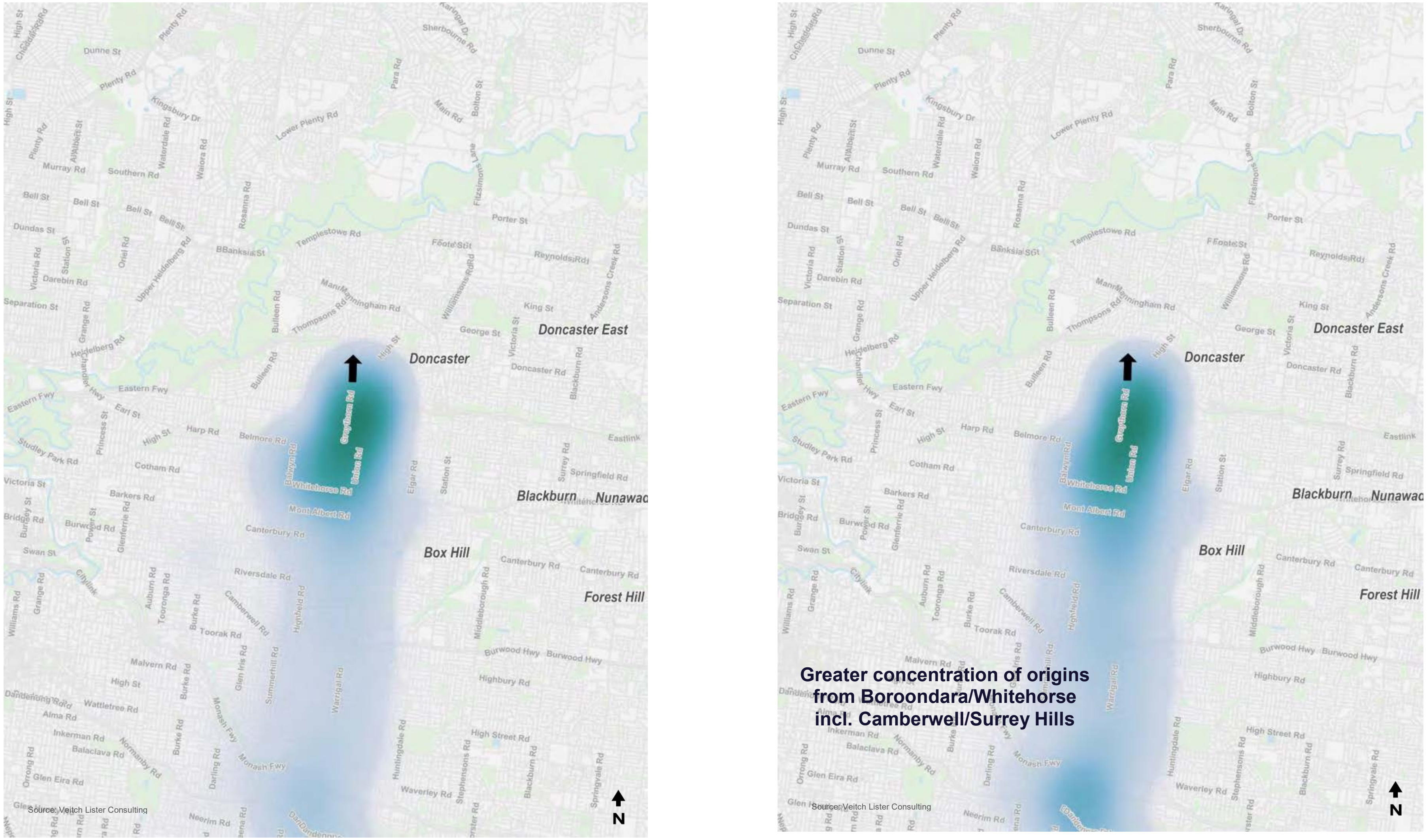
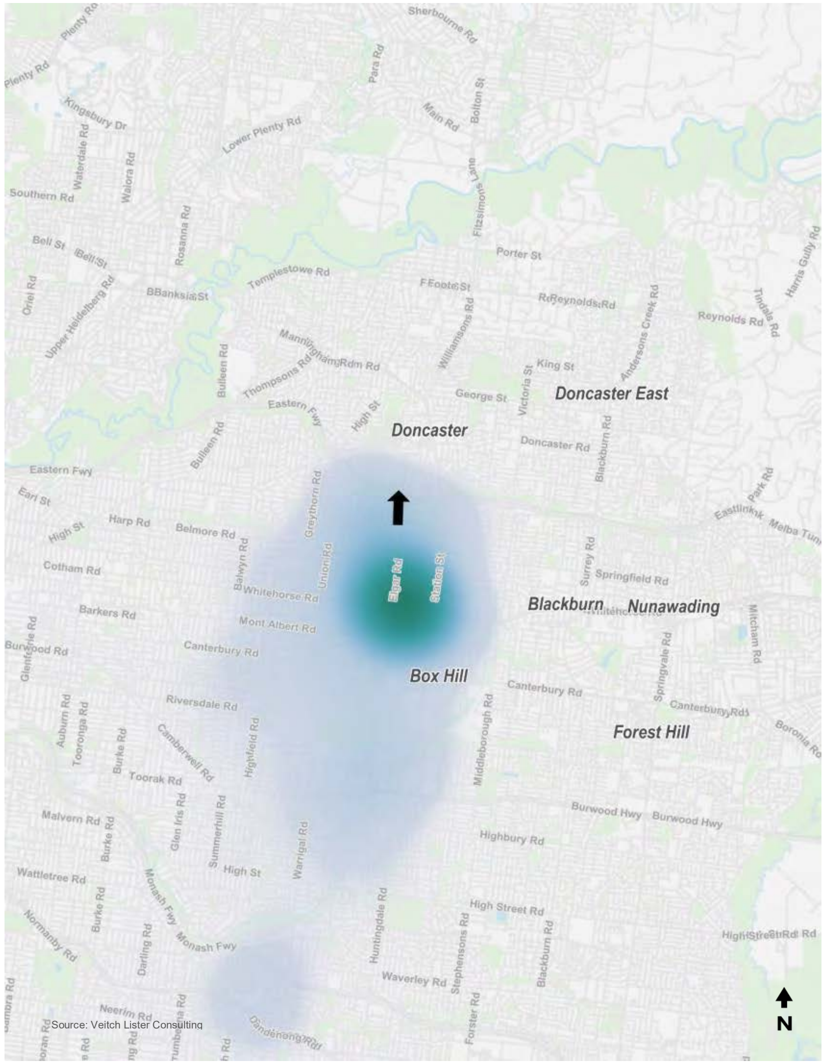


Figure 9-38 – Origins of daily traffic using Elgar Road south of the Eastern Freeway, northbound

2036 ‘no project’



2036 ‘with project’

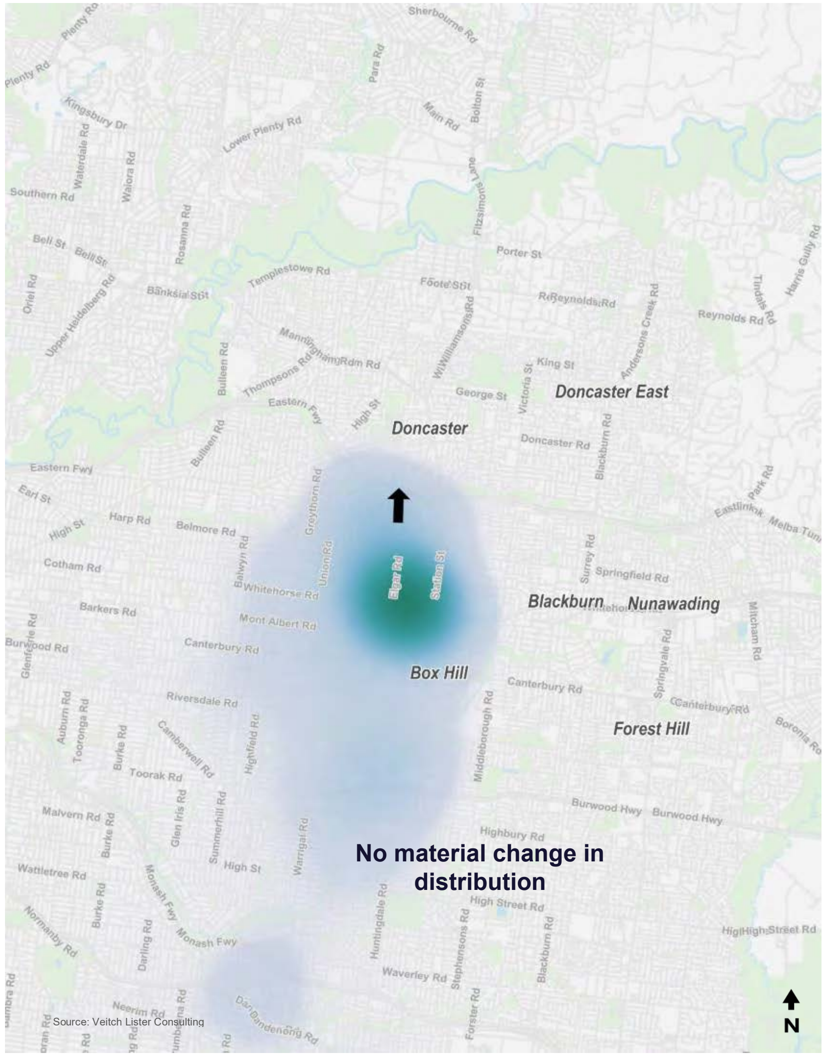
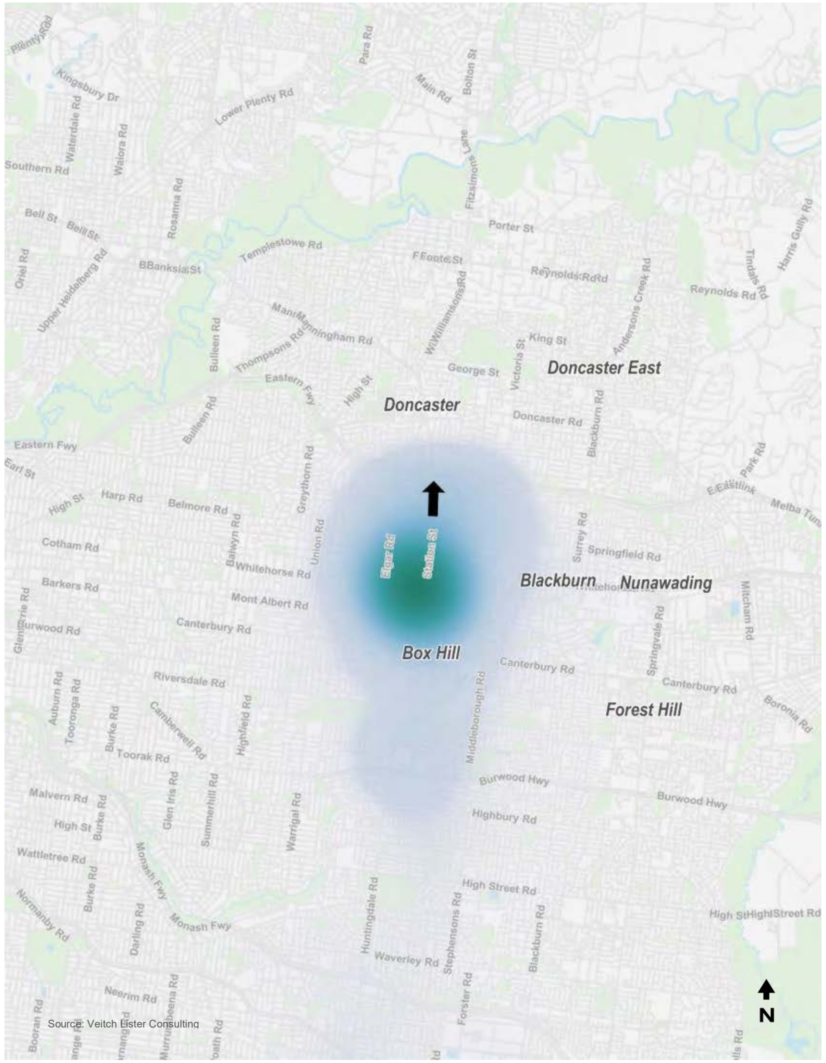


Figure 9-39 – Origins of daily traffic using Station Street south of the Eastern Freeway, northbound

2036 'no project'



2036 'with project'

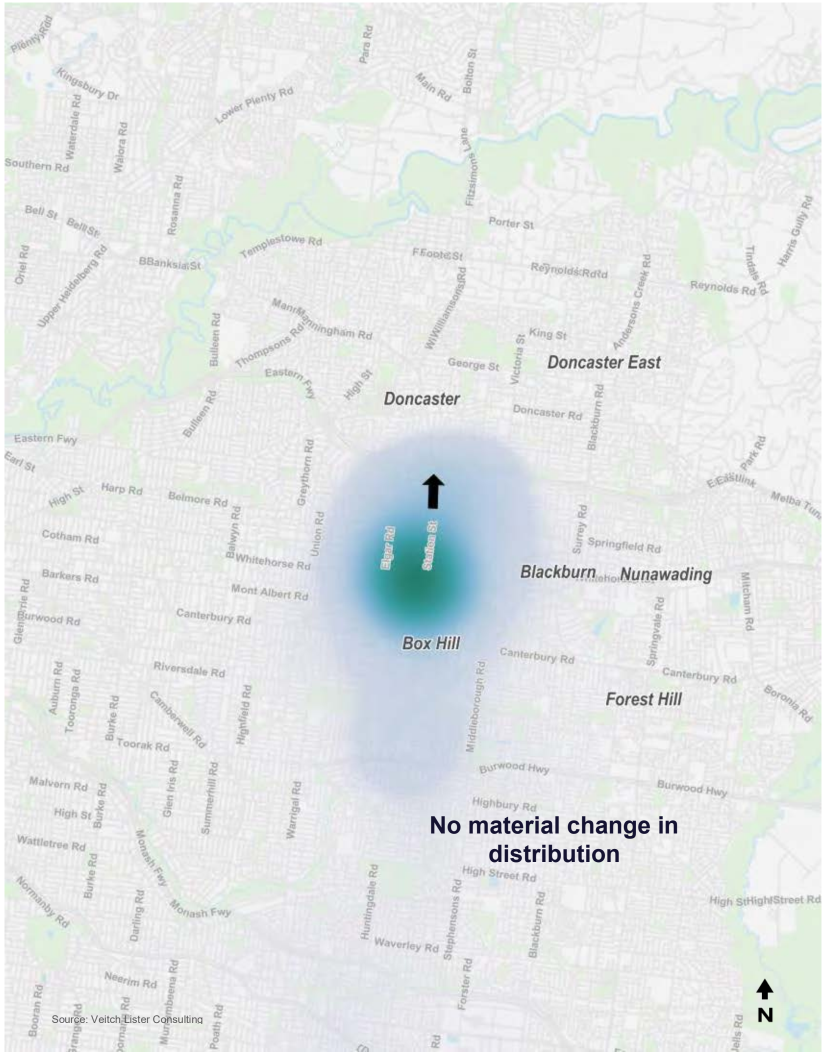
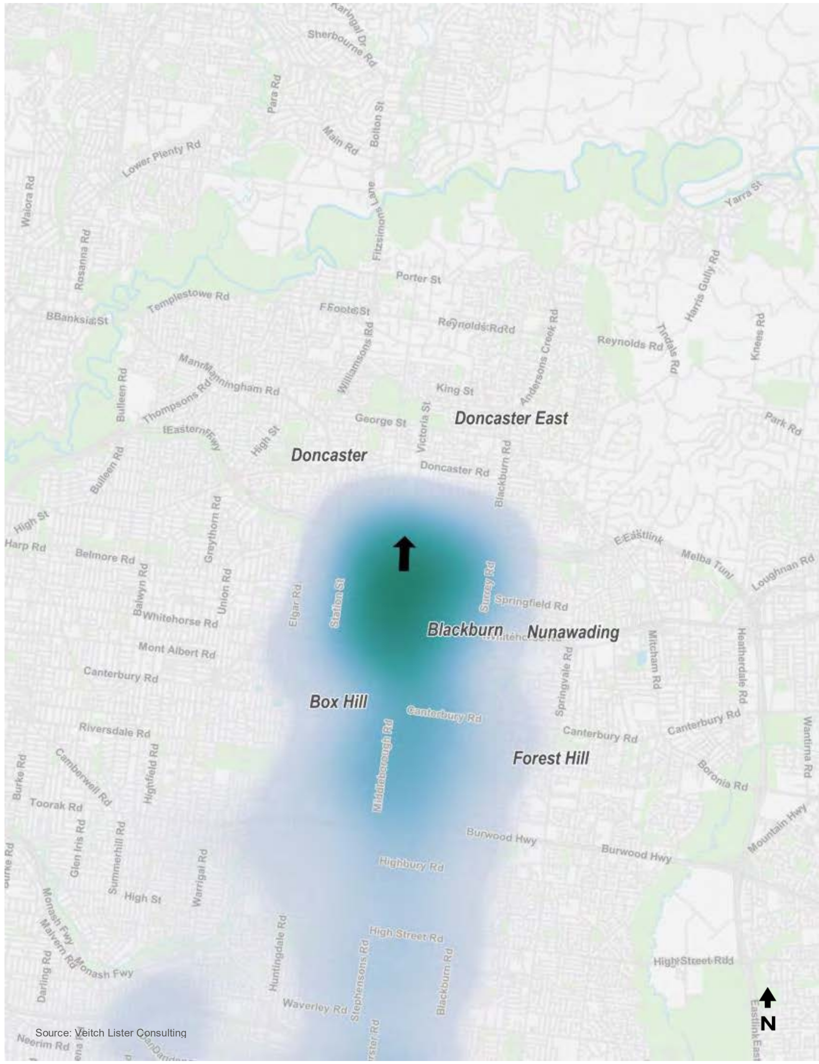


Figure 9-40 – Origins of daily traffic using Middleborough Road south of the Eastern Freeway, northbound

2036 ‘no project’



2036 ‘with project’

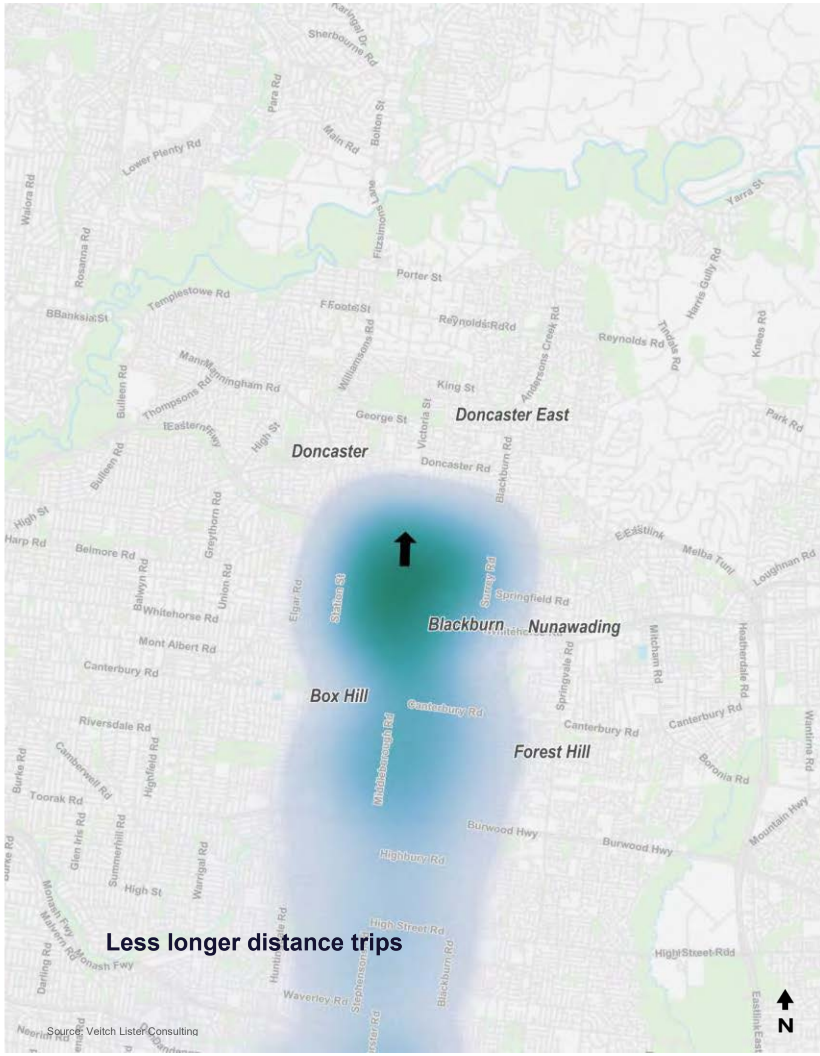
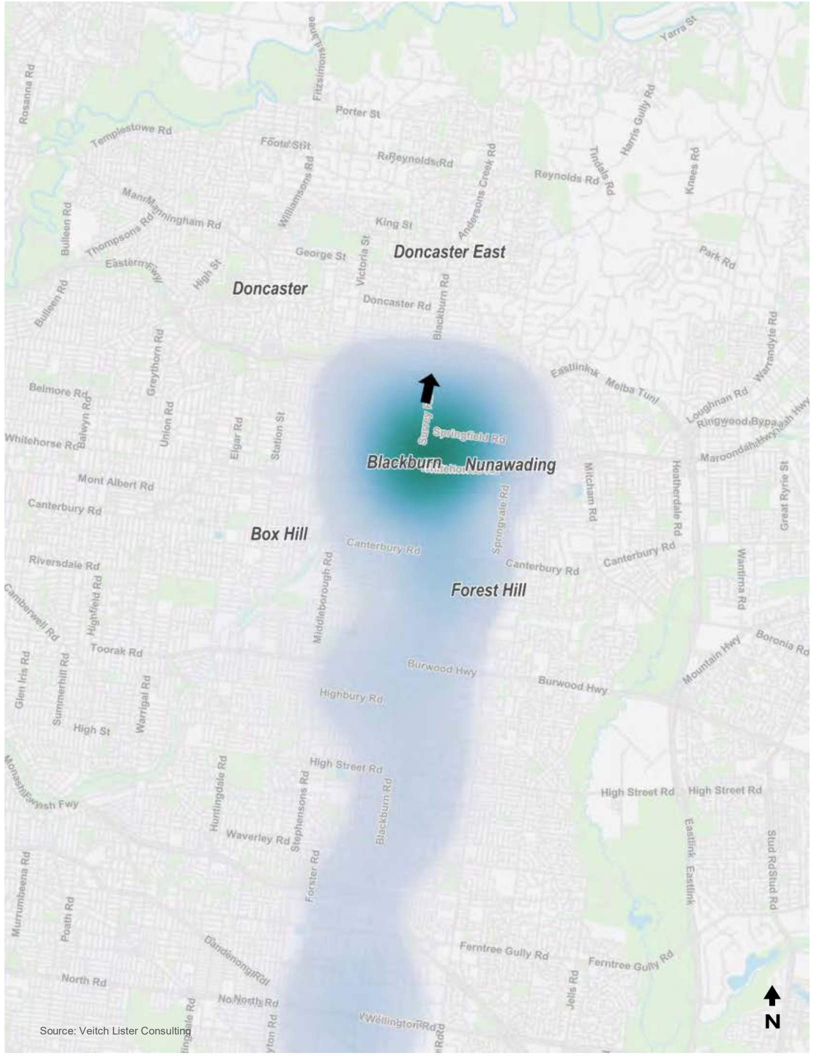


Figure 9-41 – Origins of daily traffic using Surrey Road south of the Eastern Freeway, northbound

2036 'no project'



2036 'with project'

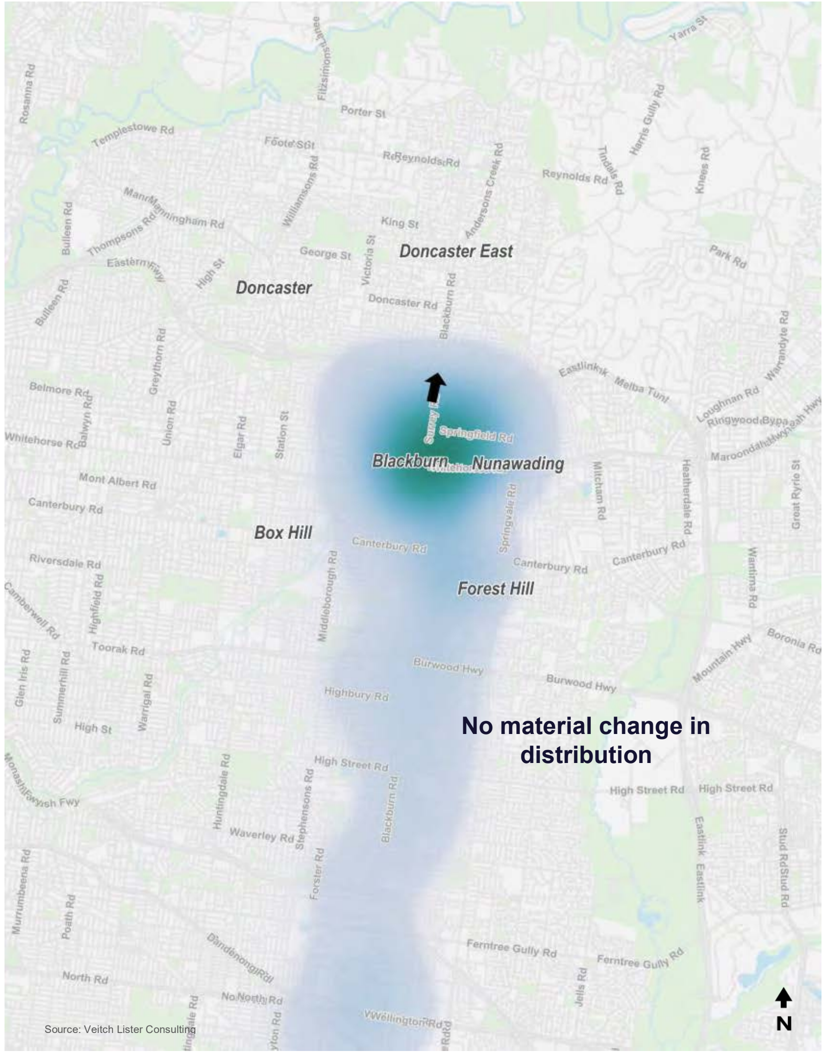
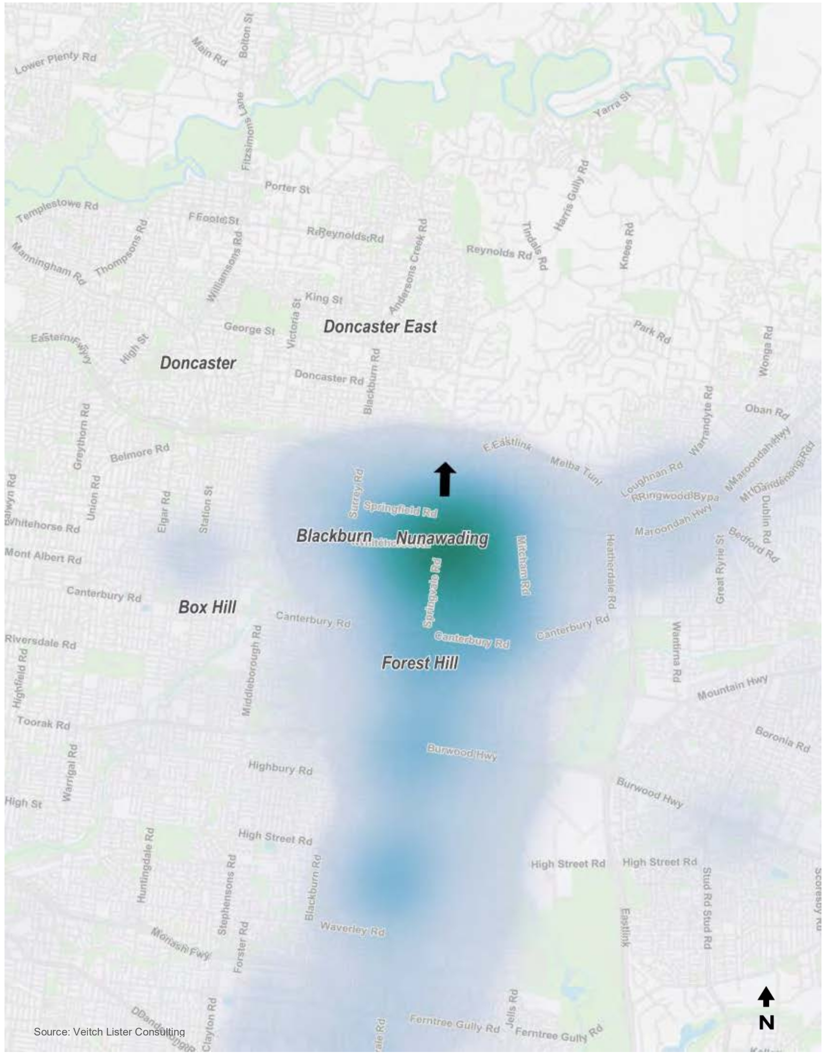
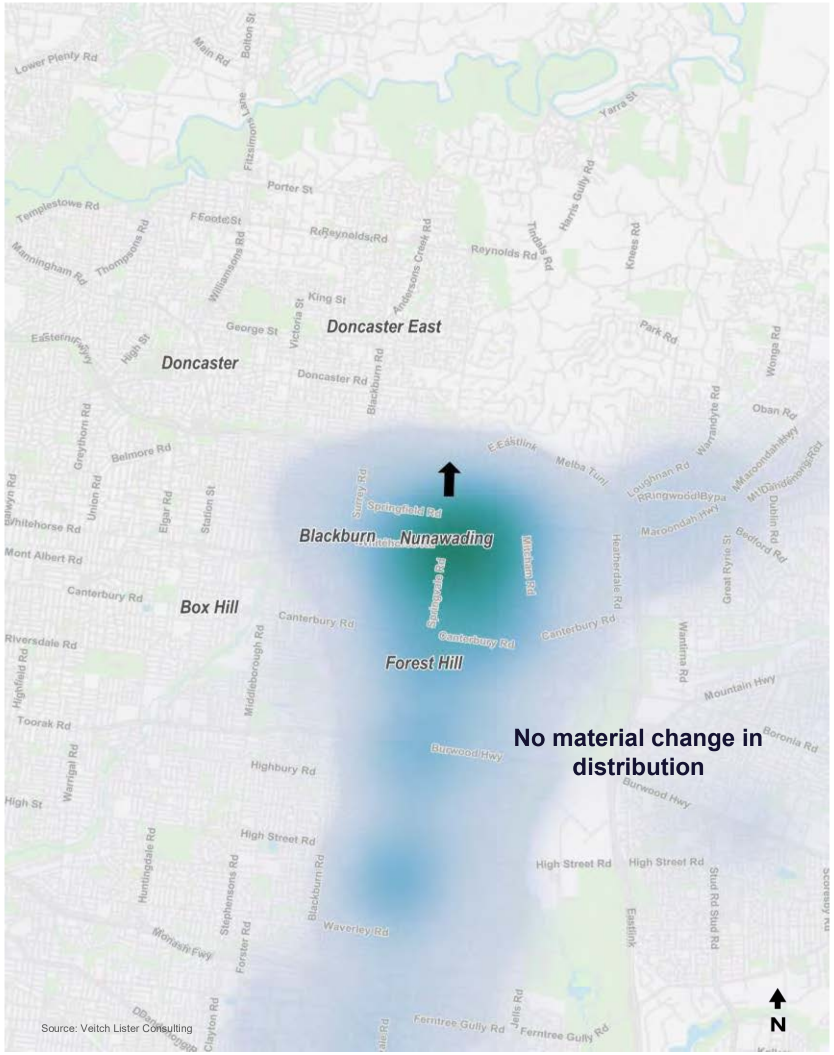


Figure 9-42 – Origins of daily traffic using Springvale Road south of the Eastern Freeway, northbound

2036 ‘no project’



2036 ‘with project’



Toll avoidance

The traffic impacts presented in this chapter account for toll avoidance, based on the Zenith model's calibrated toll choice algorithm (also discussed in Section 4.5.1). There are two forms of toll avoidance relevant to North East Link:

1. Full corridor diversion, which describes travellers who would not use any part of North East Link
2. Partial corridor diversion, where travellers may delay their entry (or exit early) from North East Link to avoid a toll gantry.

The traffic impacts associated with the first form of avoidance are unlikely to be material, as these trips are likely to continue using their existing route on the arterial road network. The second form of diversion could however lead to localised traffic increases around interchanges. Despite this, the north-eastern arterial road network is still anticipated to experience an overall reduction in traffic volumes and vehicle kilometres travelled as a result of the project.

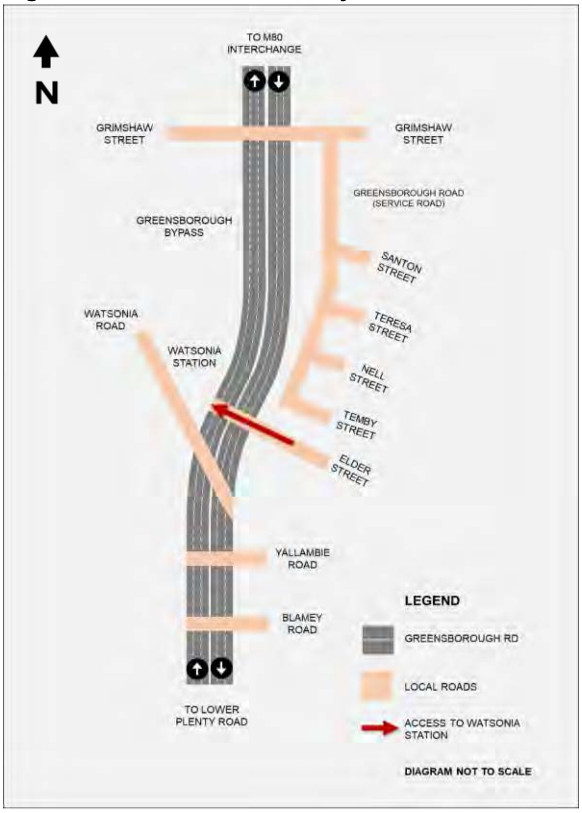
9.2.4 Changes to local access

North East Link will alter local access arrangements at several locations on the road network. The following sections describe these impacts in more detail.

Access to Watsonia railway station

North East Link will change access to Watsonia railway station from the eastern side of Greensborough Bypass. Residents east of Greensborough Bypass can presently access Watsonia railway station via a signalised intersection at Elder Street. This intersection allows direct entry into the station car park and facilitates access to Watsonia Road via a left turn onto Greensborough Bypass. This arrangement is outlined in Figure 9-43.

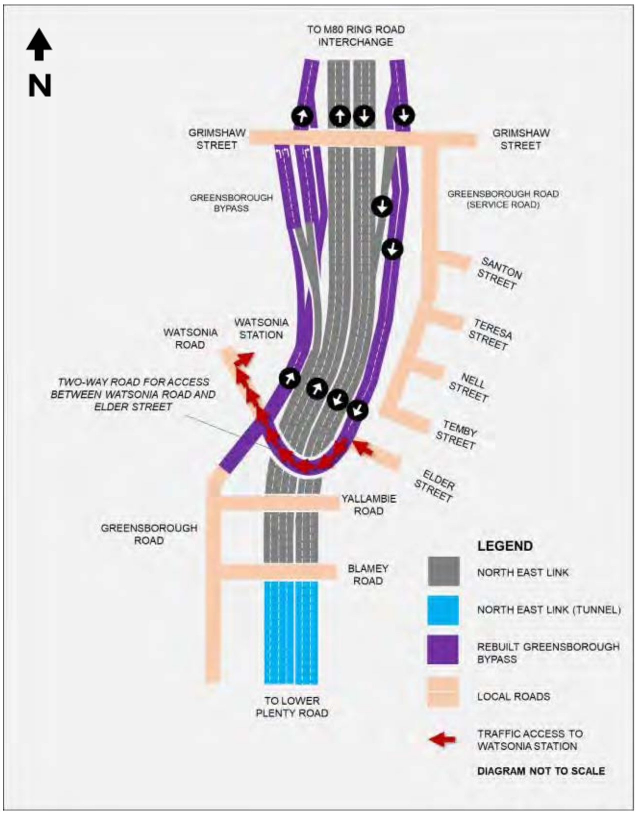
Figure 9-43 – Watsonia railway station access for existing road network, from Elder Street



In the ‘with project’ scenario, Elder Street will no longer have direct access to Watsonia railway station. In this scenario, traffic destined for the station from Elder Street will need to perform a left turn onto the rebuilt Greensborough Bypass on the eastern side of North East Link, continue to Watsonia Road and perform a right turn into the station at the roundabout of Watsonia Road/Lambourn Road/Devonshire Road. This movement will be approximately 800 metres (or an estimated 2 minutes) longer than the current access arrangement.

Daily traffic volumes on the rebuilt Greensborough Bypass are anticipated to lower than today, which will allow higher priority for local access movements. Signal phasing changes at the intersection of Greensborough Bypass/Watsonia Road will need to be adjusted in concert with the intersection at Elder Street to prioritise this local access movement, without encouraging demand for additional ‘through trips’ between Greensborough Bypass and Grimshaw Street. The new movement to Watsonia railway station from Elder Street is highlighted with red arrows in Figure 9-44.

Figure 9-44 – Watsonia railway station access for the project scenario, from Elder Street

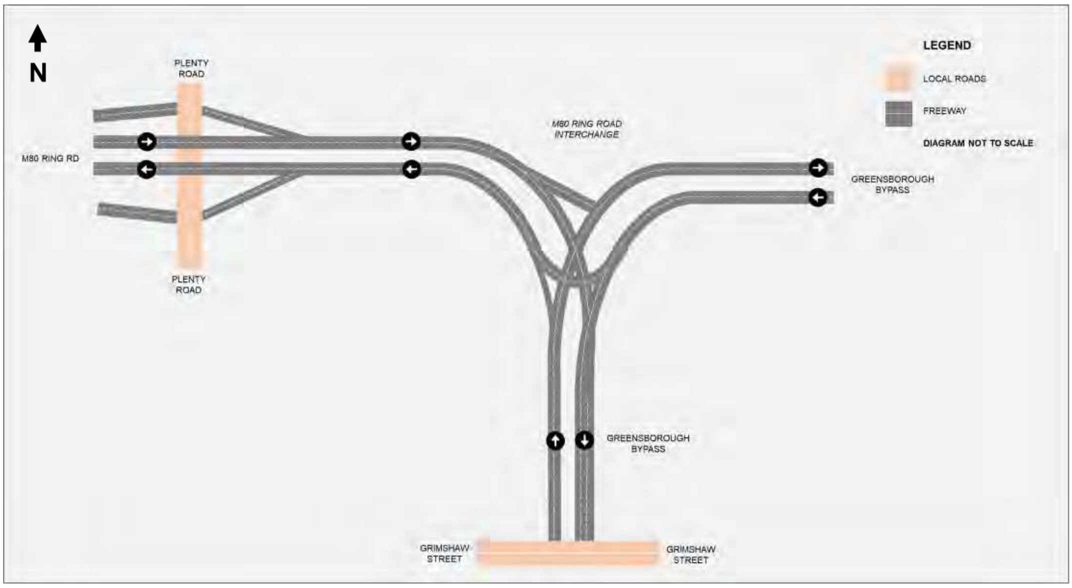


Access from Elder Street to Watsonia Road will be largely unchanged from the existing arrangement and will continue to be accessed via a left turn onto the Greensborough Bypass. As discussed in Section 9.1 the rebuilt Greensborough Bypass will remain toll-free to maintain access for locals between Watsonia Road and the M80 Ring Road. A new shared use path from the eastern side of Greensborough Bypass (near Elder Street) to Watsonia railway station would improve walking and cycling access to the precinct. Access to Greensborough Road will be maintained from Yallambie Road and Blamey Road.

M80 Ring Road to Grimshaw Street

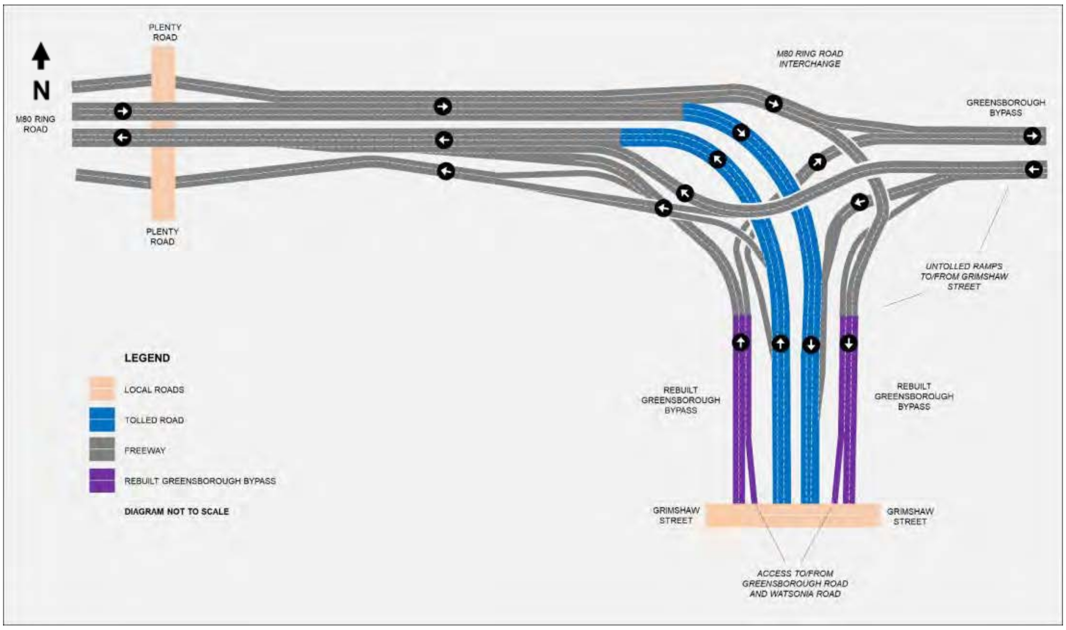
Connectivity between Grimshaw Street and the M80 Ring Road will be maintained with North East Link. The existing road network layout north of Grimshaw Street is presented in Figure 9-45. The existing arrangement allows full movements between the M80 Ring Road and Greensborough Bypass.

Figure 9-45 – M80 Ring Road to Grimshaw Street, existing road network



The road network layout in the ‘with project’ scenario is presented in Figure 9-46. Toll-free access between Grimshaw Street and the M80 Ring Road/Greensborough Bypass will be maintained via the rebuilt Greensborough Bypass located on either side of North East Link. A new ramp to Plenty Road will be constructed for northbound and westbound traffic from the Greensborough Bypass.

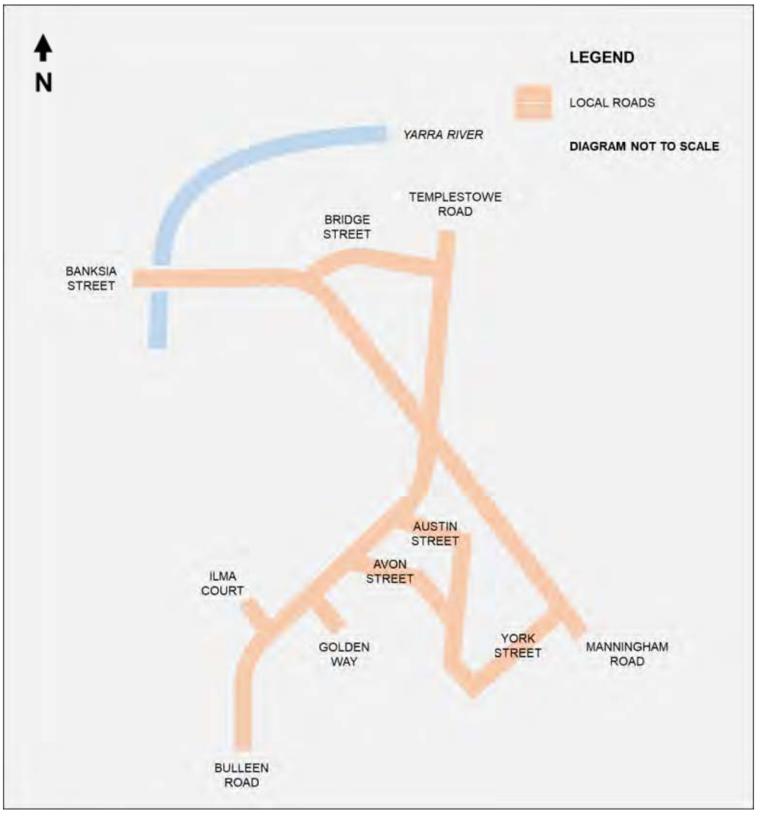
Figure 9-46 – M80 Ring Road to Grimshaw Street, ‘with project’ scenario



Manningham Road interchange

The Manningham Road interchange will require some local access changes on the surrounding road network. The existing network near the Manningham Road and Bulleen Road intersection is presented in Figure 9-47.

Figure 9-47 – Bulleen Road access for existing road network



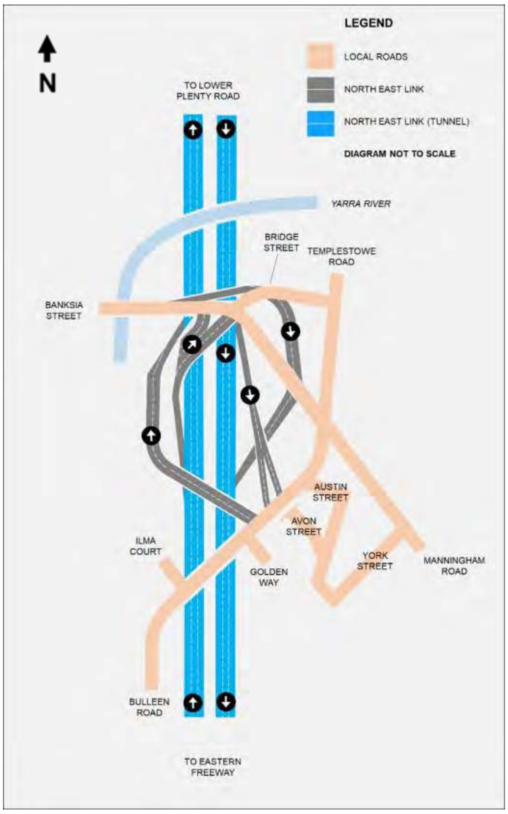
With the implementation of North East Link, Avon Street will be closed off from Bulleen Road and Austin Street will be reconfigured as left-in/left-out only. These measures have been deliberately incorporated into the design to protect Avon Street and Austin Street from potential ‘rat-running’ traffic to/from the North East Link ramps.

Traffic bound for Bulleen Road from Avon Street will be required to utilise neighbouring connections at Austin Street or York Street/Manningham Road (an additional 500 metres to one-kilometre travel distance, or approximately one to two minutes’ additional travel time). Given the small residential catchment along Avon Street, the impact on traffic volumes along Austin Street and York Street is anticipated to be negligible.

Traffic from Bulleen Road to the south wishing to access Avon Street will be required to utilise Thompsons Road/Manningham Road and perform a left turn at York Street, amounting to approximately an additional two kilometres travel distance or two minutes’ travel time. Traffic may alternatively access Avon Street by performing a U-turn at the intersection of Bulleen Road/Manningham Road and performing a left turn into Austin Street. This may contribute an additional one kilometre or two to three minutes’ travel time.

Bridge Street between Manningham Road and Templestowe Road will be reconfigured. North East Link will signalise the intersection at Bridge Street and Templestowe Road which will improve access from the east. The intersection of Bridge Street and Manningham Road will be re-aligned with improved signals and phasing arrangements. The northbound exit ramp from North East Link will connect to this intersection but will not permit direct access to Bridge Street. An outline of the intersection for the 'with project' scenario is presented in Figure 9-48.

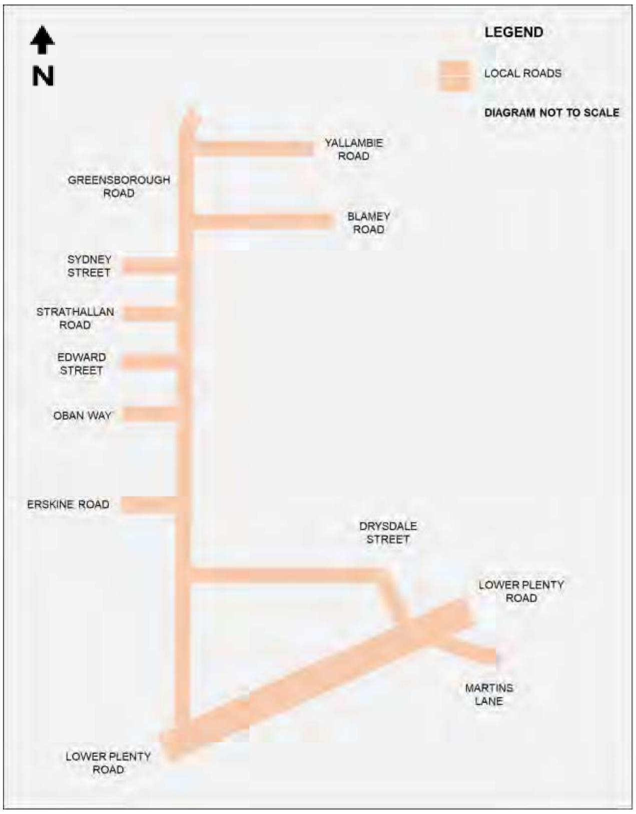
Figure 9-48 – Bulleen Road access for the 'with project' scenario



Lower Plenty Road interchange

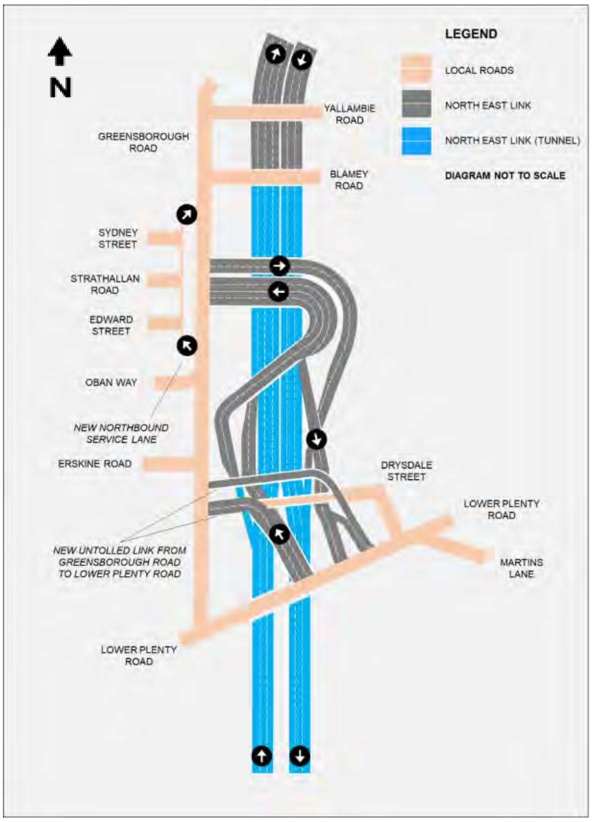
The Lower Plenty Road interchange will alter access between Greensborough Road and the side streets of Drysdale Street, Oban Way, Strathallan Road, Sydney Street and Edward Street.
At present, each of these side streets have un-signalised intersections with Greensborough Road, with full movements permitted. The existing network near the Lower Plenty Road interchange is presented in Figure 9-49.

Figure 9-49 – Lower Plenty Road, existing road network



The road network layout for the 'with project' scenario is presented in Figure 9-50. A key change will be the construction of a new link between Greensborough Road and Lower Plenty Road, commencing near Erskine Road and terminating just east of the Lower Plenty Road/Greensborough Road intersection. The new link will be two-way and provide connectivity to Drysdale Street.

Figure 9-50 – Lower Plenty Road access, 'with project' scenario



The intersection of Oban Way and Greensborough Road will be reconfigured with a median installed along Greensborough Road to accommodate the North East Link ramps. Traffic from Oban Way will therefore be unable to turn right to travel south along Greensborough Road, and southbound traffic on Greensborough Road will be unable to turn right into Oban Way. To perform these movements, traffic will need to access Oban Way from Erskine Road approximately 600 metres to the south.

Access between Greensborough Road and the side streets of Strathallan Road, Sydney Street and Edward Street will also require reconfiguration. A new northbound service lane will be constructed along Greensborough Road, commencing just south of Edward Street and terminating just north of Sydney Street. Its primary function will be to protect side streets from potential 'rat-running' traffic from the new North East Link ramps. Therefore, traffic from Strathallan Road, Sydney Street and Edward Street will no longer be able to perform a right turn at Greensborough Road to travel south, and southbound traffic from Greensborough Road will be unable to perform a right turn into these side streets. Traffic from these roads wishing to travel south along Greensborough Road may use the signalised intersection at Erskine Road to the south, or alternatively Torbay Street to the north where full movements will be permitted with the removal of the central median along Greensborough Road. This will require approximately one additional kilometre of travel, or approximately three minutes' additional travel time. There may be some very small increases in traffic along Torbay Street to accommodate local access from Greensborough Road north for residents along Strathallan Road, Edward Street and Sydney Street.

Bus services will use the same movements as general traffic through the intersection, notably for the 513 bus that operates between Greensborough Road and Rosanna Road, as well as Lower Plenty Road and Rosanna Road. The segregation of the Greensborough Road – Lower Plenty Road movement allows for improved traffic flow which would also benefit buses.

Existing bus stops along Lower Plenty Road at the approach to the Greensborough Road intersection will remain intact, however this may require to be relocated slightly to avoid the traffic signals that will be constructed on Lower Plenty Road.

North East Link will upgrade shared use paths in the vicinity of the Lower Plenty Road interchange. This is discussed in more detail in Section 9.7.1. In summary, the upgrades will involve:

- A new shared use path between Watsonia Road and Yallambie Road as well as the widening of the existing path between Yallambie Road and Lower Plenty Road
- A new east-west shared use path in the reserve north of Drysdale Street between Greensborough Road and Lower Plenty Road
- A grade-separated crossing of Lower Plenty Road connecting to the Banyule Shared Trail/River Gum Walk trail, removing cyclists from the Lower Plenty Road interchange.

9.2.5 Network resilience and redundancy

North East Link will provide an additional crossing over the Yarra River, increasing the total number of traffic lanes performing this movement from 22 to 28. The project is also predicted to reduce traffic across all five existing Yarra River crossings by approximately 50,000 vehicles per day (two-way). These volumes are presented in Table 9-10. As these trips are predicted to generally divert onto the freeway network, the overall reliance on the north-eastern arterial road network is anticipated to reduce.

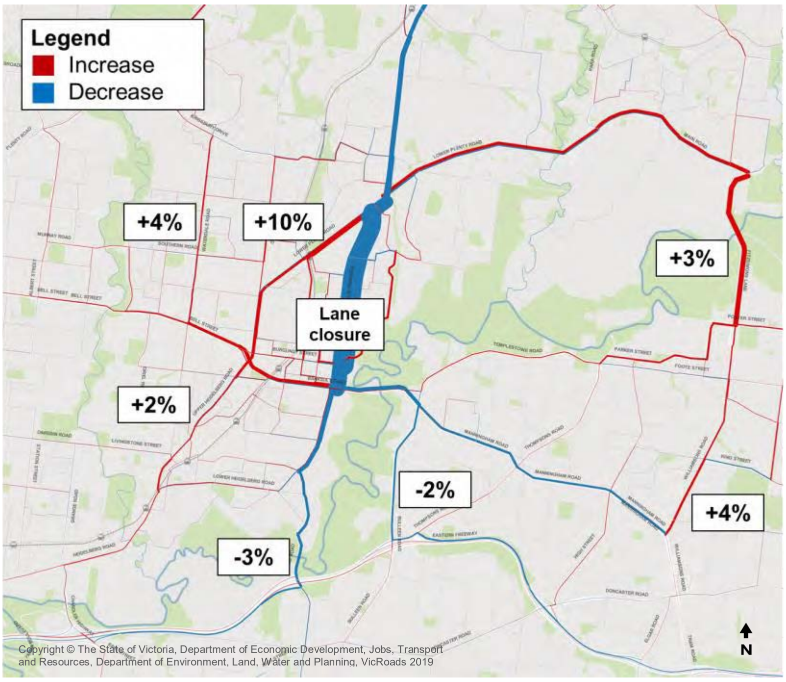
Table 9-10 – Comparison of total daily traffic volumes across the Yarra River

	2036 'no project'		2036 'with project'		
Yarra River crossing	Daily traffic	Number of lanes	Daily traffic	Number of lanes	Travel demand reduction
Chandler Highway	64,000–82,000	6*	58,000 – 76,000	6*	6,100
Burke Road	38,000–49,000	4	31,000 – 41,000	4	7,900
Manningham Road	75,000–96,000	6	63,000 – 81,000	6	13,300
Fitzsimons Lane	64,000–83,000	4	50,000 – 64,000	4	16,600
Warrandyte Bridge	21,000–27,000	3	16,000 – 21,000	3	6,200
Total – Existing Yarra River Crossings	**262,000–337,000**	**22**	**218,000 – 283,000**	**22**	**50,100**
North East Link	N/A	N/A	122,000 – 135,000	6	N/A
Total – Including North East Link	**N/A**	**N/A**	**340,000 – 418,000**	**28**	**N/A**

**Chandler Highway is assumed to be widened to six lanes by 2036.*

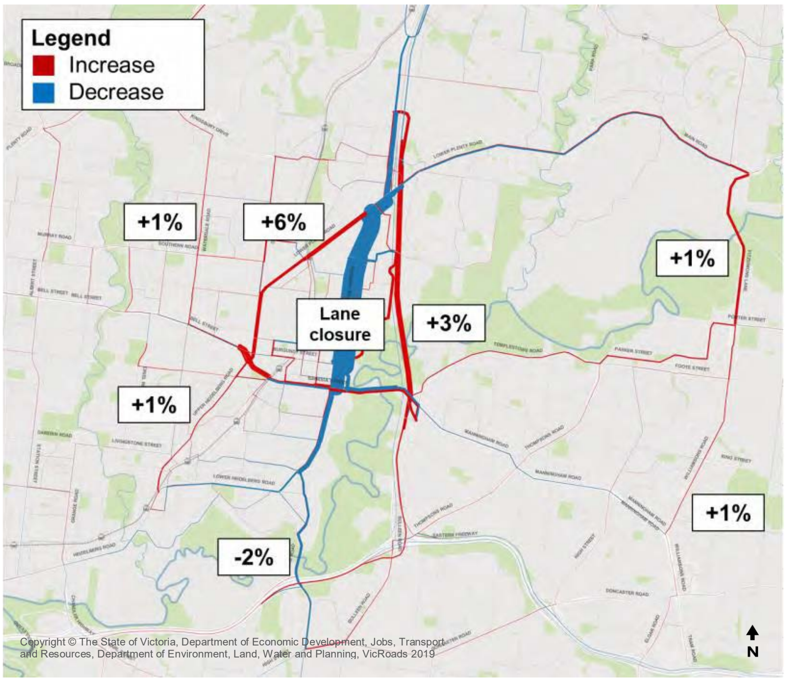
As an example, the chart in Figure 9-51 depicts the predicted changes to total daily traffic as a result of a southbound single-lane closure on Rosanna Road in the 2036 ‘no project’ scenario. Under this scenario, traffic is predicted to divert to the nearby arterial roads of Lower Plenty Road (+10 per cent), Waterdale Road (+4 per cent), Fitzsimons Lane (+3 per cent) and Williamsons Road (+4 per cent).

Figure 9-51 – Total daily traffic volume changes, Rosanna Road one lane closure (southbound), 2036 ‘no project’ case



In the 2036 ‘with project’ scenario, the same single-lane closure on Rosanna Road is predicted to have a lesser impact due to the presence of North East Link. In this scenario, traffic on North East Link between Lower Plenty Road and Manningham Road is predicted to increase by approximately 3 per cent across the day as trips divert from Rosanna Road. Traffic volume increases on nearby arterial roads are anticipated to be lower than the 2036 ‘no project’ scenario due to the additional alternative offered by the project.

Figure 9-52 – Total daily traffic volume changes, Rosanna Road one lane closure (southbound), 2036 'with project' case



The North East Link tunnels may also require closures to allow routine maintenance activities to occur. In these instances, it is likely the tunnels would be closed at night-time to minimise traffic impacts on the surrounding road network. Traffic that would normally use North East Link during these periods would need to divert onto arterial roads such as Bulleen Road, Rosanna Road, Fitzsimons Lane and Burke Road. Heavy commercial vehicle curfews along Rosanna Road would continue to apply during these periods, unless a permit was sought by truck operators.

The forecast maximum hourly volume using North East Link during night-time closure periods is approximately 2,700 vehicles (two-way) as presented in Table 9-11. The table also presents forecast maximum hourly volumes for peak and night-time closure periods for the arterial diversion routes. The differences between peak and night-time volumes represent spare capacity and are presented in the far-right column. This analysis suggests there is sufficient spare capacity along the arterial road network to accommodate night-time North East Link tunnel closures.

Table 9-11 – Comparison of evening off-peak traffic volumes, 2036 'with project' scenario

Road name	Location	Maximum hourly traffic volume during closure period (two-way)	Maximum hourly traffic volume during peak periods (two-way)	Spare hourly capacity in closure period (two-way)
North East Link	Manningham Road to Lower Plenty Road	2,700	N/A	N/A
Bulleen Road	North of Eastern Freeway	1,500	3,100	1,600
Rosanna Road	North of Dora Street	1,000	2,500	1,500
Fitzsimons Lane	At Yarra River	1,400	4,700	3,300
Burke Road	At Yarra River	800	3,200	2,400

9.2.6 Interactions with other projects

A number of other proposed infrastructure projects may impact travel behaviour in the project study area. A summary of these projects and their anticipated interactions with North East Link is provided in Table 9-12.

Table 9-12 – Potential cumulative impacts with other projects

Proposed upgrade	Included in 2036 scenario		Rationale	Potential cumulative impact
	'no project'	'with project'		
M80 Ring Road upgrade	Yes	Yes	This project (including the Plenty Road to Greensborough Bypass section) is anticipated to be completed before North East Link	None–already included in project assessment
Chandler Highway upgrade	Yes	Yes	This project is anticipated to be completed before North East Link	None–already included in project assessment
Metro Tunnel	Yes	Yes	This project is anticipated to be completed before North East Link	None–already included in project assessment
E6/OMR	No	No	These projects are anticipated to occur beyond 2036 in the Transport for Victoria Transport Modelling Reference Case assumptions	This project would likely have a large impact on the travel patterns across Melbourne, including across the north-east. Sensitivity testing of these impacts has been undertaken and are presented in Section 11
Metro Tunnel 2	No	No	These projects are anticipated to occur beyond 2036 in the Transport for Victoria Transport Modelling Reference Case assumptions	This project is likely to see a shift to public transport, reducing traffic volumes across Melbourne. However, given its location is it unlikely to have a significant impact on the north-east of Melbourne.
Hurstbridge rail line state 2	Yes	Yes	This project is anticipated to be completed before North East Link	None–already included in project assessment

9.2.7 Crash assessment

North East Link is forecast reduce the total number of crashes across the north-east, despite an overall projected increase in vehicle kilometres travelled.

The project will provide 135 lane-kilometres of additional freeway including the new North East Link and widening works along the Eastern Freeway and M80 Ring Road. This would generally divert traffic away from arterial roads and onto the freeway network, resulting in a net decrease in vehicle kilometres travelled on non-freeways. As a result, overall non-freeway crashes are forecast to decrease by 109 per year.

The project will also upgrade the Eastern Freeway to a fully managed motorway which would improve road safety via ramp-metering and overhead lane control. VicRoads has completed a study of the M1 freeway to assess changes in crash rates due to the introduction of managed motorways.
Their analysis showed that crash rates along managed motorways were approximately 30 per cent lower than those on unmanaged freeways (VicRoads, 2017). As such, a 30 per cent reduction in crash rates along the new and upgraded freeways has been applied for the 2036 'with project' scenario. Therefore, despite the net increase in vehicle kilometres travelled on freeways, crashes along these routes are predicted to remain approximately static (+1 crashes per year) in the 'with project' scenario.

Overall crashes in the north-east are forecast to reduce by 108 per year. The results of the crash analysis are presented in Table 9-13. This assessment does not take into consideration the further road safety benefits on the collector-distributor lane arrangements as there is insufficient data available to determine a suitable crash rate. However, it is likely there would be further reductions in crashes due to the separation of movements.

Table 9-13 – Forecast annual vehicle crashes in the study area, 2036 'with project' vs 2036 'no project'

	2036 'no project' scenario		2036 'with project' scenario		Change	
Road type	Crashes	Vehicle Kilometres Travelled	Crashes	Vehicle Kilometres Travelled	Crashes	Vehicle Kilometres Travelled
Freeways	192	5,952,000	193	8,573,000	+1	+2,621,000
Non-freeways	2,808	22,828,000	2,699	21,920,000	-109	-908,000
Total	**3,000**	**28,780,000**	**2,893**	**30,493,000**	**-108**	**+1,713,000**

9.3 Project corridor assessment

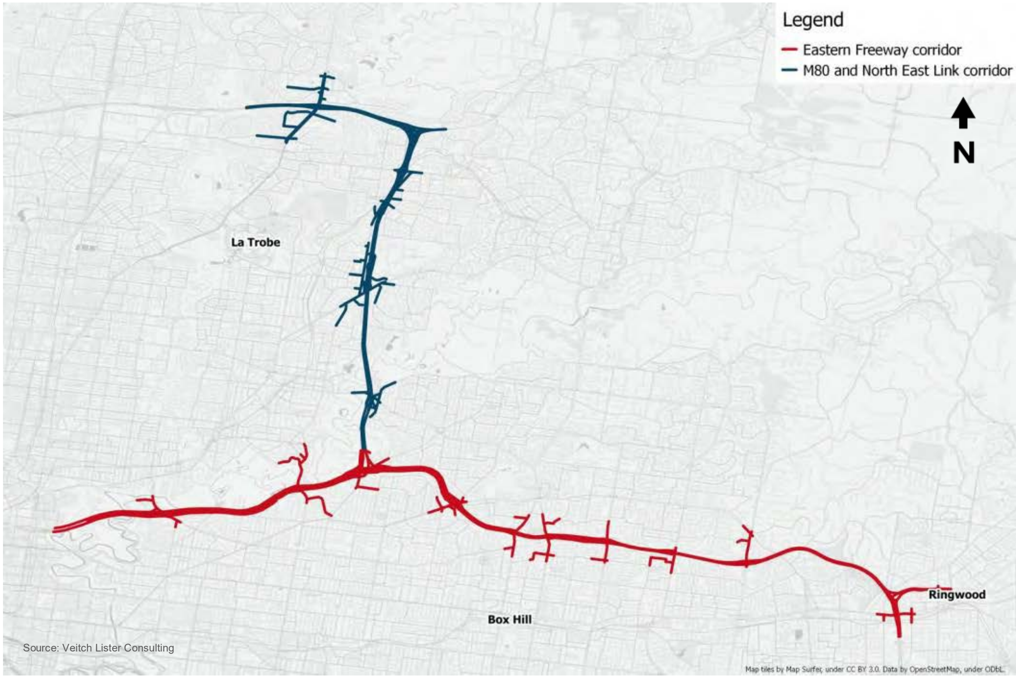
This section assesses the performance of the 2036 'with project' scenario along the project corridor. The assessment comprises the following two sections:

- Eastern Freeway assessment, between Hoddle Street and Springvale Road
- M80 Ring Road/North East Link corridor assessment, spanning the M80 Ring Road to the Eastern Freeway.

Detailed microsimulation modelling has been undertaken for each project corridor for the AM and PM peaks. The extent of the microsimulation modelling for the two sections is presented in Figure 9-53.

This section summarises the results of the microsimulation modelling using Level of Service and average speed metrics. Detailed results from the microsimulation model is provided in Appendix E – Microsimulation results.

Figure 9-53 – Overview of corridor assessment, 2036 'with project'



The development of the 2036 'with project' microsimulation model includes some assumptions regarding the road network. These are summarised as:

- All signalised intersections have been rephased to take into consideration the changes in traffic distribution
- Chandler Highway between the Yarra River and the Eastern Freeway has been widened to three lanes in each direction
- The lane arrangement at the intersection of Elgar Road and Belmore Road has been changed to allow two left-turn lanes from Belmore Road into Elgar Road
- An additional right-turn lane has been provided at the intersection of Springvale Road and Mitcham Road (northbound to eastbound) to allow for the changes in traffic distribution.

These changes to the network have been discussed and agreed with VicRoads and would be undertaken by others.

An overview of the sign-posted speeds along the Eastern Freeway and M80 Ring Road is provided in Figure 9-54 and Figure 9-55. Sign-posted speeds along the Eastern Freeway corridor are anticipated to be unchanged from today, that is, sign-posted at 100 km/hr and at 80 km/hr through the EastLink tunnels. North East Link will be sign-posted at 100 km/hr along the surface sections north of Lower Plenty Road and will operate at 80 km/hr through all tunnel sections.

Figure 9-54 – Eastern Freeway sign-posted speeds, 2036 'with project' and 'no project' scenarios

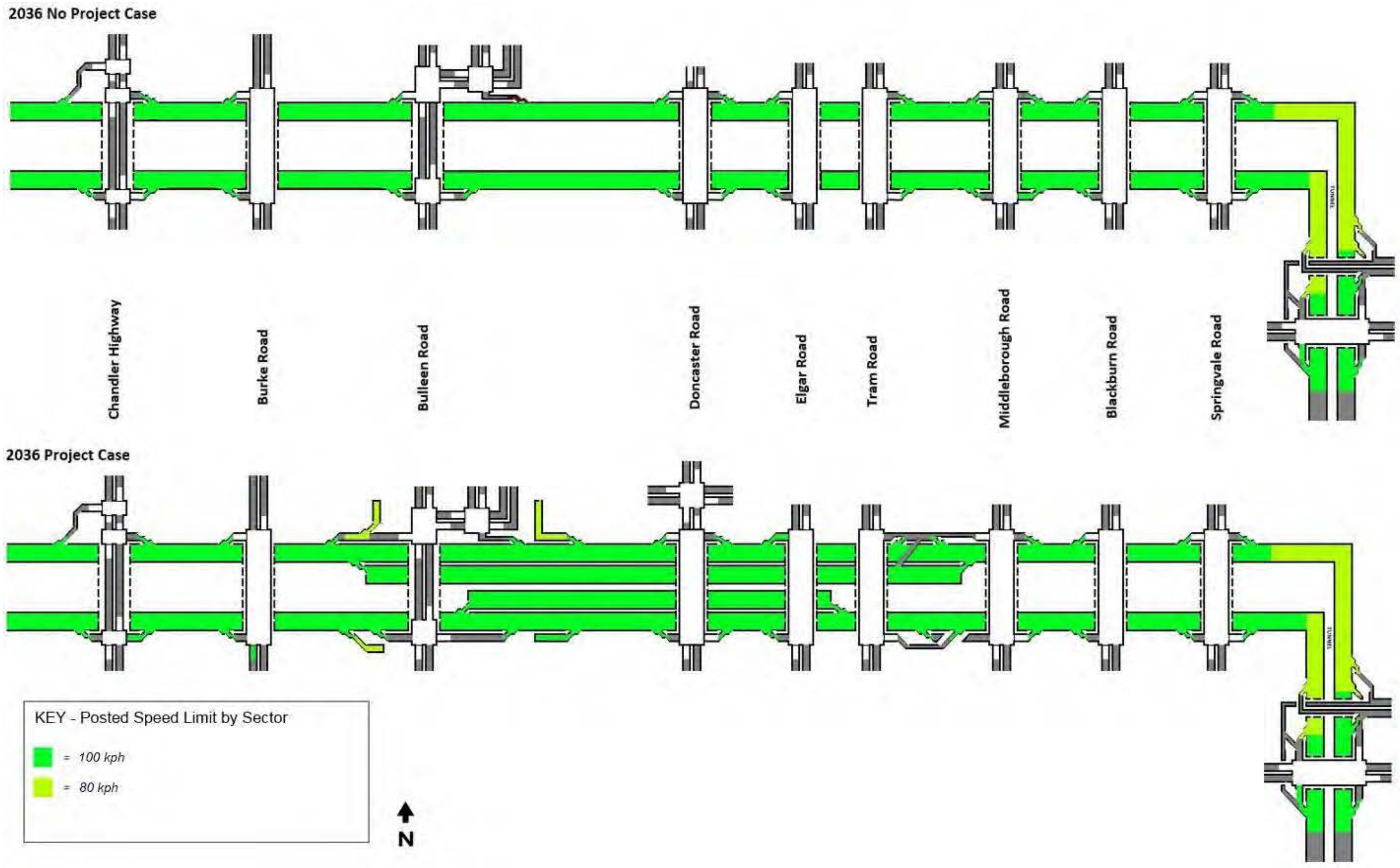
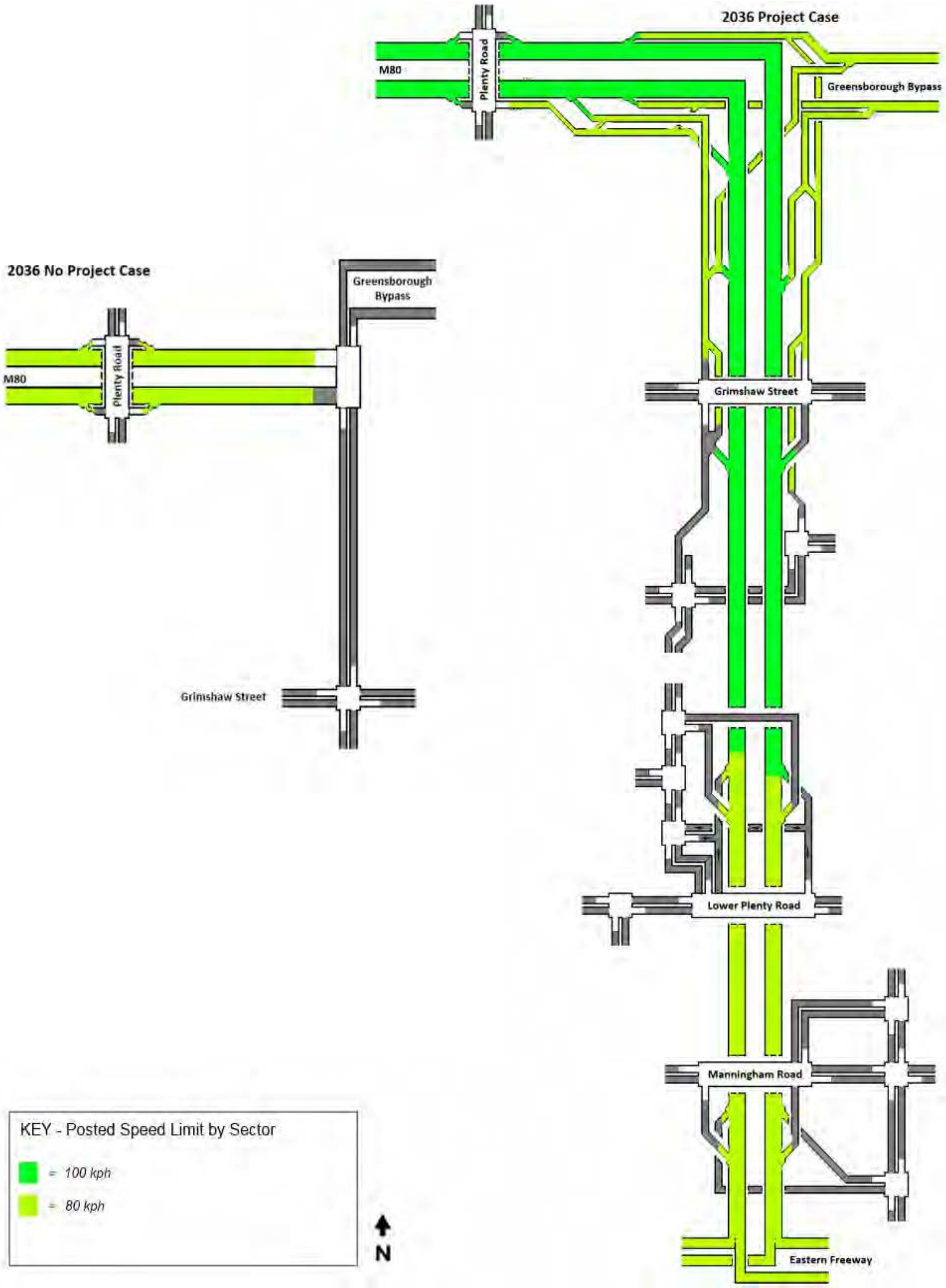


Figure 9-55 – M80 Ring Road/North East Link sign-posted speeds, 2036 'with project' and 'no project' scenarios



9.3.1 Peak period traffic volumes

The schematic maps in Figure 9-56 to Figure 9-59 present the 2036 'with project' volumes along the Eastern Freeway. The schematic maps in Figure 9-60 to Figure 9-63 present the 2036 'with project' volumes along the North East Link corridor. The volumes reflect total traffic (all vehicle classes) for the AM and PM peak (2 hour) periods.

Figure 9-56 – Eastern Freeway AM peak traffic volumes – Hoddle Street to Doncaster Road, 2036 'with project'

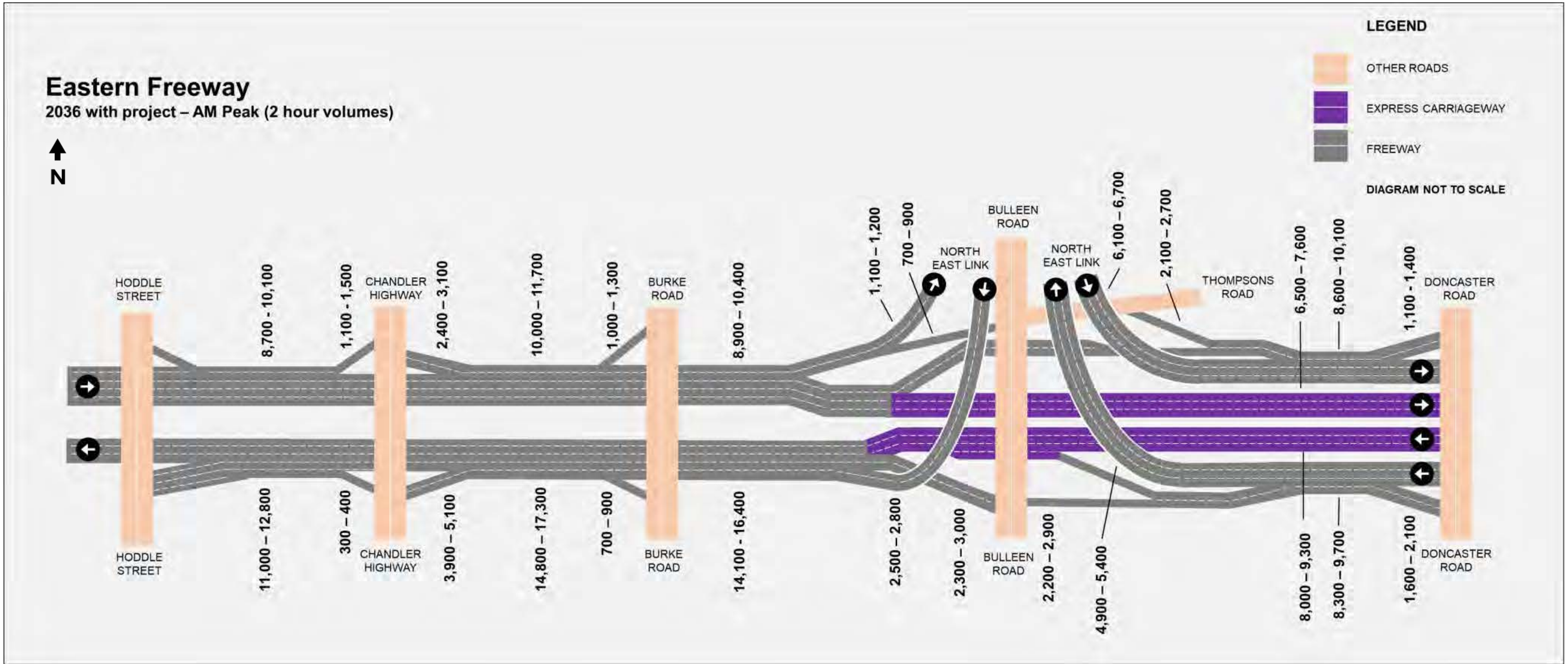


Figure 9-57 – Eastern Freeway AM peak traffic volumes – Doncaster Road to Springvale Road, 2036 'with project'

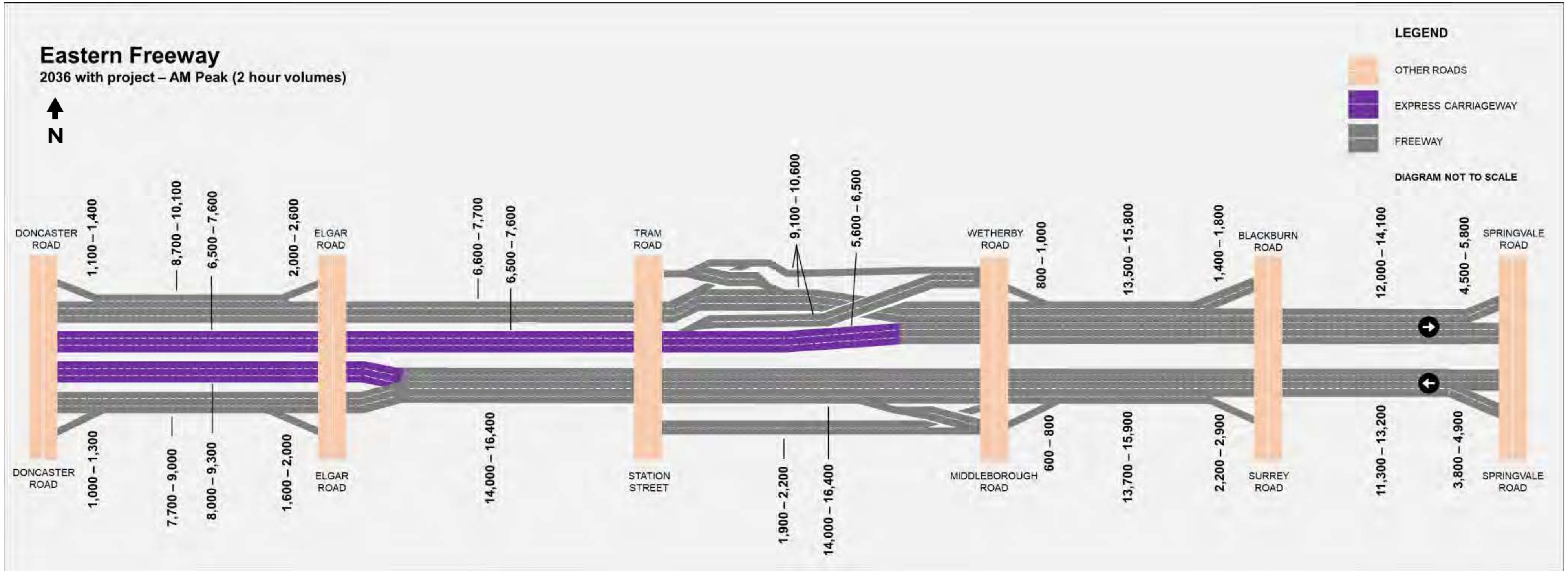


Figure 9-58 – Eastern Freeway PM peak traffic volumes – Hoddle Street to Doncaster Road, 2036 ‘with project’

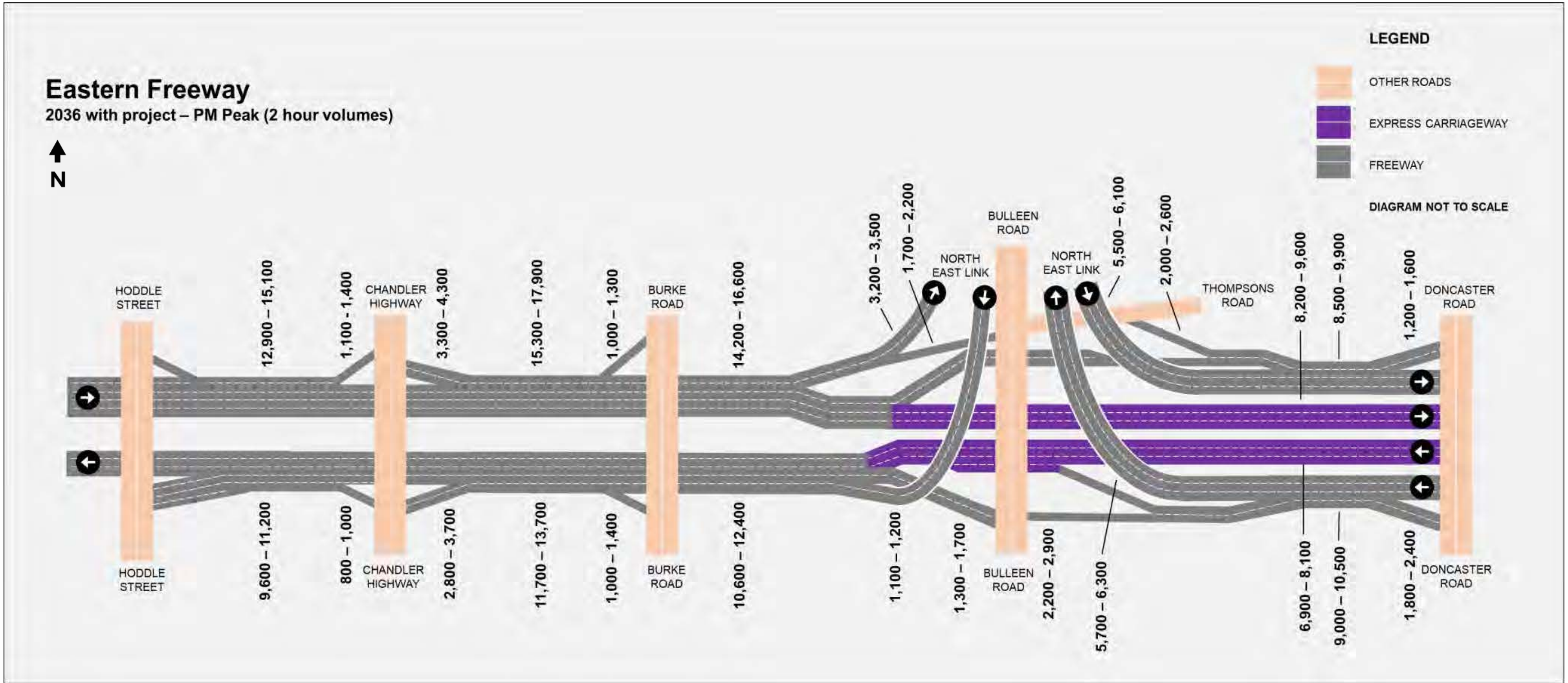


Figure 9-59 – Eastern Freeway PM peak traffic volumes – Doncaster Road to Springvale Road, 2036 ‘with project’

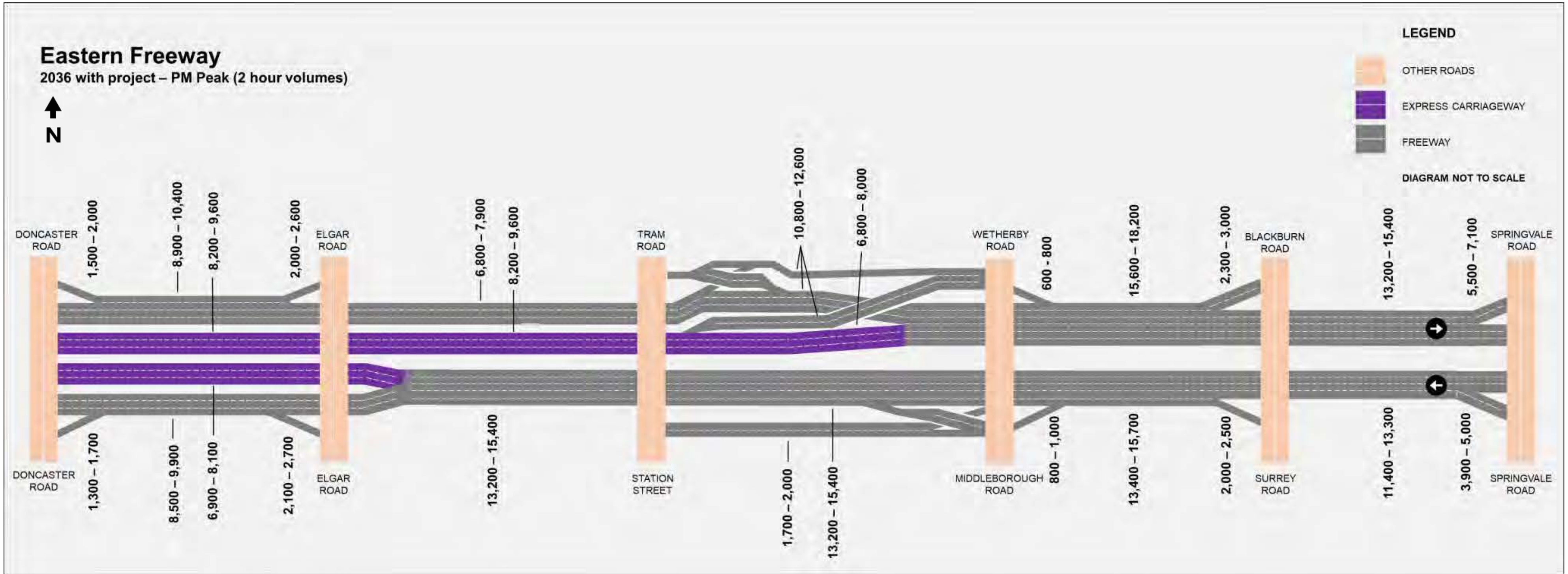


Figure 9-60 – North East Link AM peak traffic volumes – M80 Ring Road to Grimshaw Street, 2036 'with project'

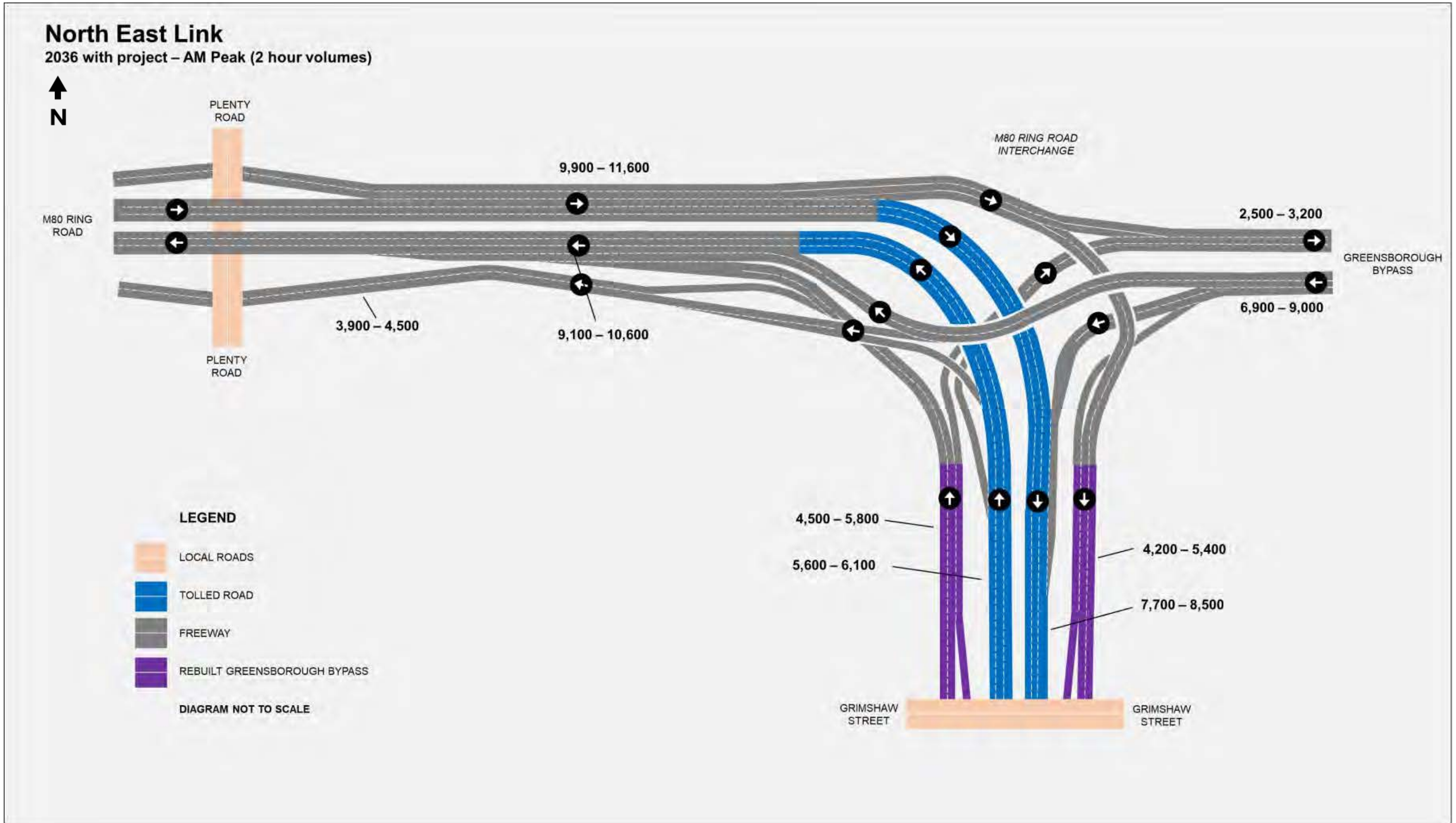


Figure 9-61 – North East Link AM peak traffic volumes – Grimshaw Street to Eastern Freeway, 2036 'with project'

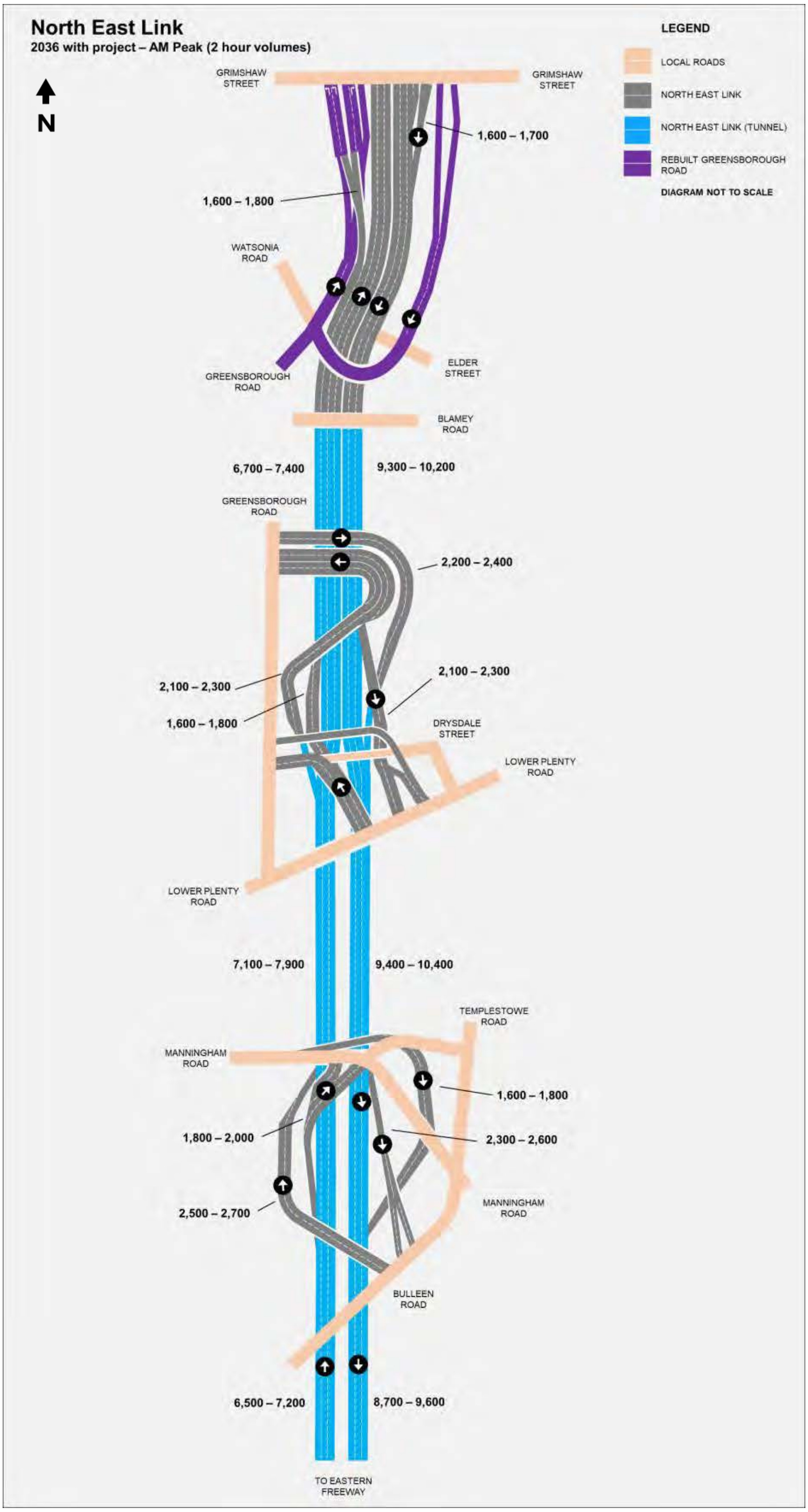


Figure 9-62 – North East Link PM peak traffic volumes – M80 Ring Road to Grimshaw Street, 2036 'with project'

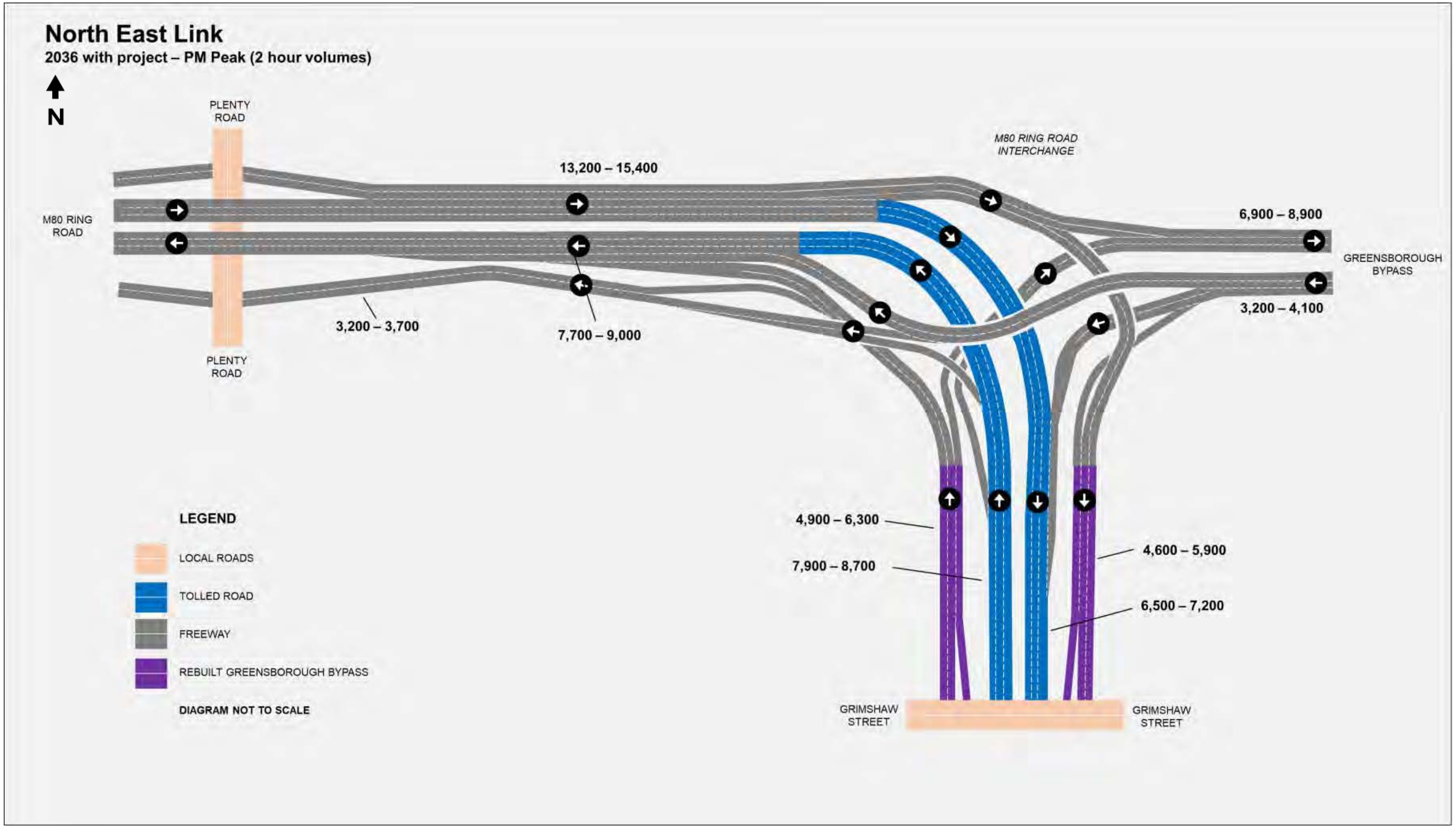
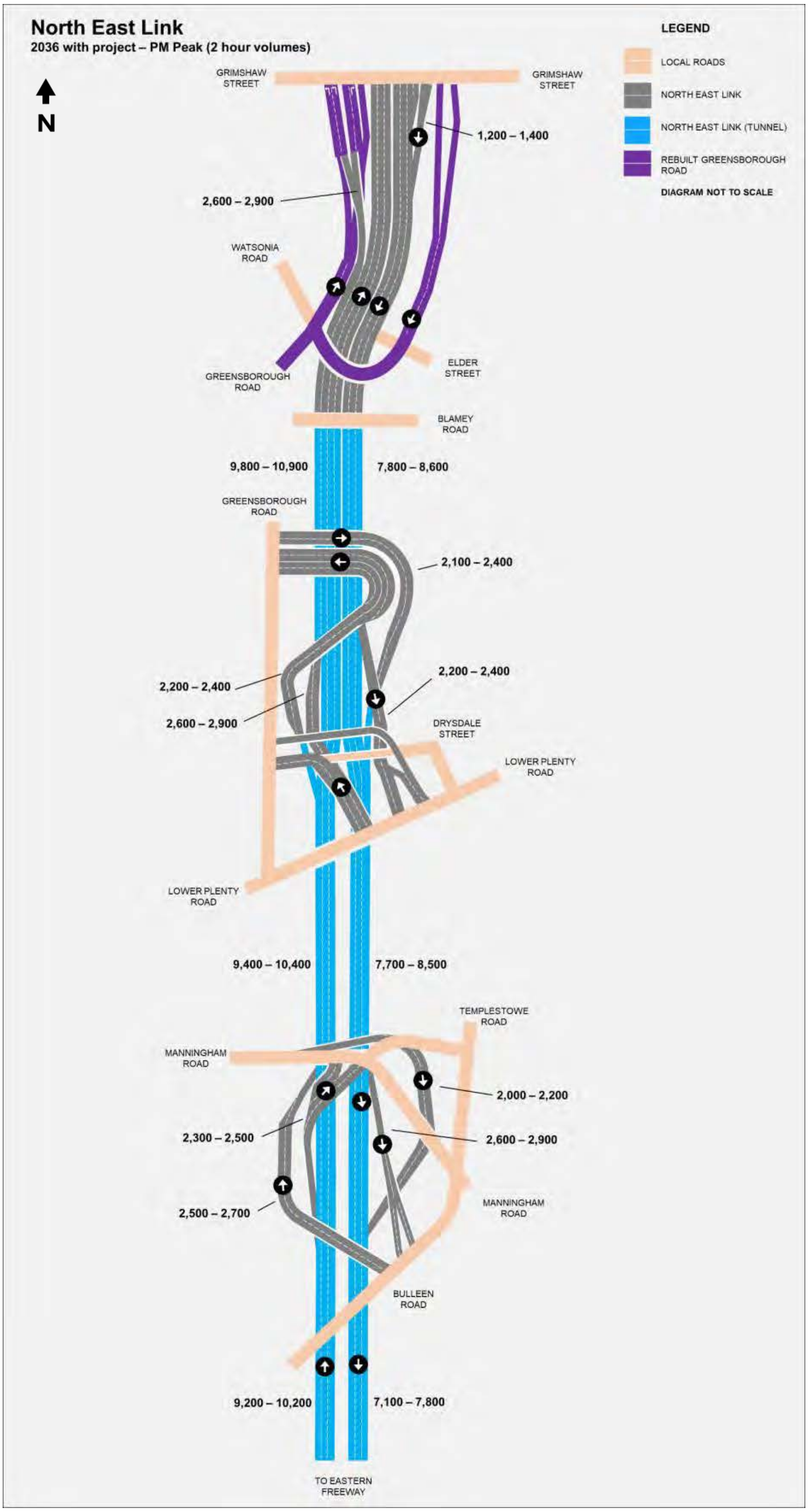


Figure 9-63 – North East Link PM peak traffic volumes – Grimshaw Street to Eastern Freeway, 2036 'with project'



9.3.2 Peak period traffic speeds

Eastern Freeway – AM peak

The schematic map in Figure 9-64 presents the 2036 'with project' Eastern Freeway traffic speeds for the first AM peak hour. The 'no project' speeds have also been provided for comparison.

Key observations include:

- Traffic speeds along the inbound and outbound mainlines improve significantly in the 'with project' scenario, operating at an average speed above 85 km/hr throughout.
- Flow breakdowns along the Middleborough Road to Bulleen Road segment which occurred in the 'no project' scenario have been relieved by the inclusion of the collector-distributor. The collector-distributor reduces weave movements by separating through (or 'express') traffic from shorter trips using the entry and exit ramps. Traffic west of Bulleen Road wishing to travel east of Middleborough Road uses the mainline carriageway, while traffic entering or exiting at any of intermediate interchanges uses the collector-distributor. By separating these movements, the demand for weave movements along the Eastern Freeway decreases, which reduces the likelihood of flow breakdown.
- The flow breakdown which occurred in the 'no project' scenario at the Springvale Road inbound merge improves through the inclusion of ramp-metering and an added lane at the entry ramp. The ramp-metering controls the entry volumes to specified levels, which reduces the overall merge demand and likelihood of flow breakdown.

The schematic map in Figure 9-65 presents the 2036 'with project' Eastern Freeway traffic speeds for the second AM peak hour. The 'no project' speeds have also been provided for comparison.

Key observations include:

- There are broad improvements to travel speeds along the Eastern Freeway mainlines and collector-distributors in both directions, with all operating above 85 km/hr.
- The flow breakdown at the Chandler Highway inbound diverge improves by reducing the demand for weave movements between Burke Road and Chandler Highway. This has been achieved by a combination of upstream ramp-metering and an additional lane to the exit ramp.
- The Springvale Road inbound merge improves due to the effects of ramp-metering and an additional lane.
- There is a slight reduction in speed for the outbound mainline in the EastLink tunnel, due to a small increase in demand during this period. In absolute terms the reduction in speed is very small at approximately 2 km/hr, as shown in Appendix E – Microsimulation results. This small change in vehicles speeds is unlikely to be noticed by drivers.

Figure 9-64 – Eastern Freeway AM peak traffic speeds, 2036 'with project' vs 2036 'no project' – first hour

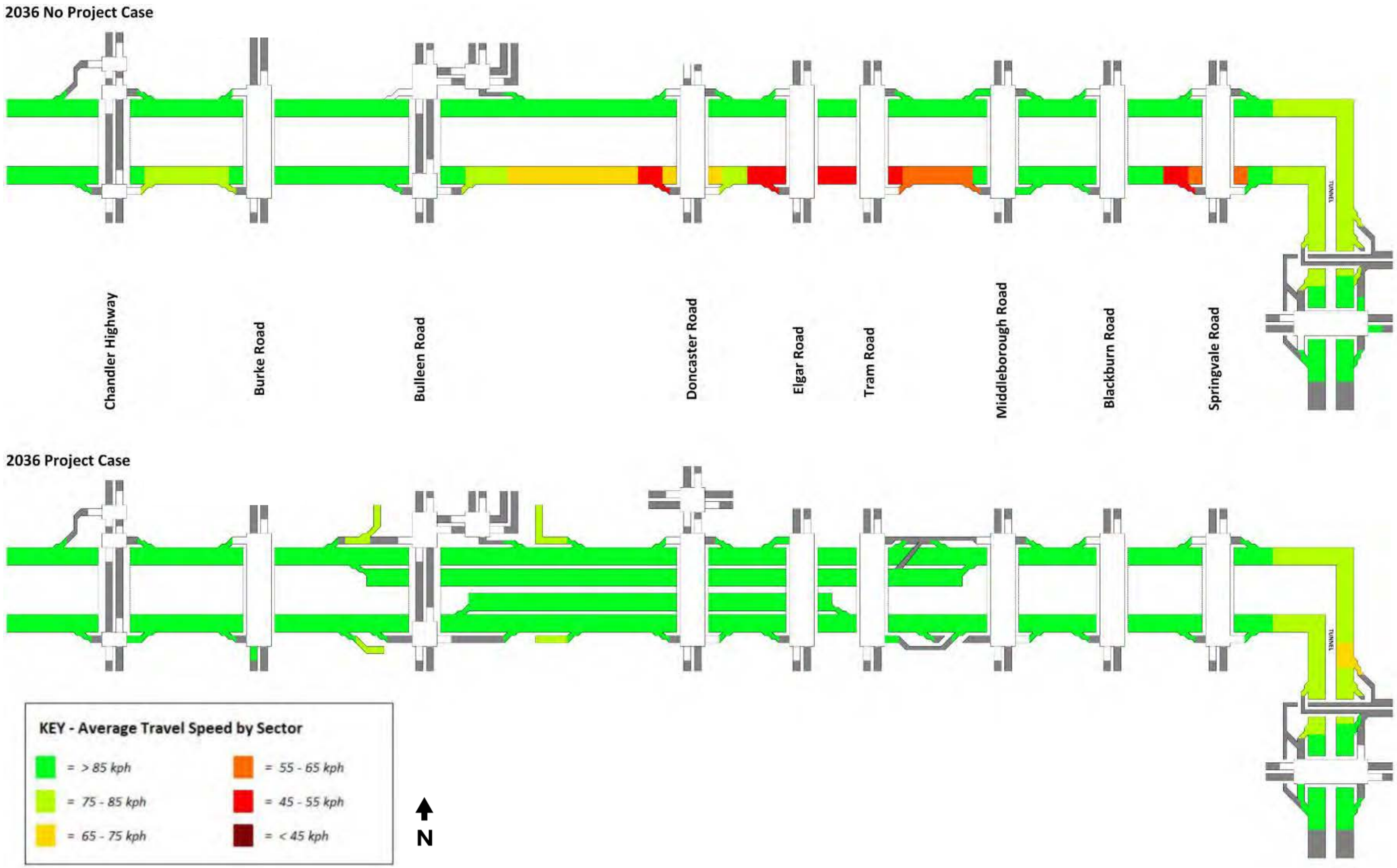
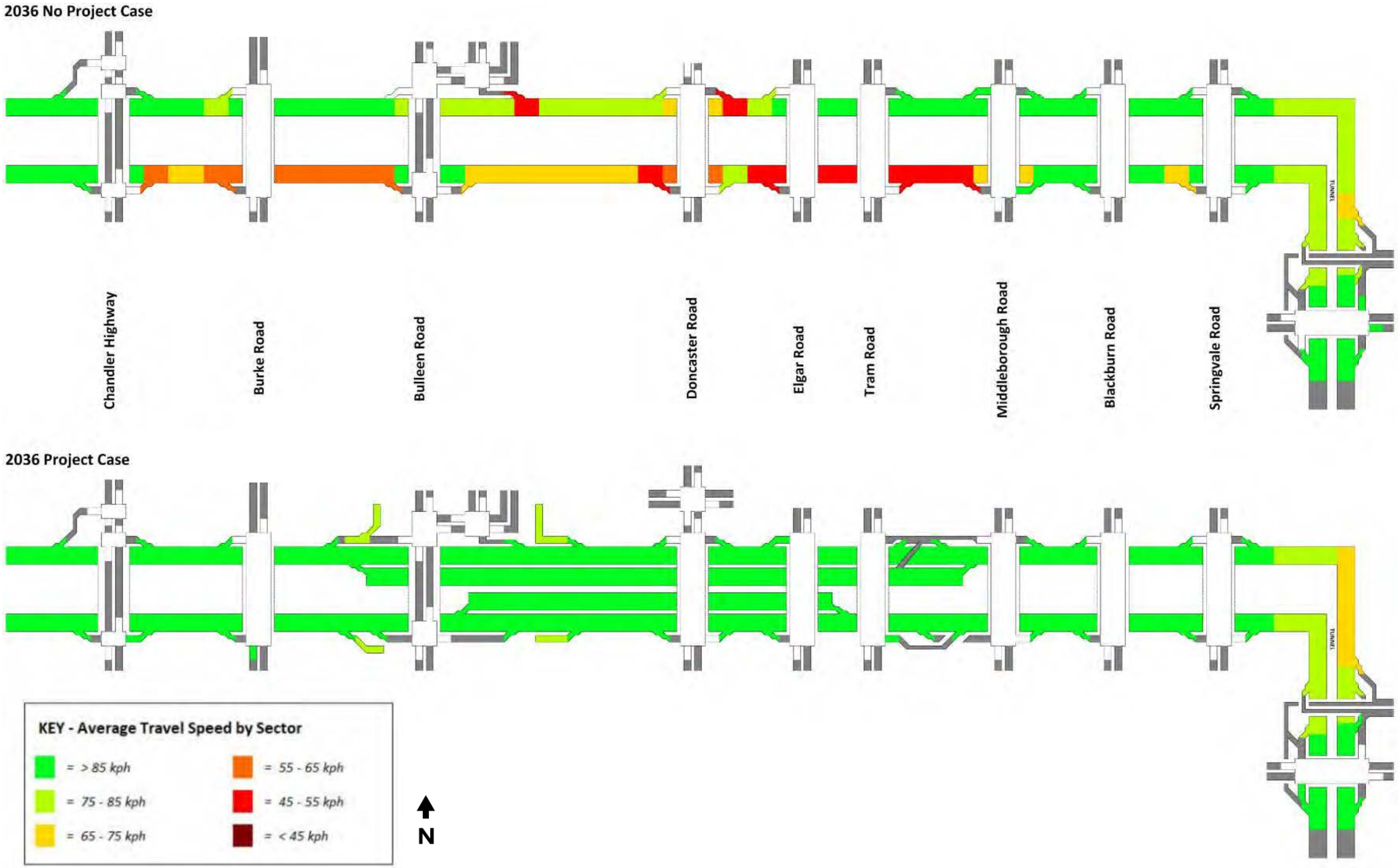


Figure 9-65 – Eastern Freeway AM peak traffic speeds, 2036 ‘with project’ vs 2036 ‘no project’ – second hour



Eastern Freeway – PM peak

The schematic map in Figure 9-66 presents the 2036 'with project' Eastern Freeway traffic speeds for the first PM peak hour. The 'no project' speeds have also been provided for comparison.

Key observations include:

- The heavy flow breakdown which occurred along the outbound mainline segment between Chandler Highway and Doncaster Road in the 'no project' case improves significantly. This segment previously operated at an average speed of 45 km/hr or less in the 'with project' scenario but operates at over 85 km/hr in the 'with project' scenario. This is due to a combination of the collector-distributor, which reduces weave movements, and ramp-metering along entry ramps which reduces demand for merge movements.
- Inbound travel speeds between Chandler Highway and Bulleen Road also improves due to the provision of ramp-metering and additional lanes meeting the forecast demand along the corridor.
- There is a slight reduction in speed for the outbound mainline in the EastLink tunnel, due to a small increase in demand during this period. In absolute terms the reduction in speed is very small at approximately 3 km/hr, which is shown in Appendix E – Microsimulation results.

The schematic map in Figure 9-67 presents the 2036 'with project' Eastern Freeway traffic speeds for the second PM peak hour. The 'no project' speeds have also been provided for comparison.

Key observations include:

- The project case addresses the heavy flow breakdown which occurred along the outbound mainline segment between Chandler Highway and Doncaster Road in the 'no project' case. In the 2036 'with project' scenario this segment operates at an average speed of over 85 km/hr. This is due to a combination of the collector-distributor, which reduces weave movements, and ramp-metering along entry ramps which reduces demand for merge movements.
- Inbound travel speeds east of Elgar Road improve, due to the ramp-metering effects on the Elgar Road inbound on-ramp.
- Inbound travel speeds between Chandler Highway and Bulleen Road also improve due to the provision of ramp-metering and additional lanes meeting the forecast demand along the corridor.

Figure 9-66 – Eastern Freeway PM peak traffic speeds, 2036 ‘with project’ vs 2036 ‘no project’ – first hour

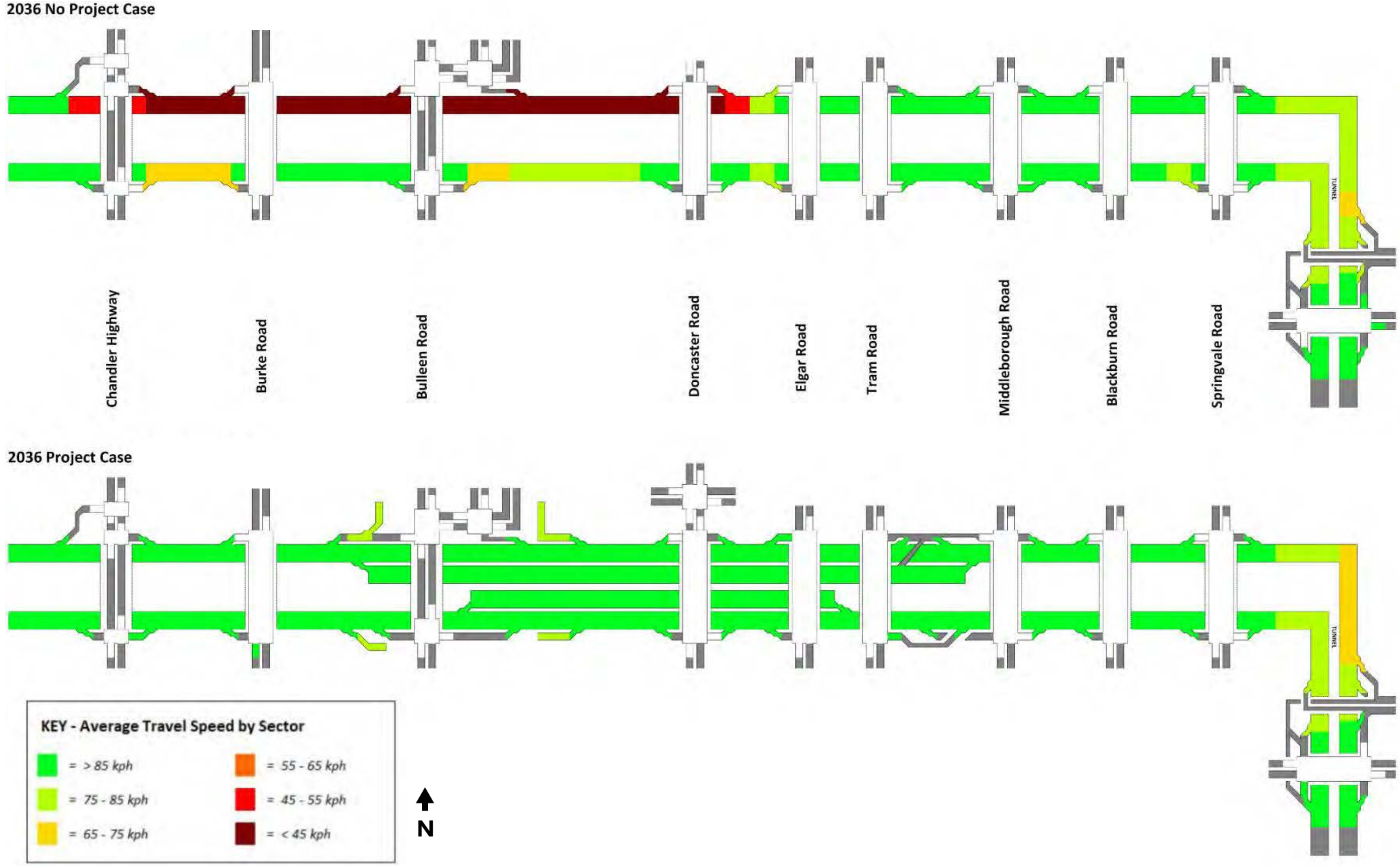
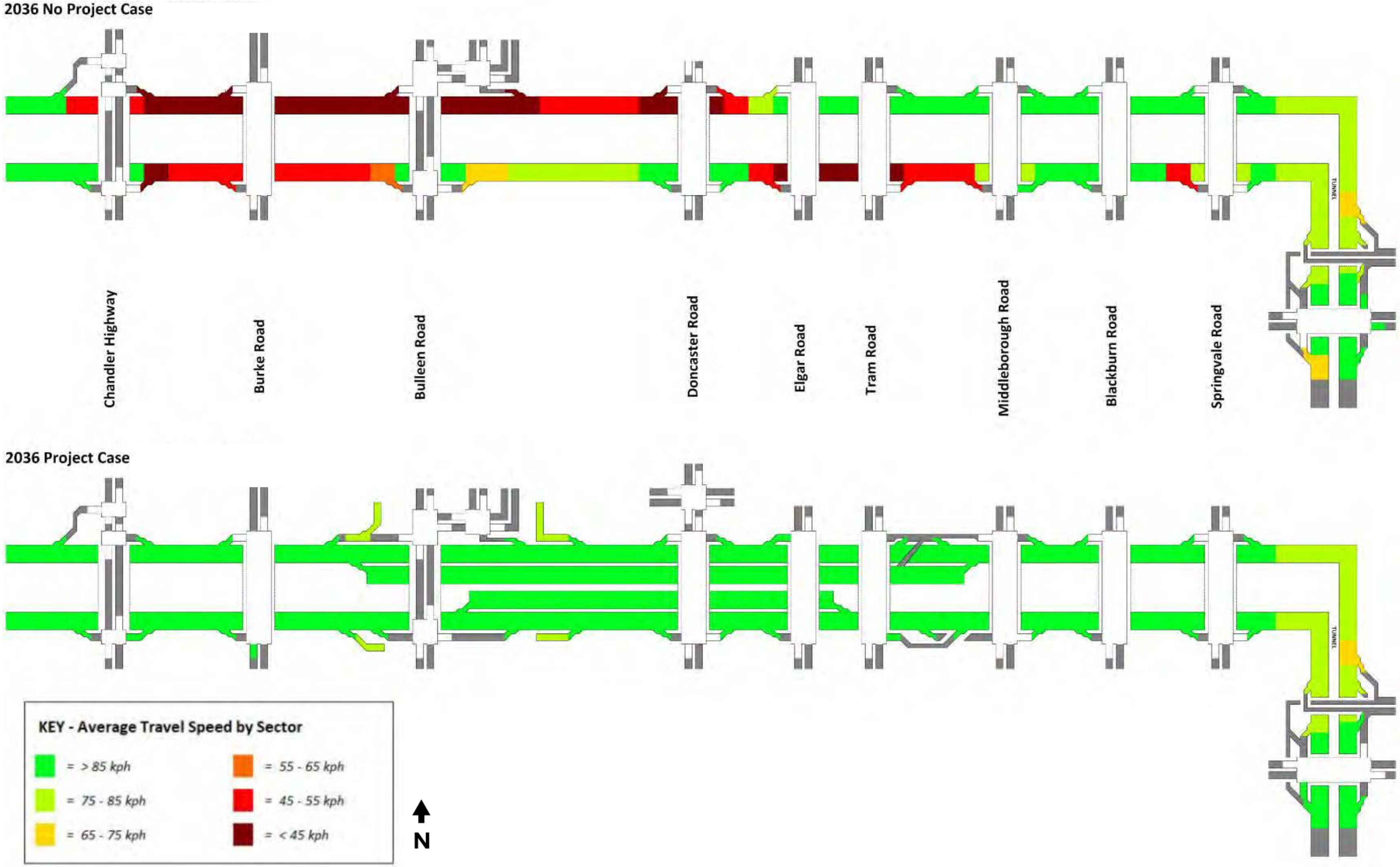


Figure 9-67 – Eastern Freeway PM peak traffic speeds, 2036 'with project' vs 2036 'no project' – second hour



M80 Ring Road interchange – AM peak and PM peak

The schematic maps in Figure 9-68 to Figure 9-71 present the 2036 'with project' M80 Ring Road and North East Link corridor speeds for the AM and PM peak hours. The 2036 'no project' speeds have also been provided for comparison.

Across all periods there is a significant improvement in average traffic speeds along the eastbound M80 Ring Road mainline, east of Plenty Road. In the 'no project' scenario speeds along this section average less than 45 km/hr but increase to over 85 km/hr in the 'with project' scenario. This is due to the removal of the freeway terminus at the Greensborough Bypass interchange which caused extensive queuing the in the 'no project' scenario.

Travel speeds along the North East Link mainline between the M80 Ring Road and the tunnel portal north of Lower Plenty Road are forecast to be over 85 km/hr. The collector-distributors and the mainline within the tunnel (between Lower Plenty Road the Eastern Freeway) have sign-posted speeds of 80 km/hr, which is reflected in the schematic maps.

Figure 9-68 – M80 Ring Road interchange AM peak traffic speeds, 2036 'with project' vs 2036 'no project' – first hour

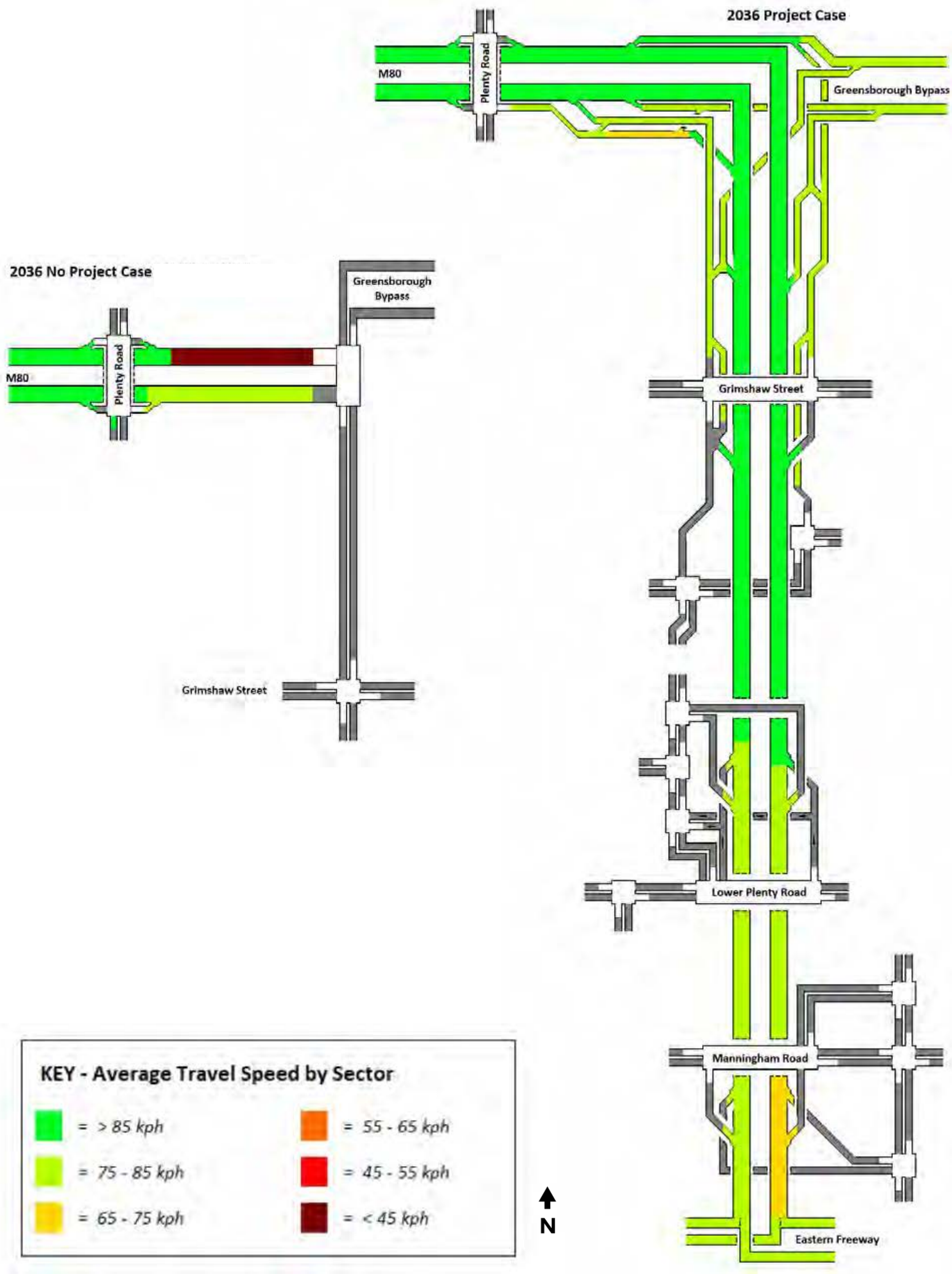


Figure 9-69 – M80 Ring Road interchange AM peak traffic speeds, 2036 'with project' vs 2036 'no project' – second hour

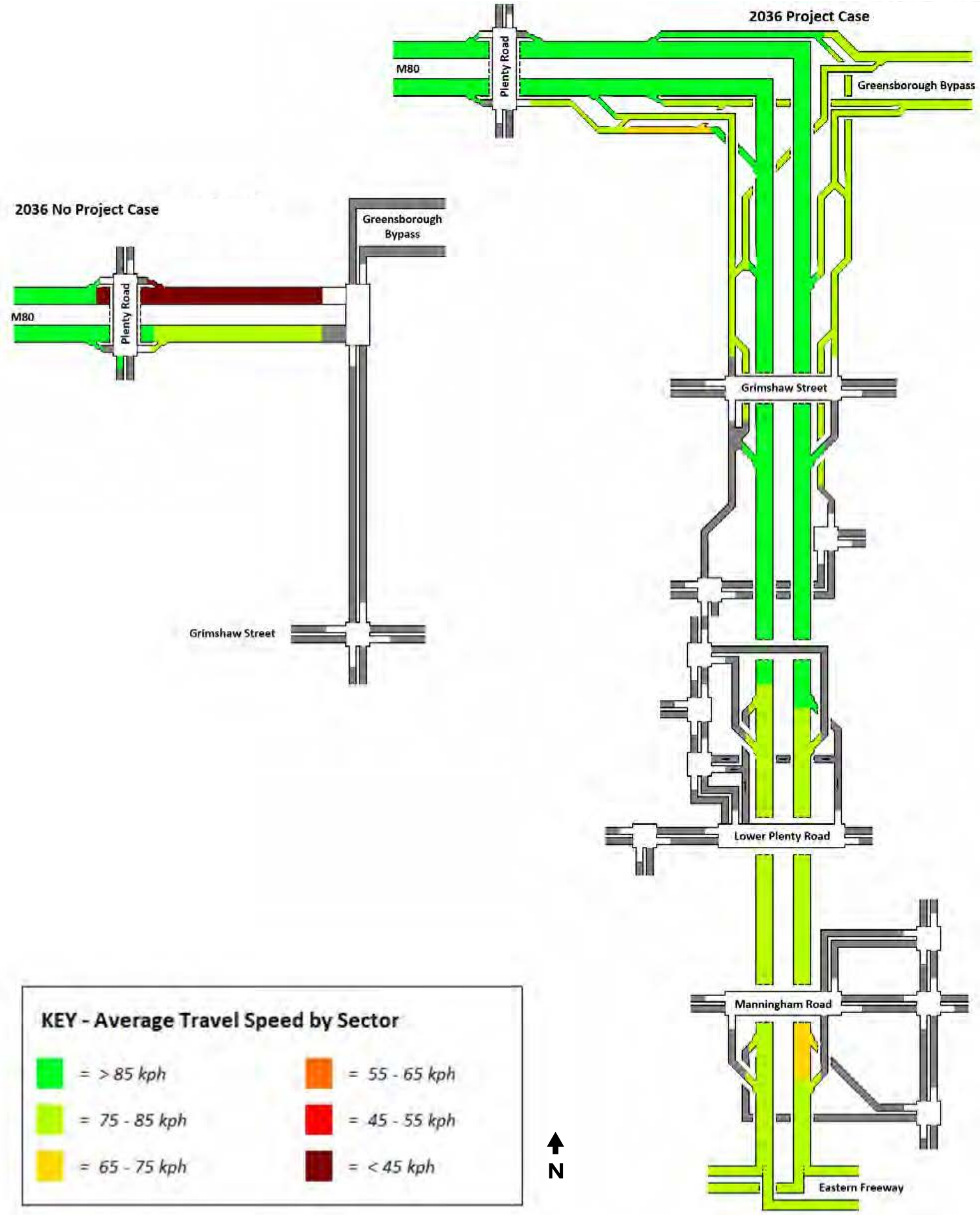


Figure 9-70 – M80 Ring Road interchange PM peak traffic speeds, 2036 'with project' vs 2036 'no project' – first hour

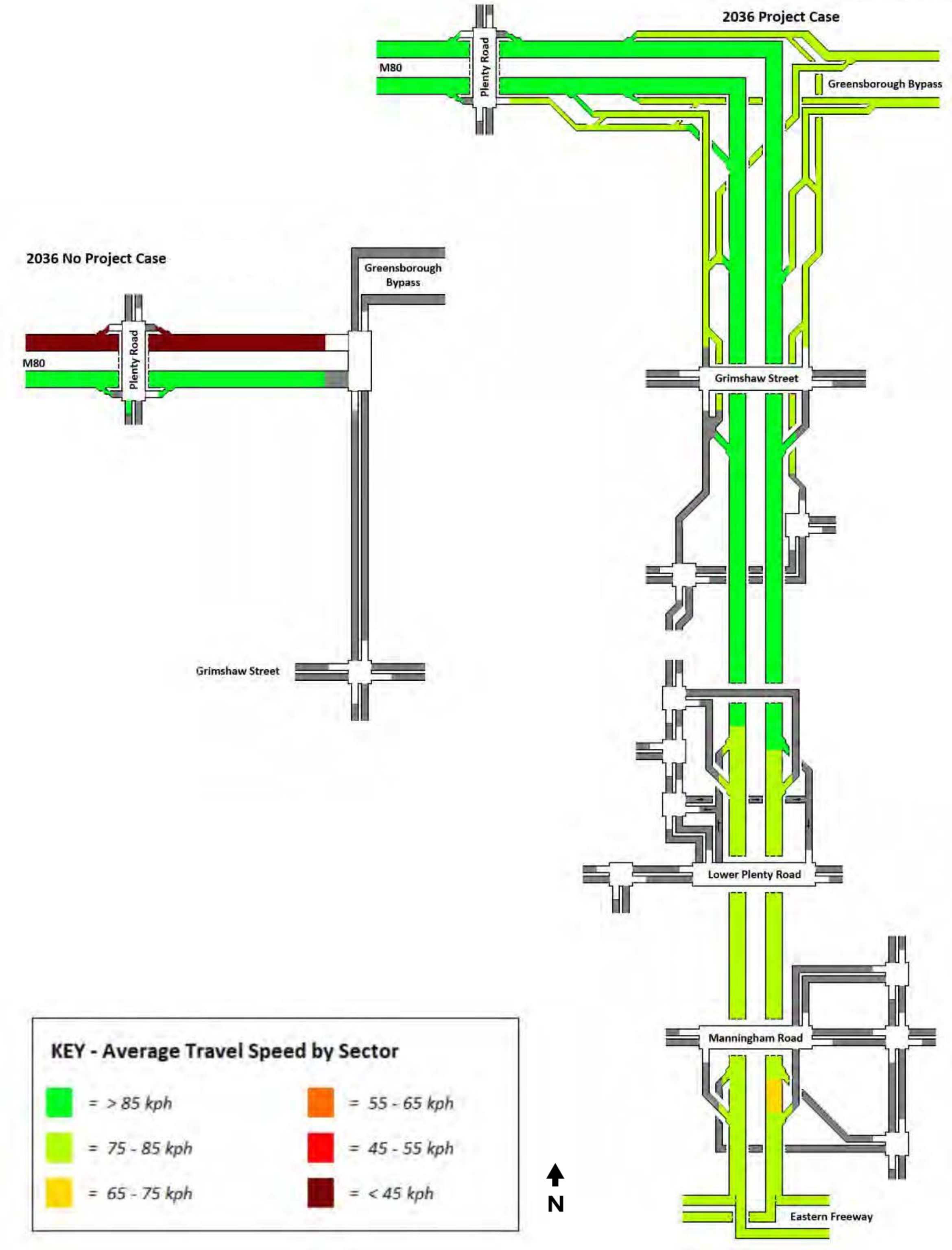
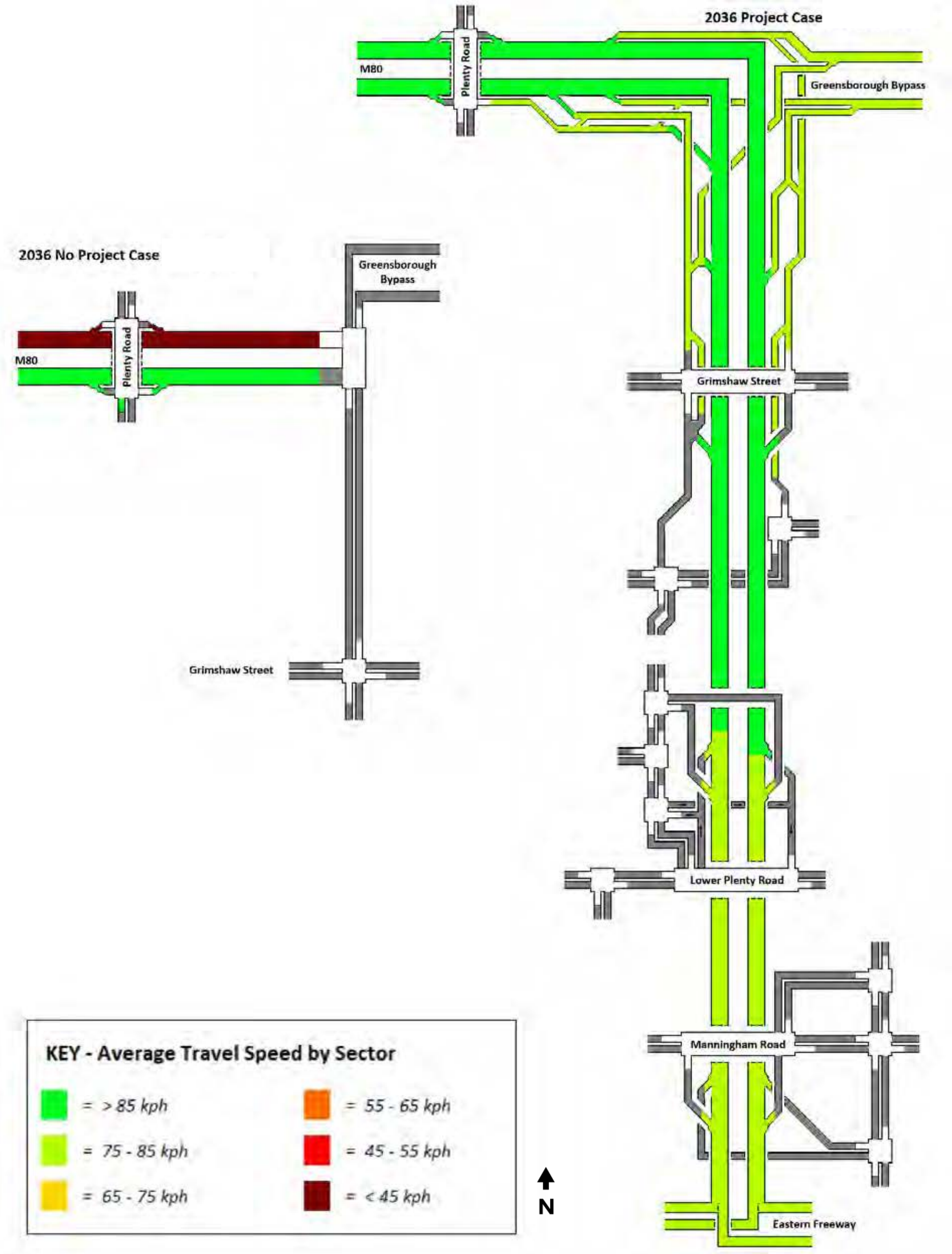


Figure 9-71 – M80 Ring Road interchange PM peak traffic speeds, 2036 'with project' vs 2036 'no project' – second hour



9.3.3 Peak period Level of Service

This section presents the Level of Service assessment along the project corridors. As discussed in Section 8.3.1, freeways use a density-based Level of Service which measures the volume of traffic demand per unit length. Freeway interchanges and signalised arterial road intersections alternatively use a delay-based Level of Service, which reflects time spent waiting at signals. A Level of Service D is deemed the minimum acceptable standard for both freeways and signalised intersections. For signalised intersections, the Level of Service D target is for the whole intersection, not individual approaches.

Traffic signal cycle times have been kept constant between the ‘no project’ and ‘with project’ scenarios, however phase times may have been altered to allow for changes in traffic distribution. Pedestrian phases have been called every cycle to maintain pedestrian movements and minimise delays.

The density-based Level of Service for freeways is suited for locations where the speed limit is 100 km/hr or above, and is not suited for locations with speed limits lower than 100 km/hr. As such, in these locations the Level of Service are not assessed and vehicle speeds are alternatively used as the primary performance indicator.

Eastern Freeway – AM peak

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the first AM peak hour are presented in Figure 9-72 and Figure 9-73.

Key observations include:

- All inbound and outbound mainlines and collector-distributors operate at a Level of Service D or better. This is a significant improvement above ‘no project’ conditions, particularly for the inbound mainline segment between Middleborough Road and Bulleen Road, which is forecast to operate at a Level of Service F. This is largely due to the separation of weave and express movements (via the mainline and collector-distributor) along this section.
- The inbound mainline between Burke Road and Chandler Highway improves from a Level of Service E to D. The inbound off-ramp to Chandler Highway also improves from a Level of Service F to C. The changes in performance are due to upgrading the inbound off-ramp at Chandler Highway to two lanes. This provides additional capacity and prevents traffic from queuing back and impacting the performance of the freeway mainline. It is further assisted by the ramp-metering at upstream locations along Burke Road and Bulleen Road/North East Link, which manages demand along the Eastern Freeway.
- Another key area of improvement is in the vicinity of the Springvale Road interchange. In the ‘no project’ scenario, the inbound mainline operates at a Level of Service E or F between Blackburn Road and Springvale Road. In the project scenario, the Blackburn Road inbound merge is ramp-metered, which controls the entry volumes and reduces merge issues. The mainline also has additional capacity between Blackburn Road and Springvale Road, with the addition of a fourth lane.
- Level of Service at the Springvale Road interchange and the intersection at Ashwood Drive (south of the Eastern Freeway) improves significantly in the ‘with project’ scenario. This is primarily due to the additional storage provided on the citybound ramps, which prevents queueing along Springvale Road. In the ‘no project’ scenario this queueing impedes traffic attempting to travel north across the Eastern Freeway causing extensive delays.

- The intersections at Doncaster Road/Gardenia Road and Elgar Road/Eastern Freeway both decrease by one Level of Service, however they still operate at a Level of Service C in the ‘with project’ scenario. The performance improvements of neighbouring intersections are likely to offset this and lead to lower overall traffic delays in the area.
- A small number of individual intersection approaches servicing bus routes worsen in the ‘with project’ scenario such as the Elgar Road northbound approach at Belmore Road (routes 281, 293 and 302). Although the performance of this individual movement does worsen in the ‘with project’ scenario, the whole-of-route travel time for these buses would improve due to decongestion of the arterial road network. This is discussed in further detail in Section 9.6.

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the second AM peak hour are presented in Figure 9-74 and Figure 9-75.

Key observations include:

- All inbound and outbound mainlines and collector-distributors operate at a Level of Service D or better. This is again a significant improvement over the ‘no project’ scenario, where the inbound mainline typically operated at a Level of Service E or F. The inclusion of the collector distributor system has alleviated congestion around the most constrained section of Bulleen Road to Doncaster Road which improves upstream traffic performance.
- The heavy weave observed in the 2036 ‘no project’ case between Burke Road and Chandler Highway has been alleviated by a combination of additional lanes and ramp-metering.
- The Doncaster Road intersection at High Street improves from a Level of Service E to D. This is due to the proposed changes at the Doncaster Road interchange which allows for a more streamlined operation of the interchange and the intersection with High Street. This reduces delays and congestion at both intersections. The Bulleen Road/Thompsons Road interchange improves from a Level of Service E/F to C/D. This is again due to the improvements at the interchange with the Eastern Freeway, specifically the merge from the eastbound entry ramp. This means that queueing and delays on the nearby arterial road network are reduced, particularly for the southbound movement along Bulleen Road.
- The Burke Road/MacArthur Road intersection improves from a Level of Service F to D. This is primarily due to the reduction in north-south traffic along Burke Road, which improves the ease of access of traffic from MacArthur Road.

Figure 9-72 – Eastern Freeway AM peak Level of Service, 2036 'with project' – Chandler Highway to Doncaster Road – first hour

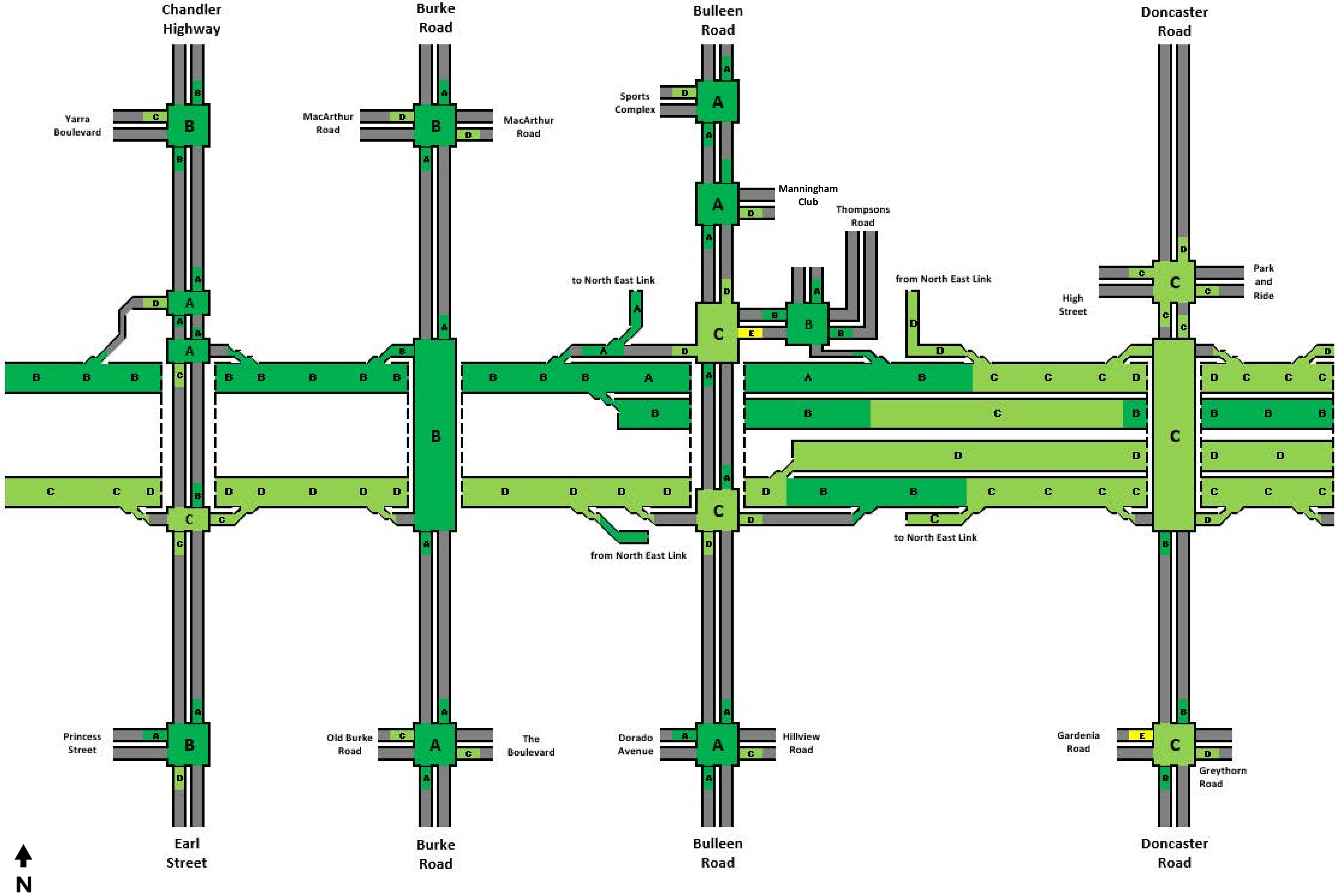


Figure 9-73 – Eastern Freeway AM peak Level of Service, 2036 ‘with project’ – Elgar Road to Springvale Road – first hour

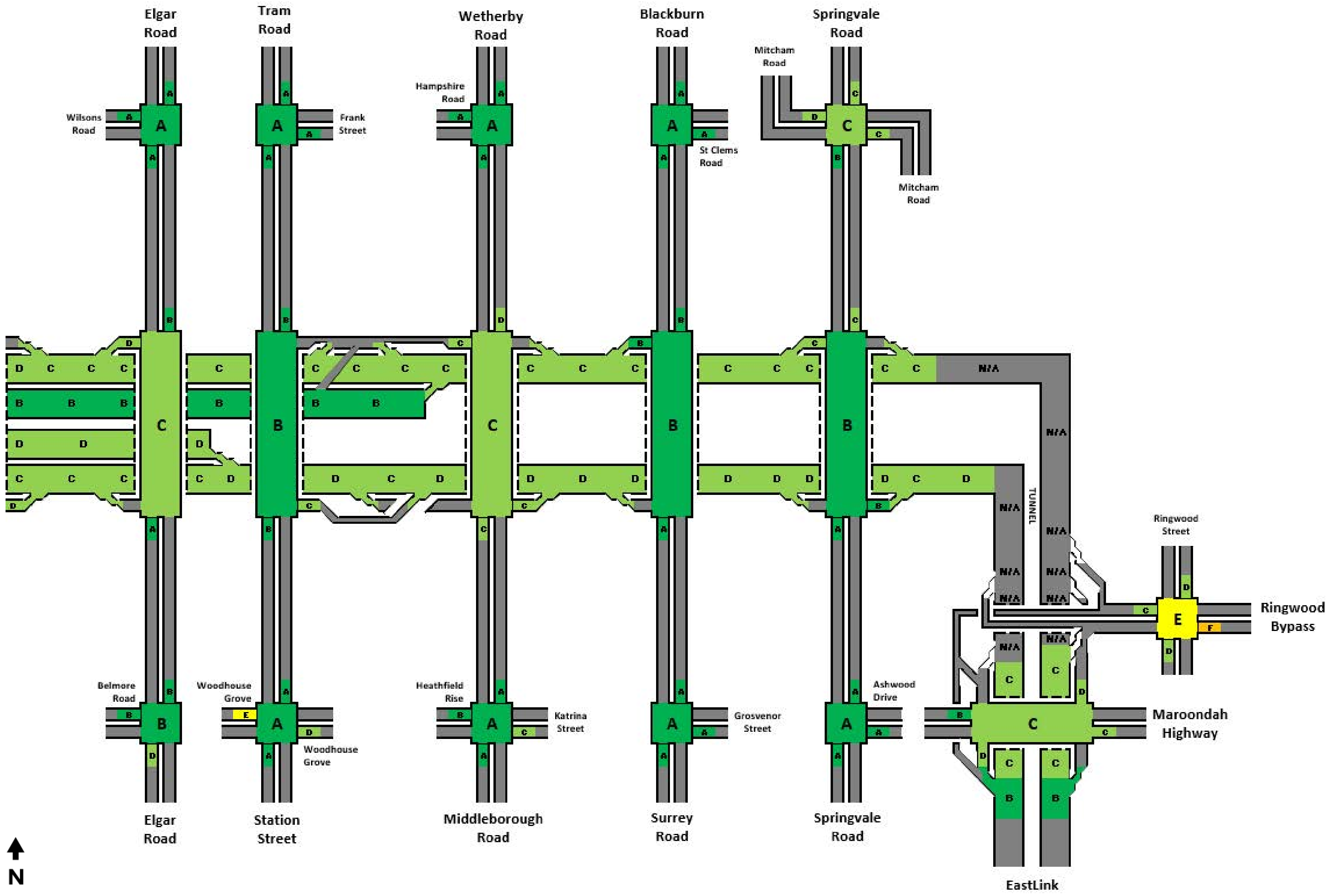


Figure 9-74 – Eastern Freeway AM peak Level of Service, 2036 'with project' – Chandler Highway to Doncaster Road – second hour

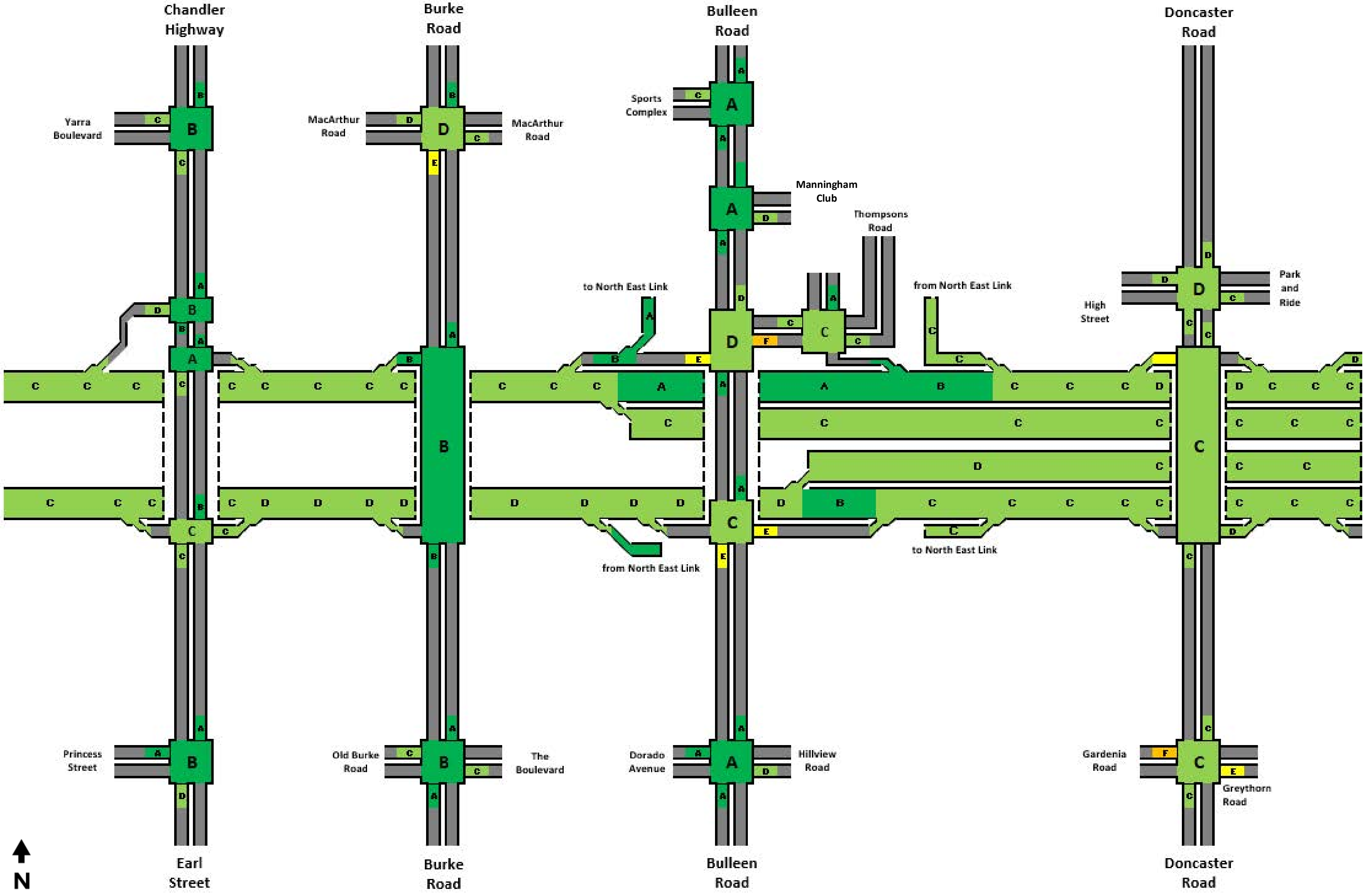
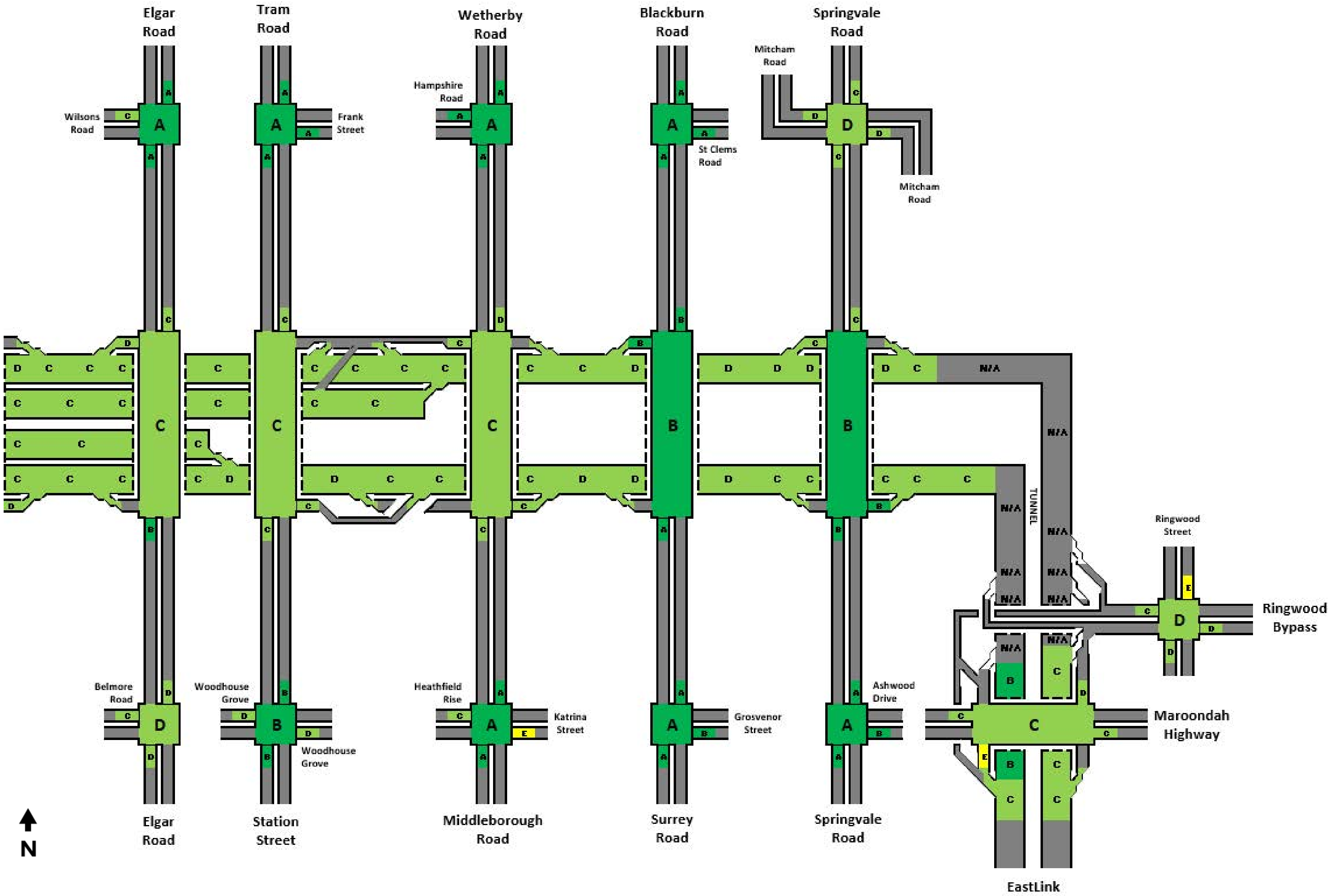


Figure 9-75 – Eastern Freeway AM peak Level of Service, 2036 'with project' – Elgar Road to Springvale Road – second hour



Eastern Freeway – PM peak

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the first PM peak hour are presented in Figure 9-76 and Figure 9-77.

Key observations include:

- All inbound and outbound mainlines and collector-distributors operate at a Level of Service D or better. This is a significant improvement above 'no project' conditions, particularly for the outbound mainline segment between Chandler Highway and Elgar Road, which operated at a Level of Service E or F. This is largely due to the separation of weave and express movements (via the mainline and collector-distributor) along this section.
- The heavy inbound weave observed in the 2036 'no project' case between Burke Road and Chandler Highway has been alleviated by a combination of additional lanes and ramp-metering.
- The Chandler Highway/Yarra Boulevard intersection improves from a Level of Service F to C, primarily due to improvements at the Eastern Freeway interchange. This includes additional storage on the eastbound entry ramp which reduces queueing for southbound traffic along Chandler Highway.
- A small number of individual intersection approaches servicing bus routes worsen in the 'with project' scenario. This includes the Katrina Street westbound approach at Middleborough Road (route 270), and the Yarra Boulevard eastbound approach at Chandler Highway (route 609). Although the performance of these individual movements does worsen in the 'with project' scenario, the whole-of-route travel time for these buses improves due to the decongestion of the north-eastern arterial road network. This is discussed in further detail in Section 9.6.

Schematic maps outlining the modelled Level of Service along the Eastern Freeway for the second PM peak hour are presented in Figure 9-78 and Figure 9-79.

Key observations include:

- All inbound and outbound mainlines and collector-distributors operate at a Level of Service D or better. This is again a significant improvement over the 'no project' scenario, where much of the inbound and outbound mainlines operated at Level of Service E or F.
- The Bulleen Road intersection at Thompsons Road improves from a Level of Service E to C. This is due to the changes in vehicle mix at the intersection with reduced numbers of heavy vehicles which improves the overall performance. Traffic patterns also change at the interchange due to North East Link.
- Improvements at the Bulleen Road intersection with Thompsons Road has upstream effects at further north on Bulleen Road. At the intersection with the sports complex, the Level of Service improves from E to A, primarily due to the reduction in queueing further south.
- The Doncaster Road intersection at High Street improves from a Level of Service E to D. This is again due to the proposed changes at the Doncaster Road interchange which allows for a more streamlined operation of the interchange and the intersection with High Street. This reduces delays and congestion at both intersections.

Figure 9-76 – Eastern Freeway PM peak Level of Service, 2036 'with project' – Chandler Highway to Doncaster Road – first hour

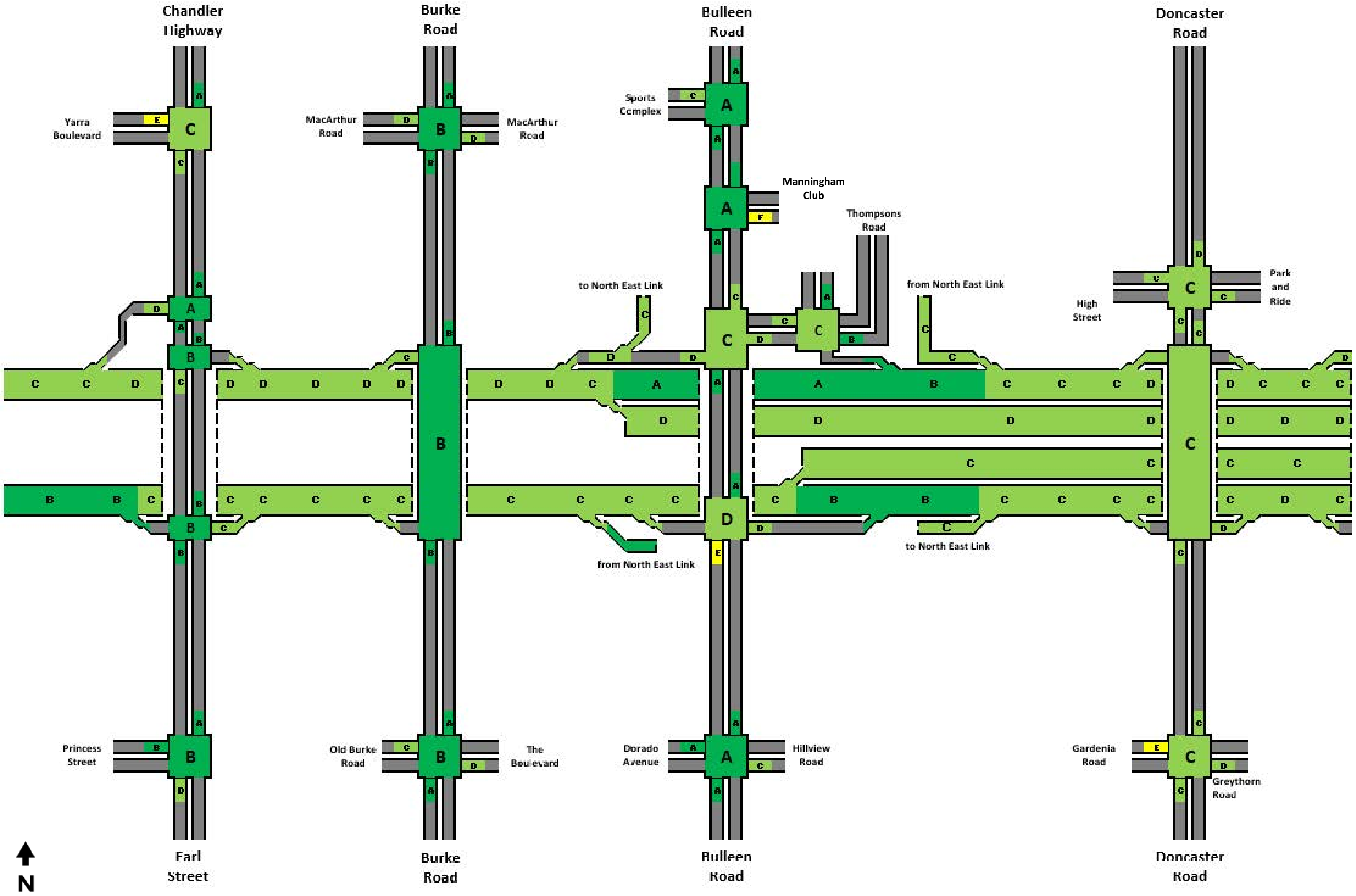


Figure 9-77 – Eastern Freeway PM peak Level of Service, 2036 ‘with project’ – Elgar Road to Springvale Road – first hour

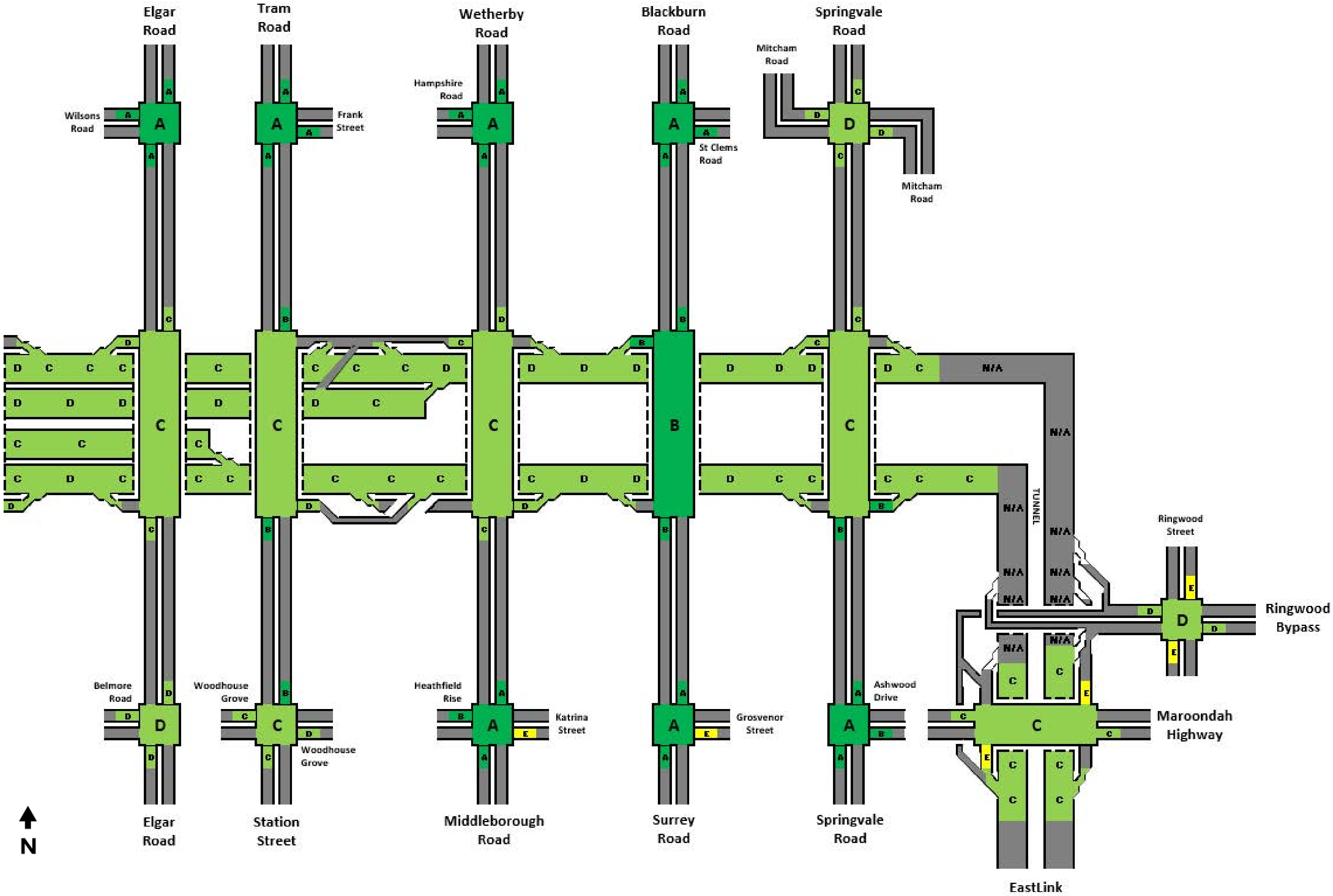


Figure 9-78 – Eastern Freeway PM peak Level of Service, 2036 'with project' – Chandler Highway to Doncaster Road – second hour

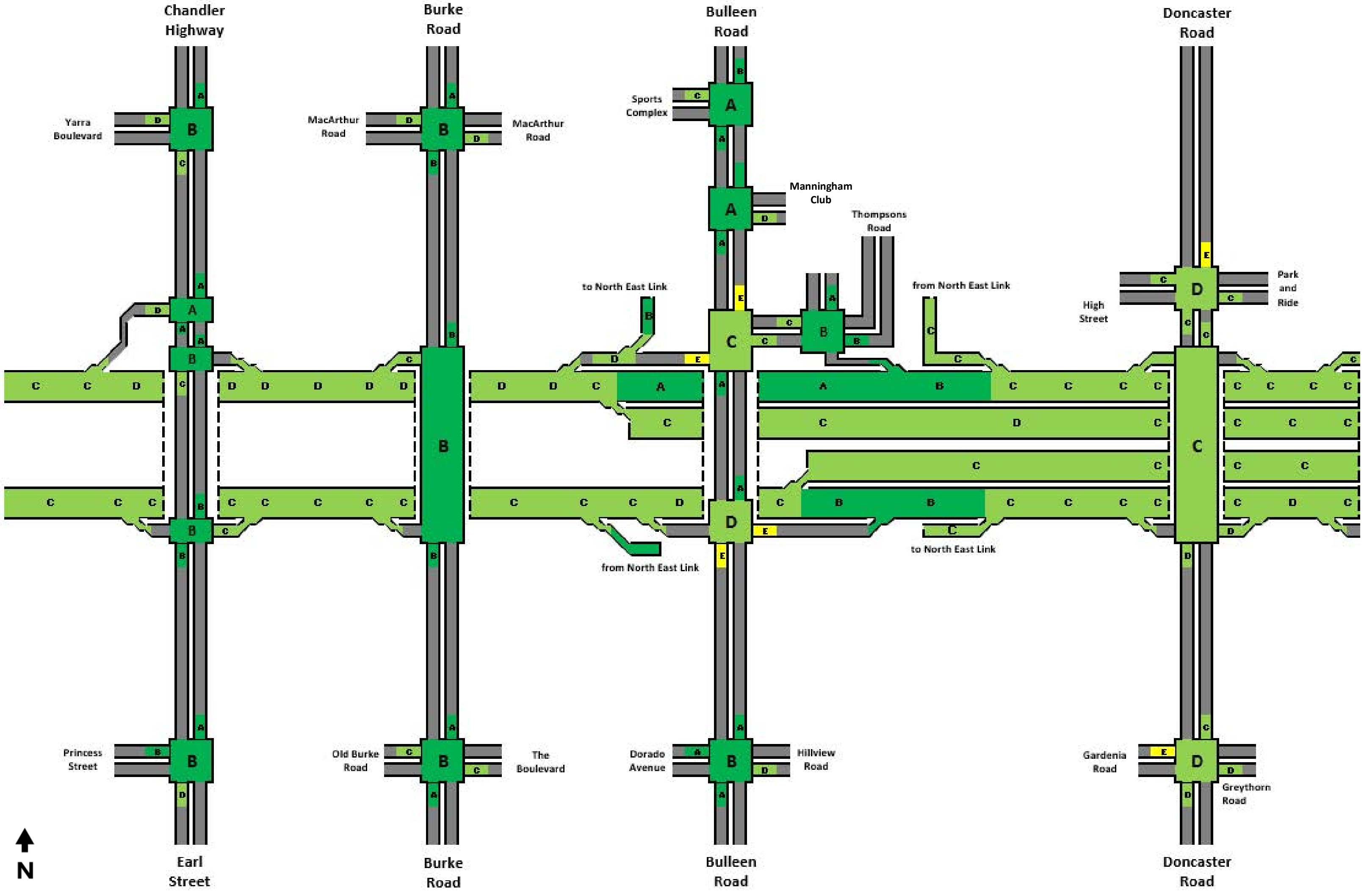
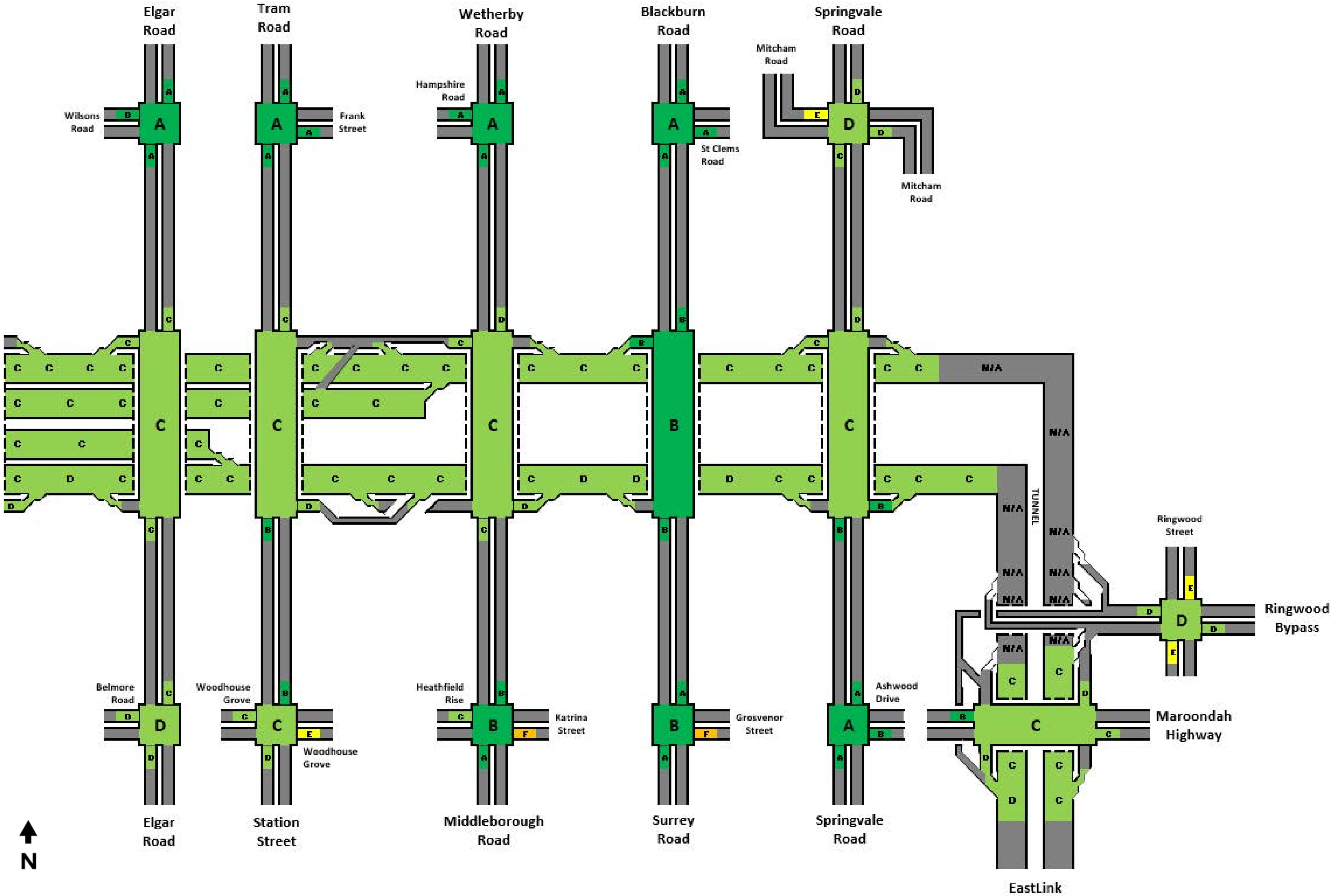


Figure 9-79 – Eastern Freeway PM peak Level of Service, 2036 'with project' – Elgar Road to Springvale Road – second hour



M80 Ring Road and North East Link corridor – AM peak and PM peak

The following schematic maps have been prepared, representing the modelled Level of Service along the M80 Ring Road and North East Link corridor:

- The first AM peak hour is presented in Figure 9-80 and Figure 9-81
- The second AM peak hour is presented in Figure 9-82 and Figure 9-83
- The first PM peak hour is presented in Figure 9-84 and Figure 9-85
- The second PM peak hour is presented in Figure 9-86 and Figure 9-87.

The speed limit in the North East Link tunnels (which approximately span north of Lower Plenty Road to north of the Eastern Freeway) is 80 km/hr. The density-based Level of Service calculation for freeways is suited for locations where the speed limit is 100 km/hr or above, and is not suited for locations with a speed limit lower than 100 km/hr. As such, the Level of Service is not assessed within the North East Link tunnels.

Key observations include:

- Across all periods, the M80 Ring Road and North East Link freeways generally operate at Level of Service of B to D. Removal of the freeway terminus at the M80 Ring Road/Greensborough Bypass interchange reduces the extent of queueing which led to heavy flow breakdown in the 'no project' scenario.
- All North East Link interchanges (at Grimshaw Street, Lower Plenty Road and Manningham Road) operate at Level of Service D or better.
- In the 2036 'no project' scenario the Greensborough Bypass intersection at Grimshaw Street operated at Level of Service F. In the 'with project' scenario the Grimshaw Street interchange operates at a Level of Service D across all assessed periods. This is due to the reduction in overall traffic demand along Greensborough Bypass and Greensborough Road, which reduces the likelihood of queues at signalised intersections.
- The Greensborough Bypass intersections at Elder Street and Watsonia Road generally operated at a Level of Service E/F in the 'no project' scenario. Traffic performance along these intersections improves in the 2036 'with project' scenario to Level of Service C or better due to a general reduction in traffic demand along Greensborough Bypass.
- The Greensborough Road/Erskine Road intersection improves from a Level of Service E/F to C.
- The performance of the Lower Plenty Road/Rosanna Road and Bulleen Road/Manningham Road intersections in the PM peak improves significantly from the 'no project' scenario, where they operated at a Level of Service E/F. Both intersections operate at a Level of Service D or better in the 'with project' scenario.

Figure 9-80 – M80 Ring Road and North East Link corridor AM peak Level of Service, 2036 'with project' – M80 Ring Road to Watsonia Road – first hour

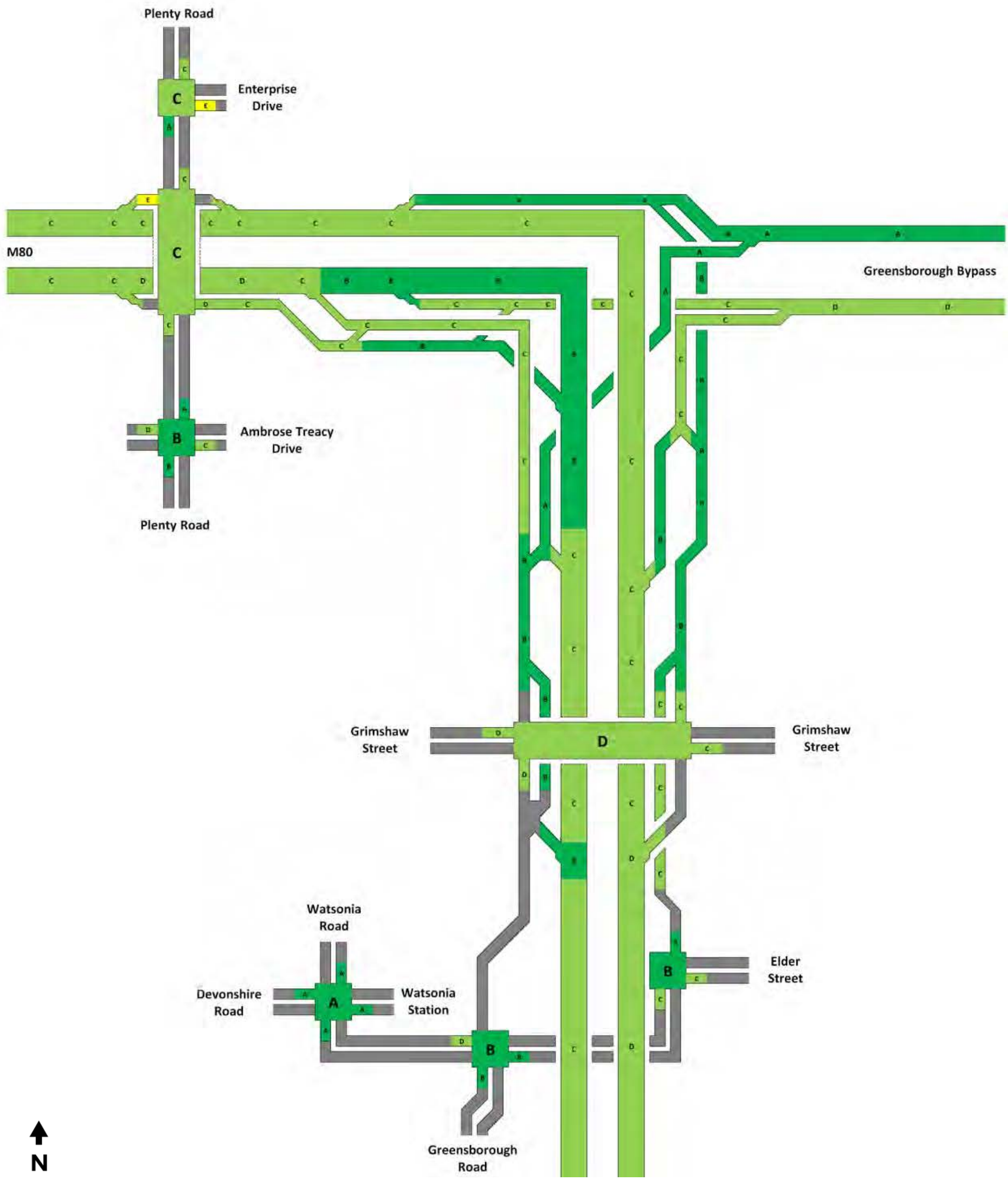


Figure 9-81 – M80 Ring Road and North East Link corridor AM peak Level of Service, 2036 'with project' – Lower Plenty Road and Manningham Road – first hour

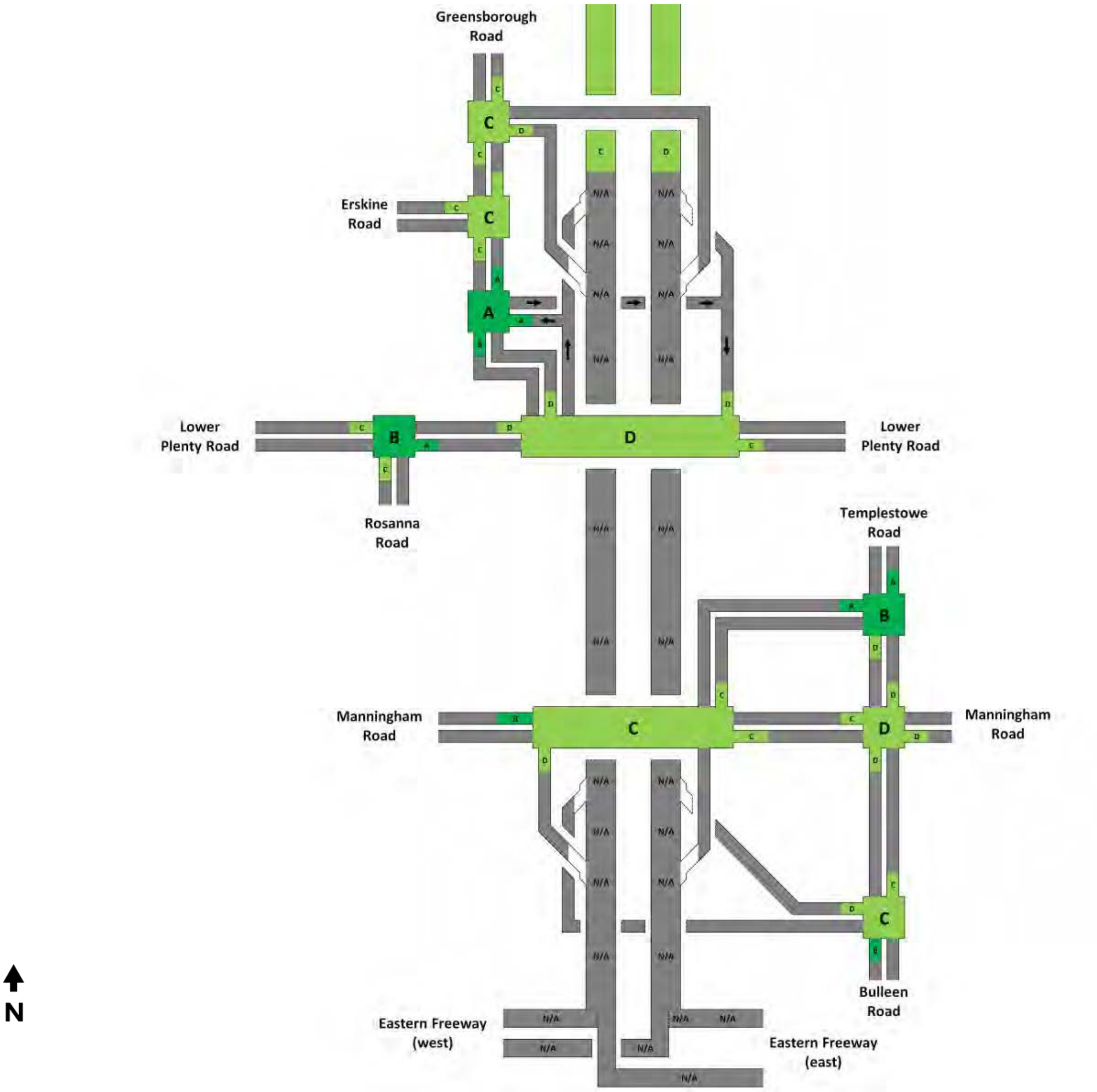


Figure 9-82 – M80 Ring Road and North East Link corridor AM peak Level of Service, 2036 ‘with project’ – M80 Ring Road to Watsonia Road – second hour

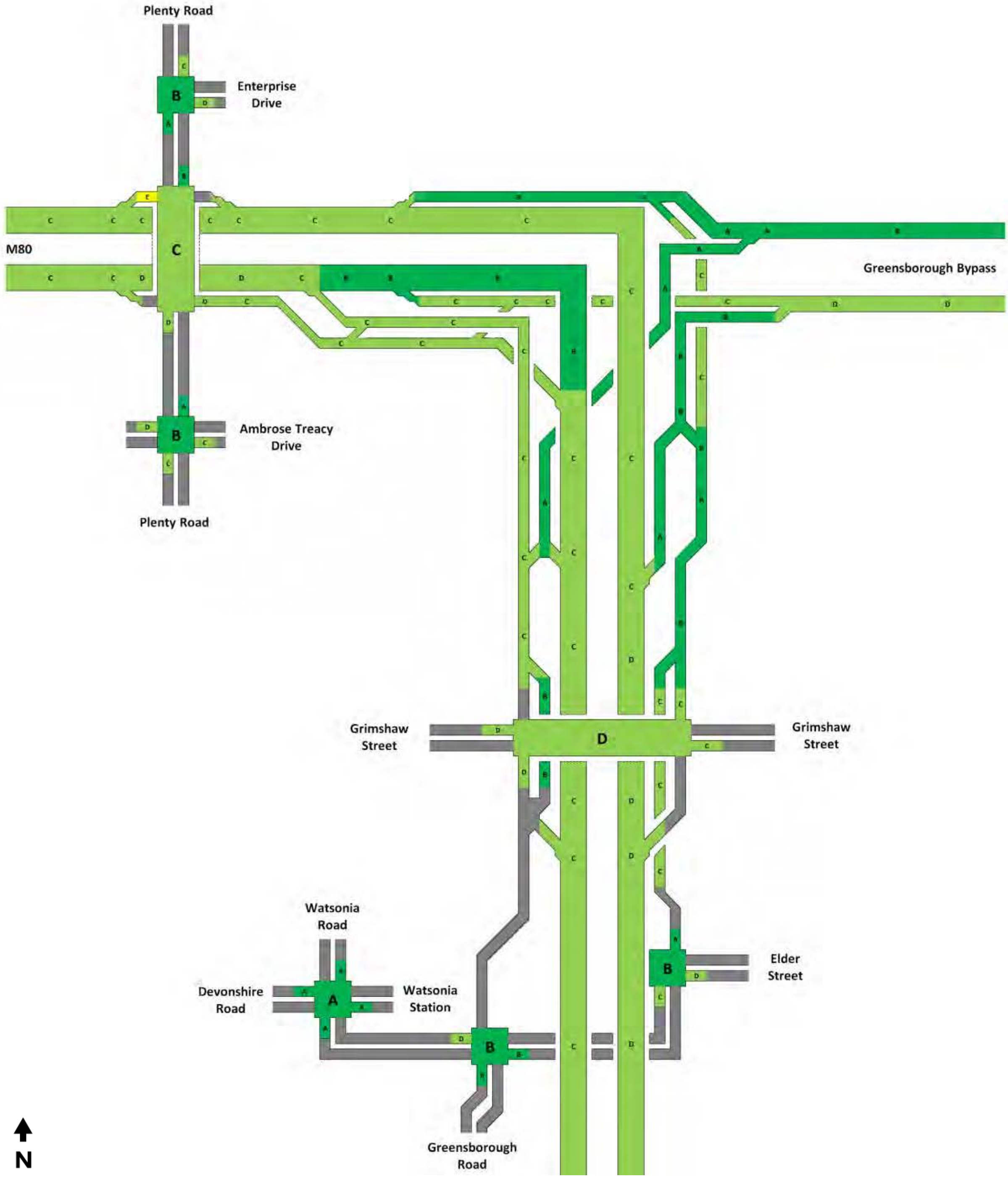


Figure 9-83 – M80 Ring Road and North East Link corridor AM peak Level of Service, 2036 'with project' – Lower Plenty Road and Manningham Road – second hour

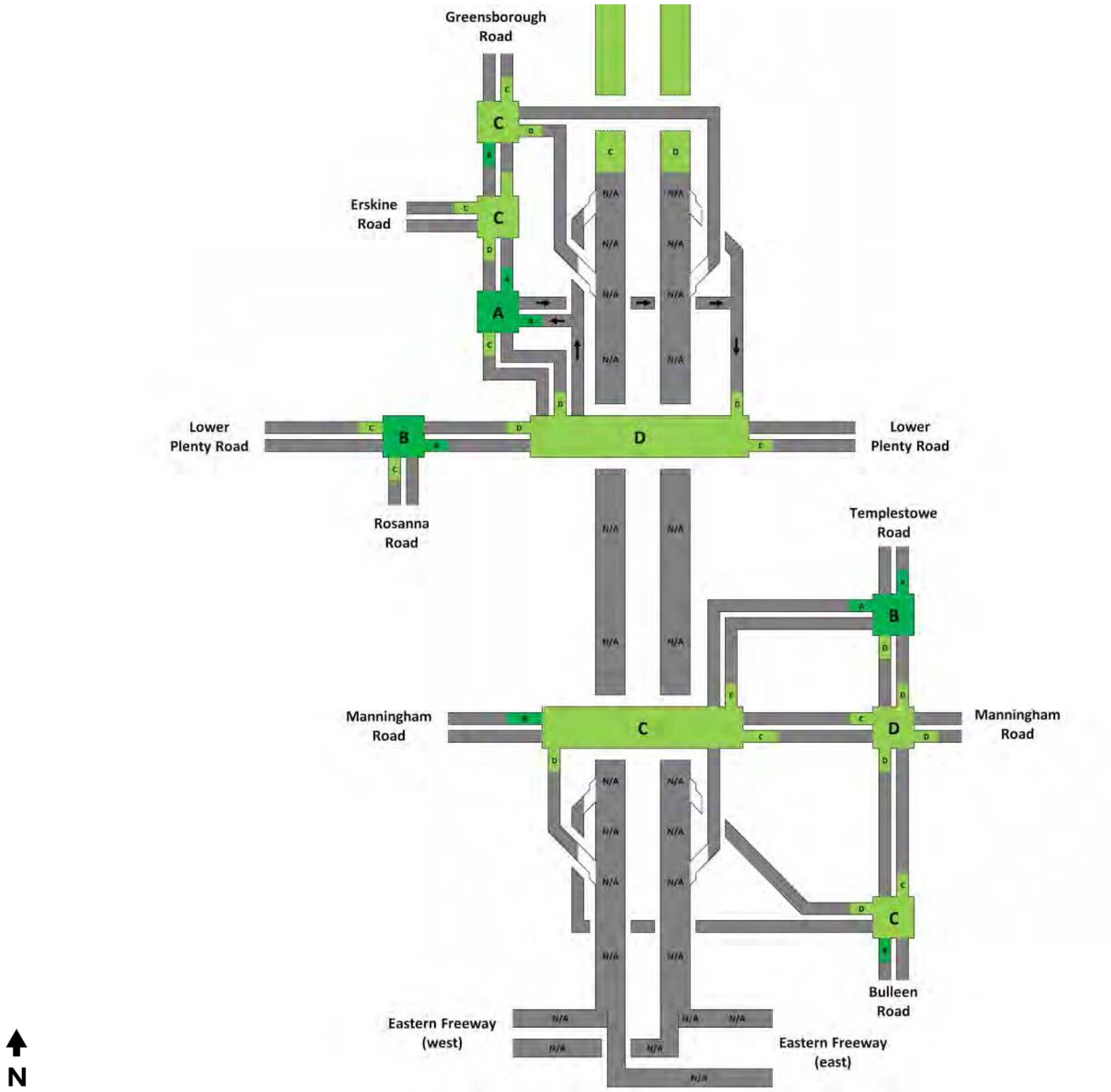


Figure 9-84 – M80 Ring Road and North East Link corridor PM peak Level of Service, 2036 'with project' – M80 Ring Road to Watsonia Road – first hour

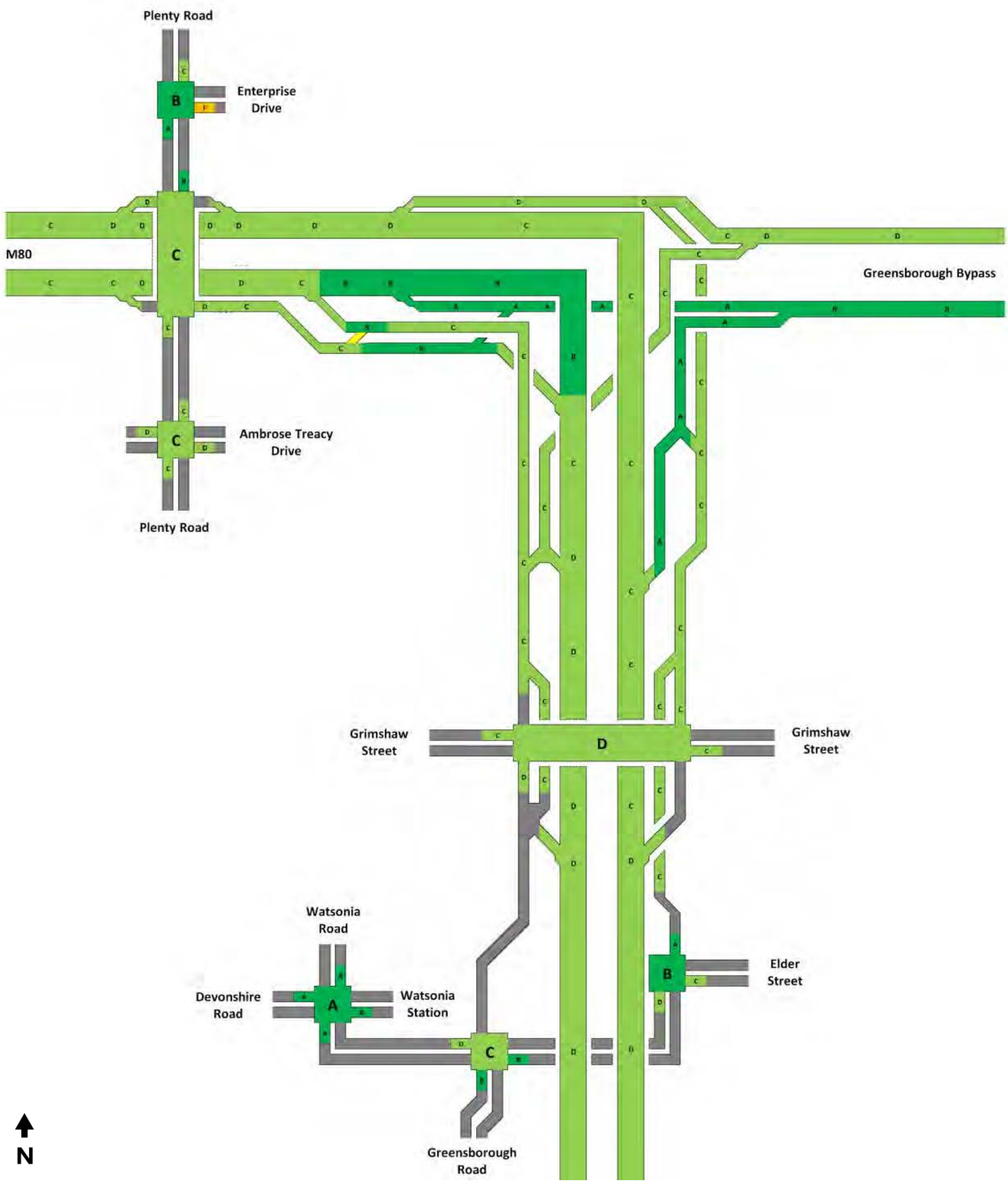


Figure 9-85 – M80 Ring Road and North East Link corridor PM peak Level of Service, 2036 ‘with project’ – Lower Plenty Road and Manningham Road – first hour

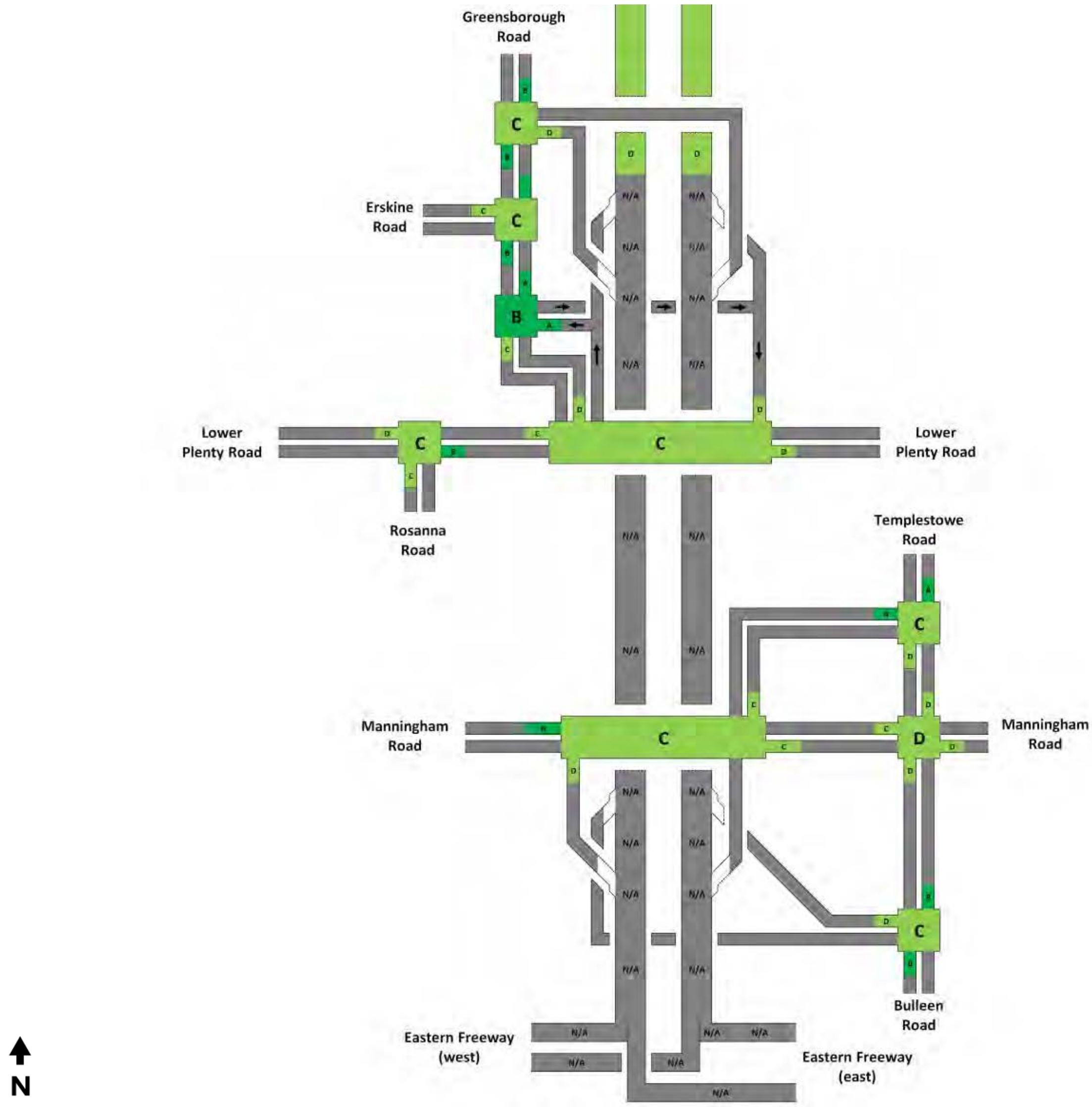


Figure 9-86 – M80 Ring Road and North East Link corridor PM peak Level of Service, 2036 'with project' – M80 Ring Road to Watsonia Road – second hour

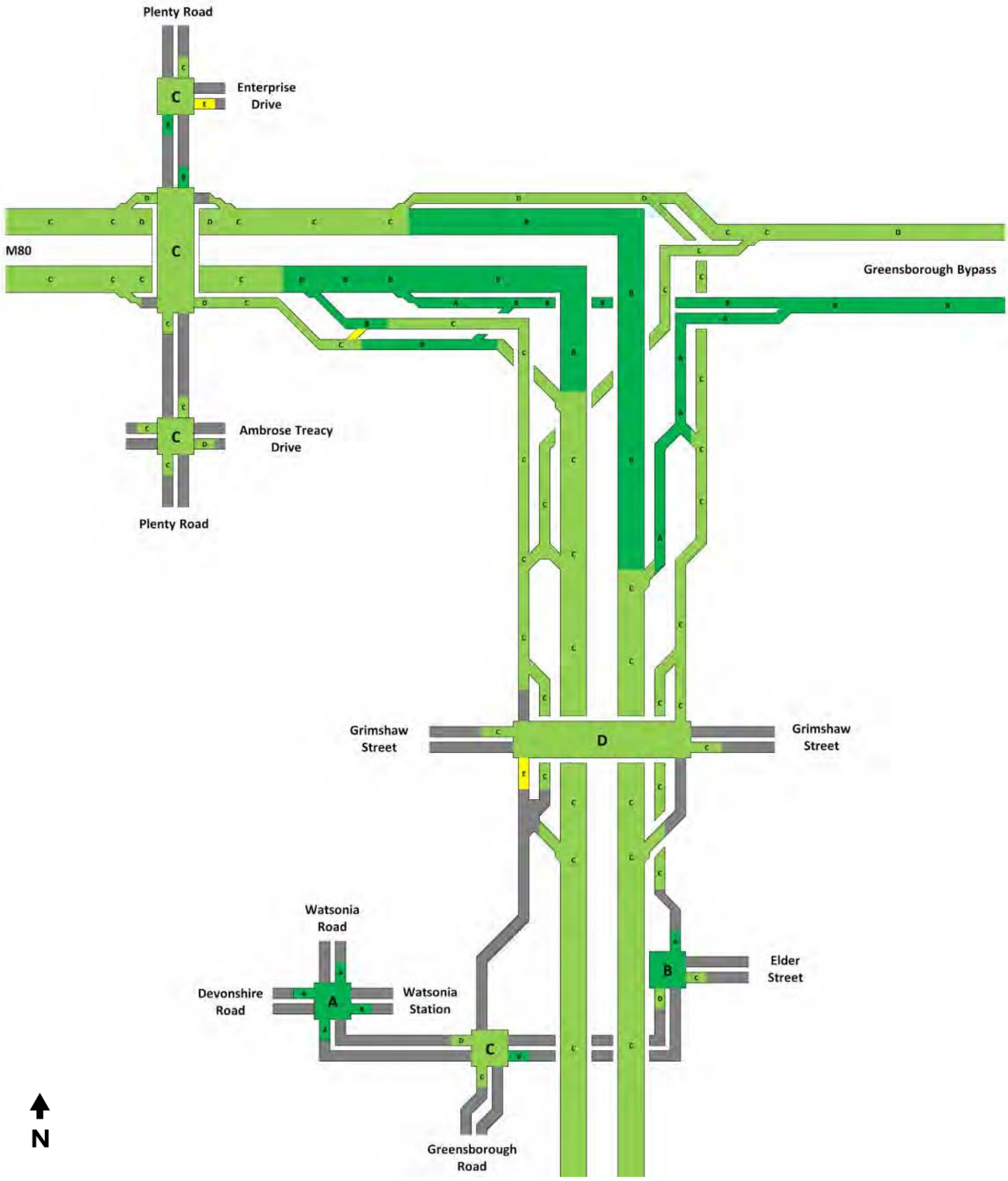
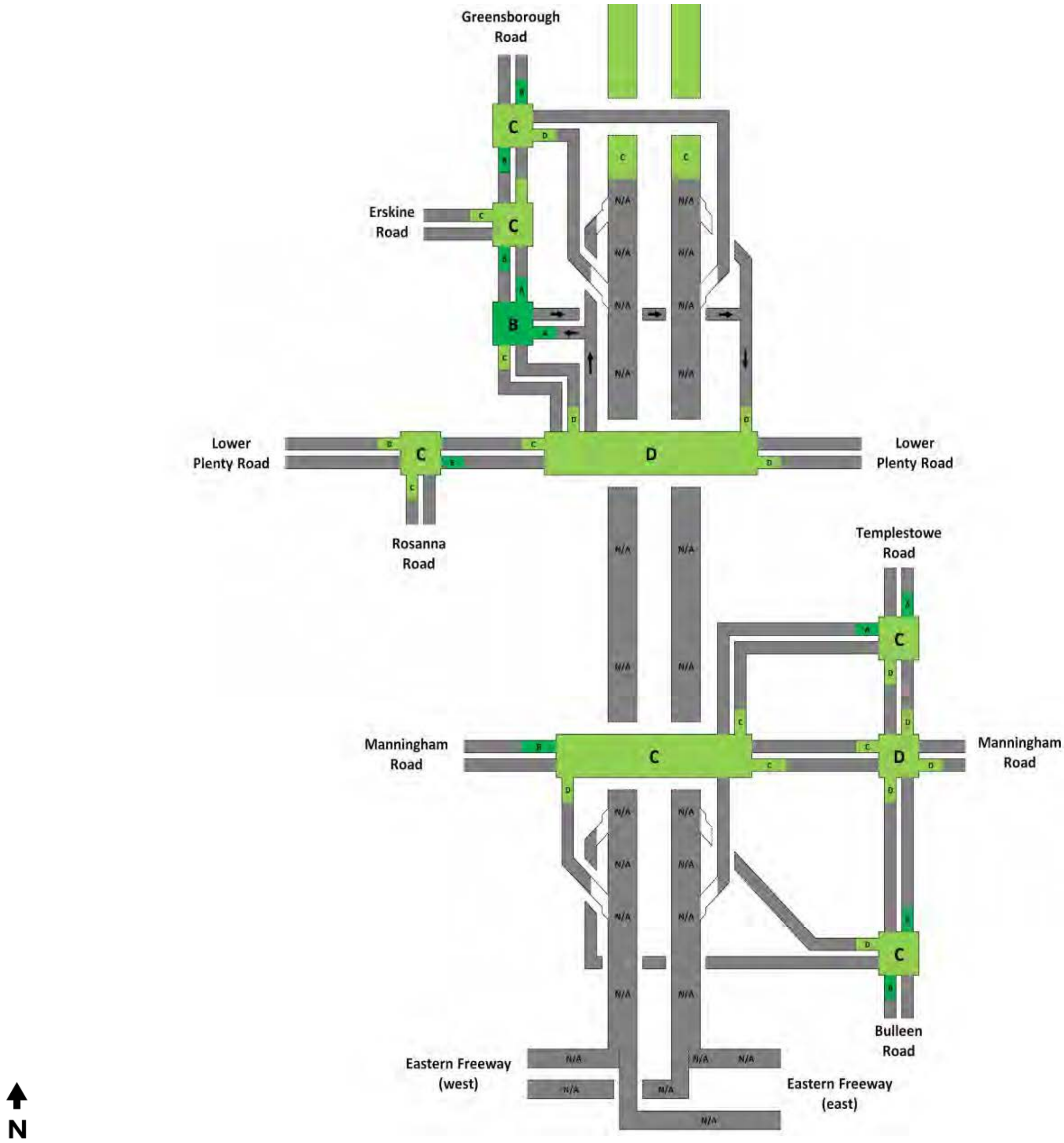


Figure 9-87 – M80 Ring Road and North East Link corridor PM peak Level of Service, 2036 'no project' – Lower Plenty Road and Manningham Road – second hour



9.3.4 Watsonia railway station access

The reference project allows access to Watsonia railway station via the roundabout at Watsonia Road/Devonshire Road/Lambourn Road. Access to the station will form the fifth arm of this roundabout and will allow for vehicle parking and kiss and ride access.

The performance of this roundabout has been assessed within the microsimulation model. Traffic demands for this location have been generated using the same methodology as the remainder of the project. Parking demand at the station is assumed to be approximately 20 per cent higher than is currently provided. It has also been assumed that kiss and ride demand is twice the existing level to take into account the additional train services due to the Hurstbridge Stage 2 works.

Pedestrians have been included in the microsimulation model, using the existing zebra crossings of Devonshire Road and Lambourn Road. These crossings align with those identified within the reference project.

The results of the microsimulation modelling of the proposed access to Watsonia Station is presented in Table 9-14 and Table 9-15. These results show that the roundabout performs well with a Level of Service A across both peak periods. This performance is due to the relatively low to moderate north/south traffic volumes along Watsonia Road and low turning volumes at the roundabout. These are assisted with the traffic signals at the intersection of Watsonia Road and Greensborough Bypass, which platoon some of the northbound traffic providing more gaps for the roundabout to operate.

Table 9-14 – Watsonia railway station access at Watsonia Road, AM peak performance results

	AM peak first hour				AM peak second hour			
Approach	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Watsonia Road south	579	3.8	A	57	513	2.8	A	23
Station access	117	8.0	A	17	116	8.4	A	19
Watsonia Road north	845	7.9	A	132	634	2.2	A	28
Lambourn Road	90	7.4	A	14	68	5.5	A	13
Devonshire Road	186	7.1	A	26	213	5.7	A	26
Intersection	**1,187**	**6.5**	**A**		**1,554**	**3.5**	**A**	

Table 9-15 – Watsonia railway station access at Watsonia Road, PM peak performance results

Approach	PM peak first hour				PM peak second hour			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Watsonia Road south	581	2.3	A	24	622	2.9	A	25
Station access	219	10.0	B	31	217	12.9	B	36
Watsonia Road north	516	2.8	A	25	568	3.3	A	36
Lambourn Road	56	5.7	A	13	64	7.7	A	13
Devonshire Road	224	7.2	A	27	253	7.7	A	28
Intersection	**1,596**	**4.3**	**A**		**1,724**	**5.2**	**A**	

9.4 Travel time and accessibility changes

Peak period travel times between the M80 Ring Road and the Eastern Freeway via the Greensborough Road – Rosanna Road – Bulleen Road and the North East Link corridors are compared in Table 9-16. Travel times along North East Link are projected to be approximately 15 minutes during peak periods, which represents a time saving of up to 35 minutes relative to the 2036 'no project' scenario.

As the forecast travel times are based on strategic modelling results, it is likely that travel time savings are underestimated. This is because the strategic model estimates travel times and speeds as an average across the two-hour AM and PM peaks, rather than the busiest or 'peak' hour. In reality, the largest travel time savings would likely occur in the peak hour, where traffic demand and congestion are greatest.

Table 9-16 – Comparison of forecast travel times along North East Link and arterial road network, 2036

Route	Via	2017	2036 'no project'	2036 'with project'
AM peak southbound				
M80 Ring Road to Eastern Freeway	Greensborough Road – Rosanna Road – Bulleen Road	45	54	39
	North East Link	-	-	19
PM peak northbound				
Eastern Freeway to M80 Ring Road	Greensborough Road – Rosanna Road – Bulleen Road	34	42	28
	North East Link	-	-	16

Travel time comparisons for 2017, 2036 'no project' and 2036 'with project' are presented in Figure 9-88 to Figure 9-89. Note again that travel times are based on strategic modelling results, which are likely to underestimate travel time savings. Key observations are summarised below:

- Forecast travel times are generally faster than the 'no project' scenario, with most routes improving to better than 2017 conditions.
- Large time savings are forecast along the Eastern Freeway (Route E), ranging from five to 11 minutes across the different time periods and directions. This would be due to the additional capacity provided by the Eastern Freeway widening works, delivered as part of North East Link.
- Travel times along the Greensborough Road – Rosanna Road – Bulleen Road (Route F) corridor are also anticipated to improve, by approximately 10 to 17 minutes. This would be due to a reduction in traffic demand along the corridor, as vehicles divert from the arterial road network onto North East Link.
- Travel times along Route A, between Wattle Glen and the M80 Ring Road, are anticipated to increase slightly in the peak direction. This is likely due to additional traffic along the Greensborough Bypass approaching the M80 Ring Road and North East Link interchange. However, counter-peak travel times are predicted to decrease slightly.
- Travel times for Routes B, C and D are generally forecast to decrease by several minutes each, reflecting the localised decongestion effects of the project.

Figure 9-88 – Forecast travel times, AM peak westbound/southbound – 2017, 2036 'no project' and 2036 'with project'

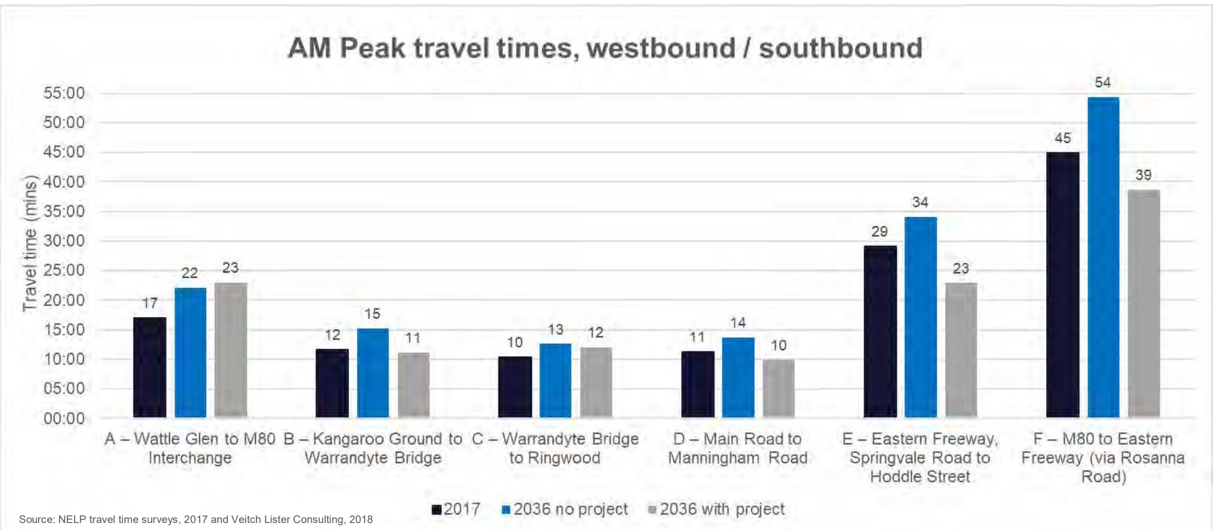


Figure 9-89 – Forecast travel times, PM peak westbound/southbound – 2017, 2036 'no project' and 2036 'with project'

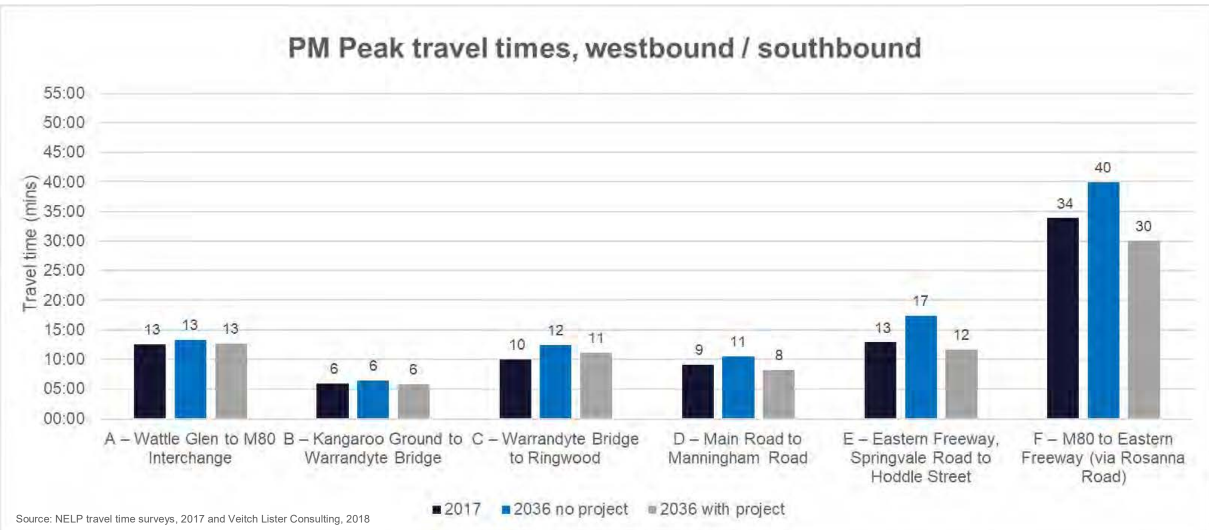


Figure 9-90 – Forecast travel times, AM peak eastbound/northbound – 2017, 2036 'no project' and 2036 'with project'

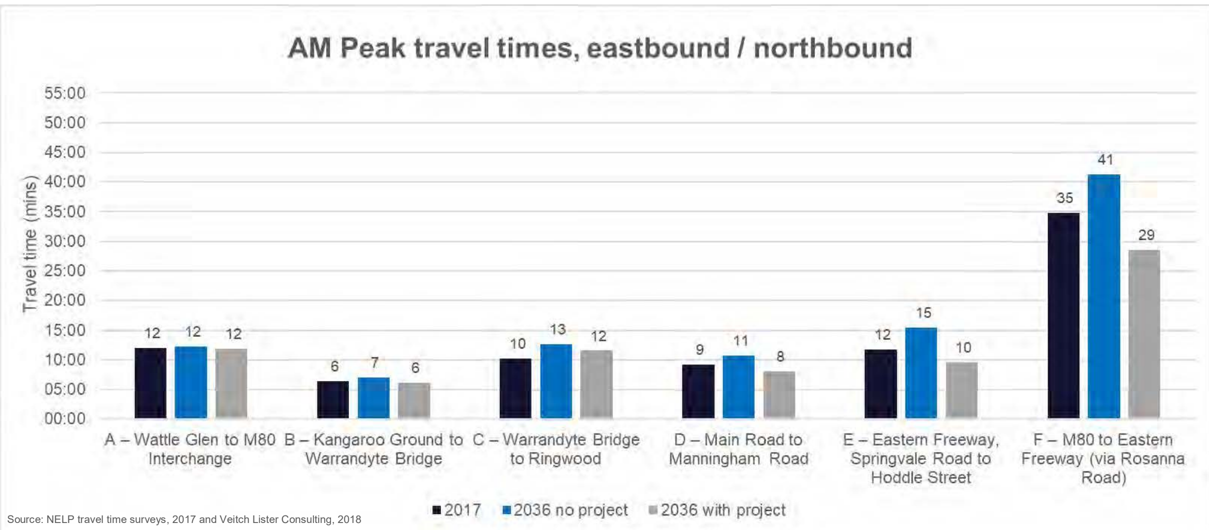
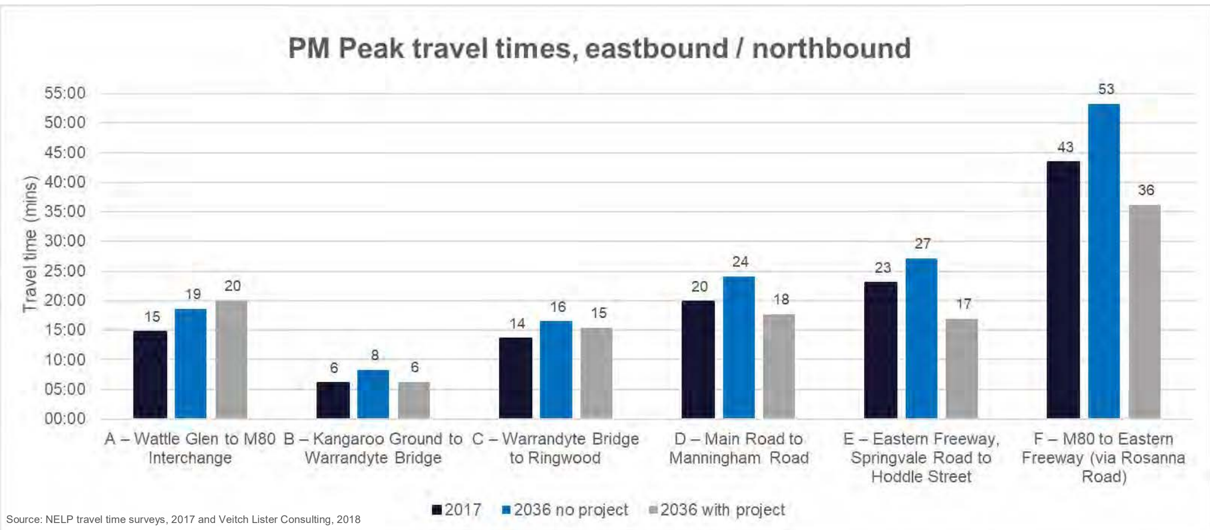


Figure 9-91 – Forecast travel times, PM peak eastbound/northbound – 2017, 2036 ‘no project’ and 2036 ‘with project’



North East Link is predicted to generally improve network-wide travel times. Three indicative locations have been chosen to assess changes in future travel times across the study area. Travel time contour plots for trips originating from Greensborough, Doncaster and Epping across the 2036 ‘with project’ and 2036 ‘no project’ scenarios are presented in Figure 9-92 to Figure 9-94.

The contour plots have been prepared using the strategic model, with darker red colouring indicating longer journey times. Note that the charts present average travel times across the two-hour AM (7:00 am to 9:00 am) and PM (4:00 pm to 6:00 pm) peaks, rather than the ‘worst case’ travel times for each period.

From Greensborough, travel times are forecast to improve particularly for trips destined for the eastern suburbs. This is as a result of the new link offering direct time savings for trips crossing the Yarra River, as well as decongestion effects across the existing north-eastern arterial road network. Similarly, time savings from Doncaster are most pronounced for trips crossing the river to the north, to destinations such as Epping and Greensborough. Smaller improvements are also anticipated for destinations in the west, due to improved connectivity to the M80 Ring Road via North East Link.

Travel time improvements are more pronounced for the outer northern suburb of Epping, particularly for destinations to the eastern suburbs such as Doncaster and Bulleen. Again, these effects are due to the direct time savings afforded by North East Link, as well as general decongestion of the road network throughout the north-eastern suburbs. These time savings translate into improvements in overall accessibility to employment, education and other services across metropolitan Melbourne.

Figure 9-92 – Comparison of average AM and PM peak travel times from Greensborough, modelled 2036 'with project' vs modelled 2036 'no project'

	2036 'no project'	2036 'with project'
AM Peak		
PM Peak		

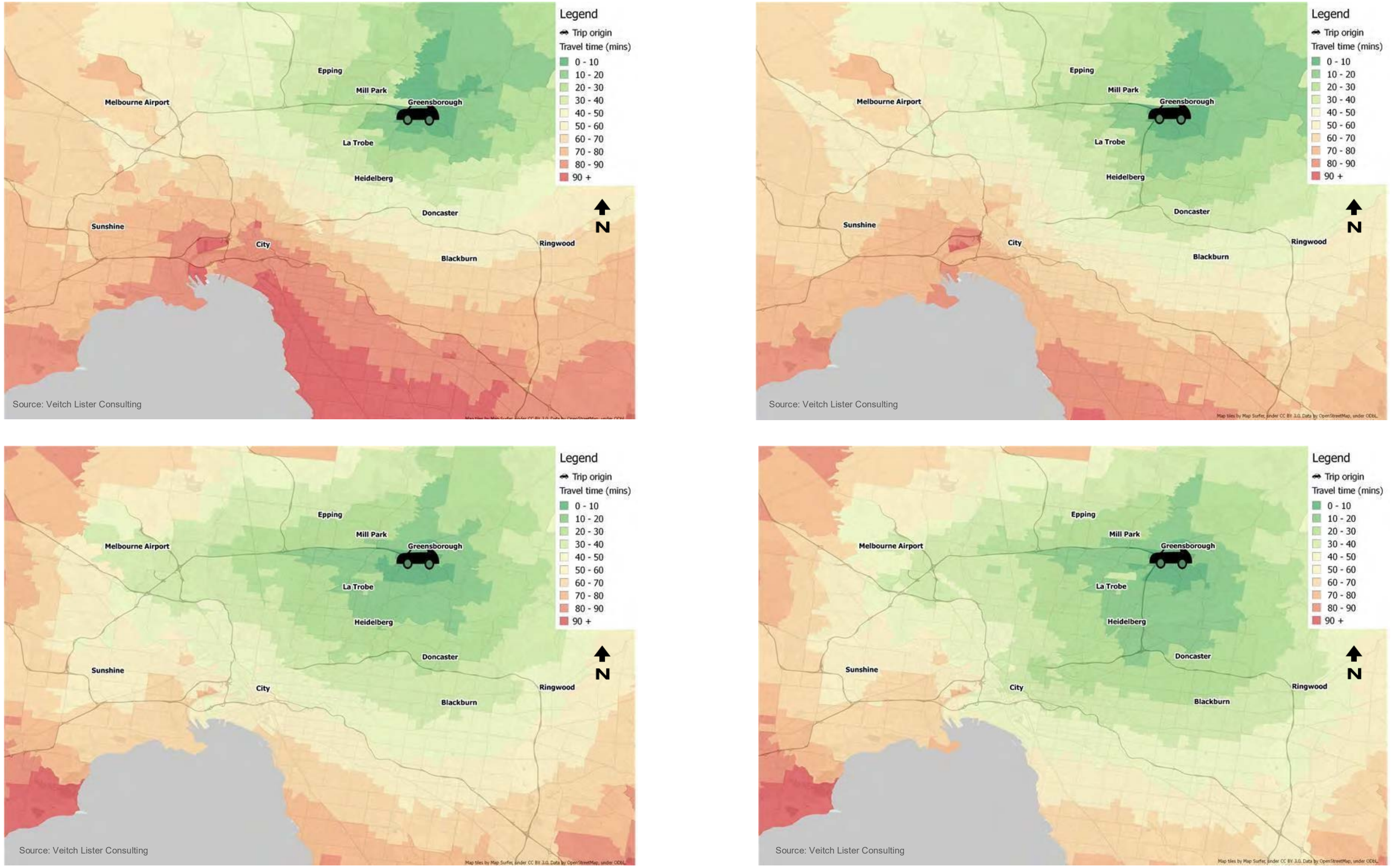
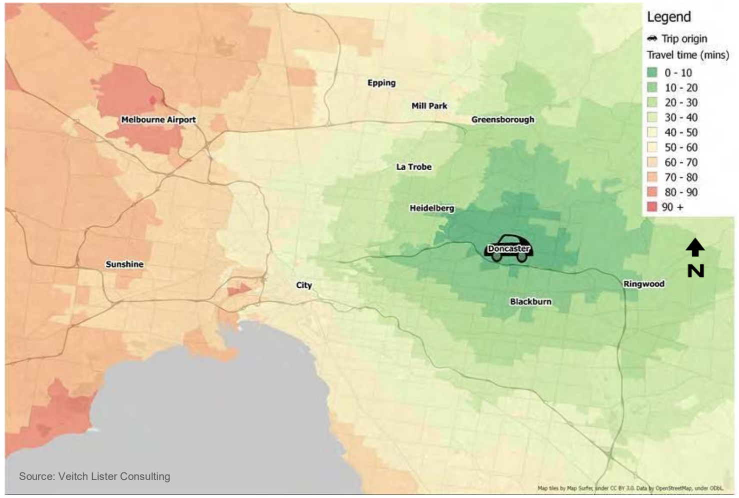
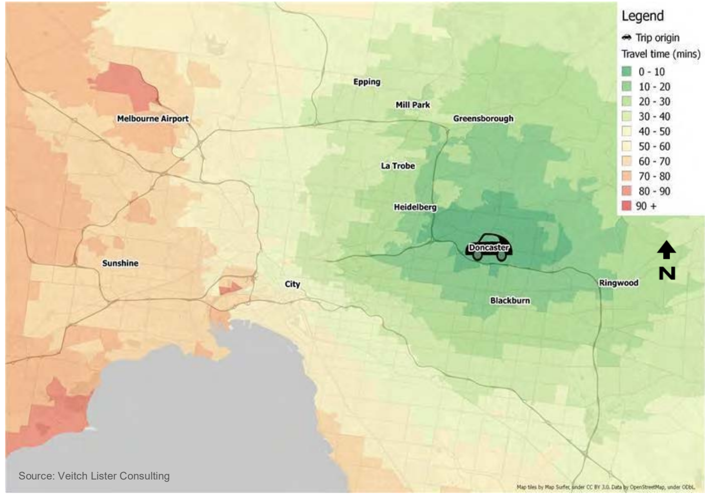


Figure 9-93 – Comparison of average AM and PM peak travel times from Doncaster, modelled 2036 ‘with project’ vs modelled 2036 ‘no project’

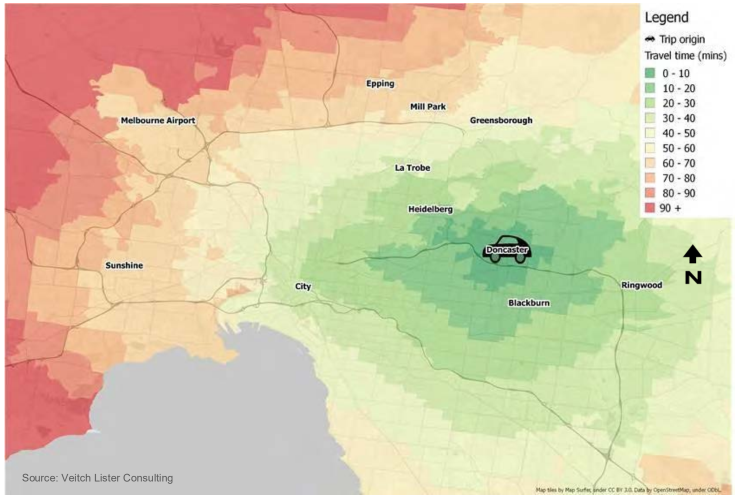
2036 ‘no project’ | **2036 ‘with project’**

AM Peak





PM Peak



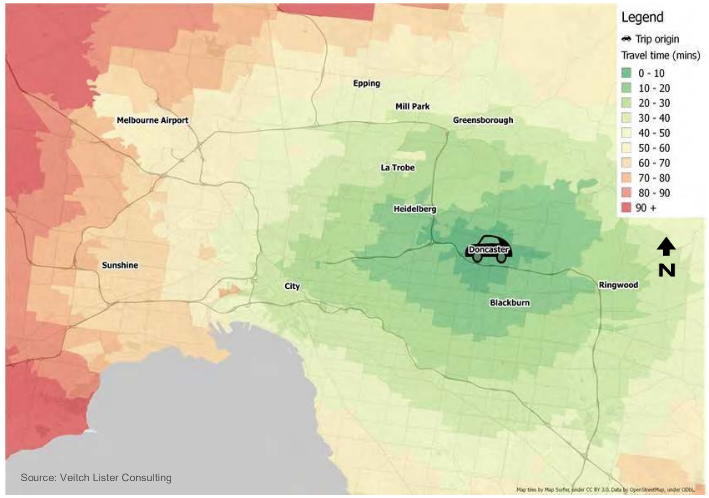
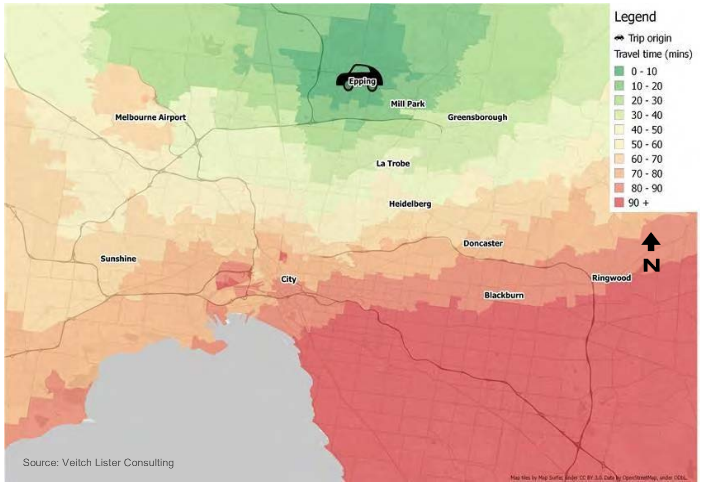
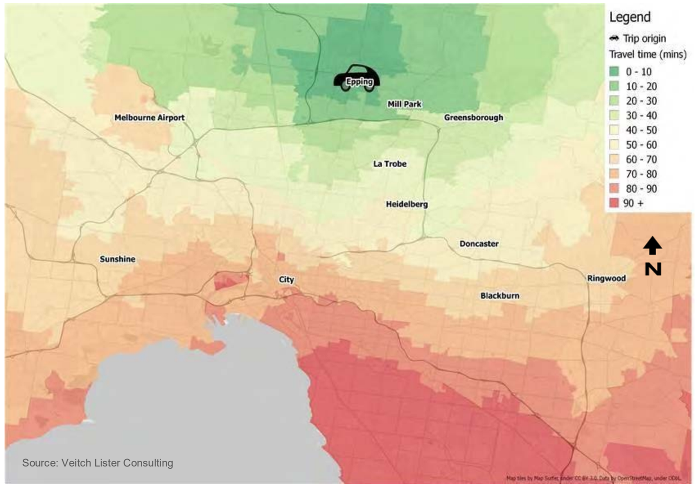
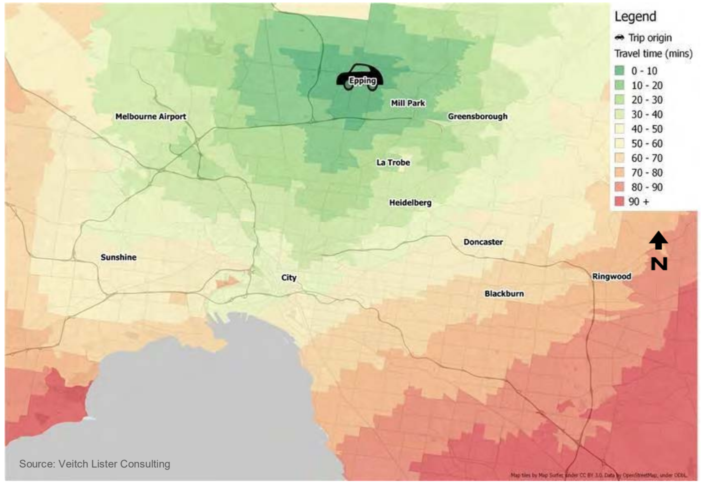
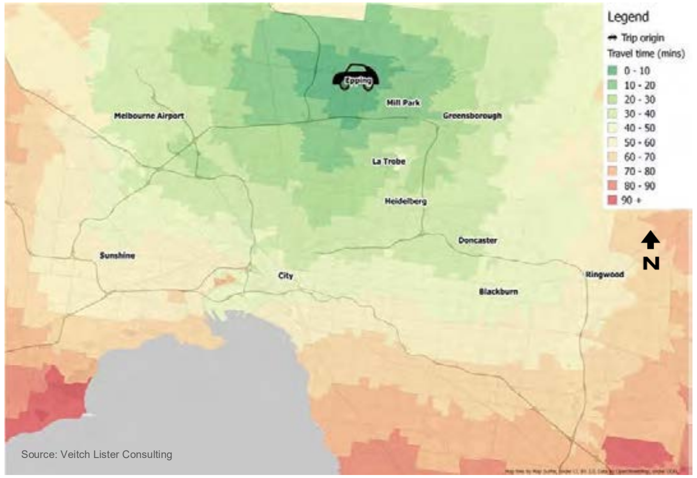


Figure 9-94 – Comparison of average AM and PM peak travel times from Epping, modelled 2036 'with project' vs modelled 2036 'no project'

	2036 'no project'	2036 'with project'
AM Peak		
PM Peak		

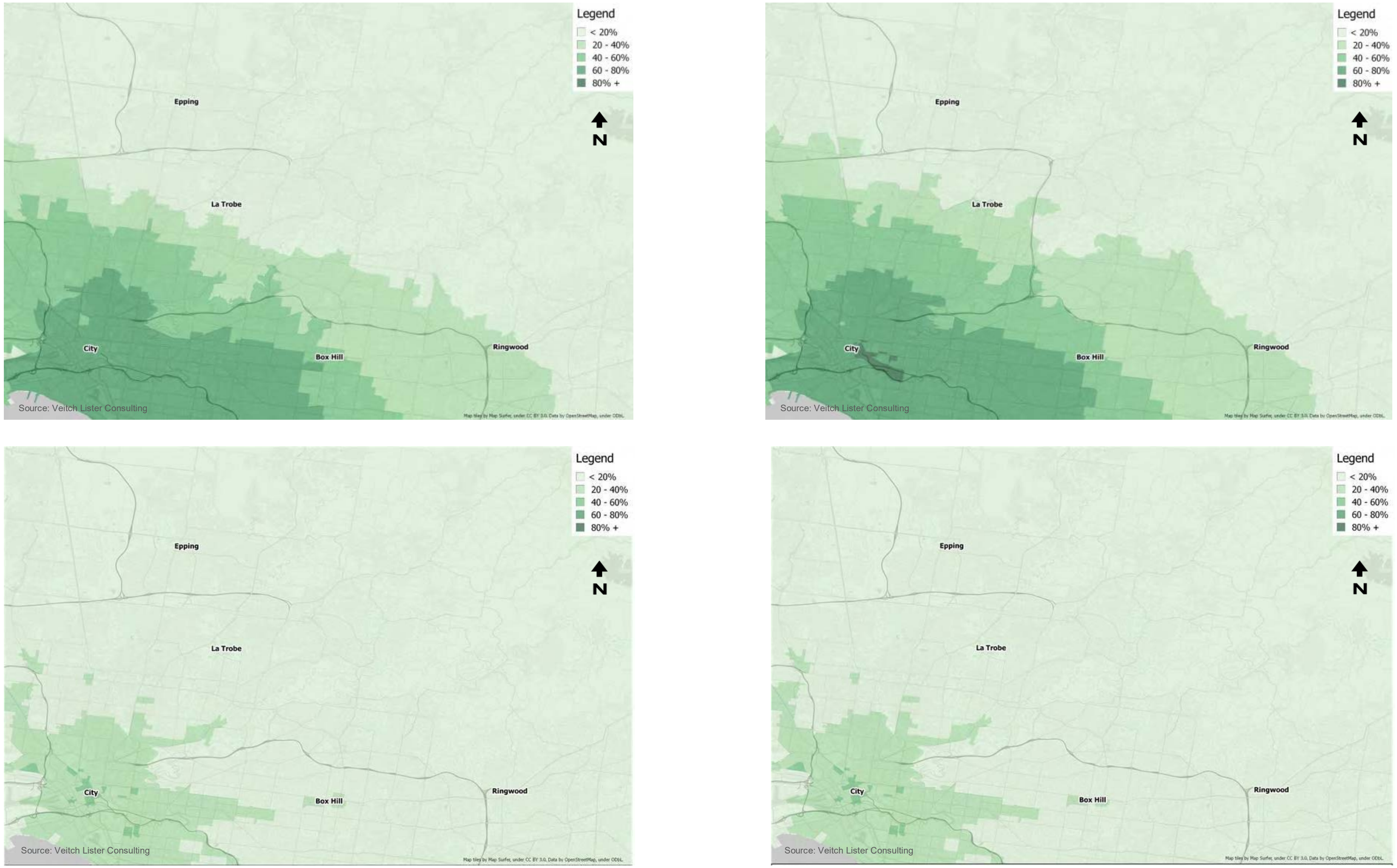
Contour plots illustrating modelled accessibility to employment by origin are presented in Figure 9-95. The charts indicate what proportion of Melbourne's total employment is accessible within a 45-minute car or public transport trip in the AM peak. Darker green areas indicate higher levels of accessibility to employment.

Accessibility to employment by car is forecast to improve slightly in the 2036 'with project' scenario, as a direct result of North East Link's travel time improvements. Improvements are seen generally across Melbourne, but is most pronounced for areas in the north-east, such as Templestowe, Bulleen and the La Trobe precinct. These areas are likely to additionally benefit from local road network decongestion as well as direct project travel time savings.

Accessibility to employment for public transport trips is again much lower than that of cars, due to generally slower travel times and a lack of orbital connections. Public transport accessibility to jobs is not anticipated to change materially as a result of the project. Although the Doncaster Busway would improve travel times for bus users along the Eastern Freeway, it would upgrade an existing public transport corridor which already provides accessibility to the employment-rich areas of the inner suburbs and CBD.

Figure 9-95 – Comparison of accessibility to employment within a 45-minute car or public transport trip in the AM peak, modelled 2036 'with project' vs modelled 2036 'no project'

	2036 'no project'	2036 'with project'
Car		
Public Transport		

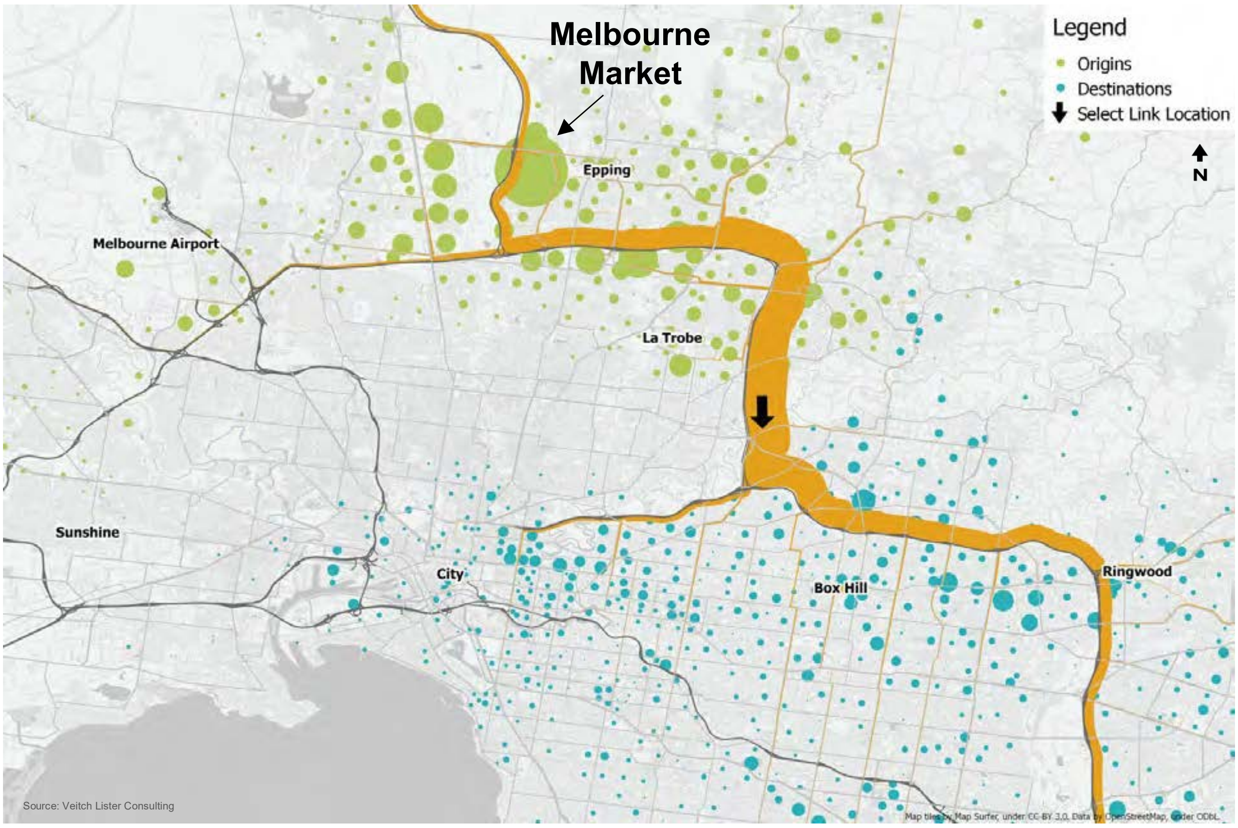


9.5 Freight

As discussed in Section 6.4.2 the north-eastern road network is generally unsuitable for high-volume freight movements. At present, the primary freight route through the north-east is the Greensborough Road – Rosanna Road – Bulleen Road corridor, despite the predominantly residential land uses fronting these roads. With North East Link, trucks would be able to travel between the north and south-east entirely via the freeway network, using a combination of EastLink, an upgraded Eastern Freeway, the new North East Link and an upgraded M80 Ring Road.

A map of the forecast origins and destinations for trucks using North East Link in 2036 is presented in Figure 9-96. Truck demand from the north is concentrated near industrial precincts, such as the Melbourne Market, Thomastown and Somerton. A large proportion of trucks that would use North East Link are forecast to travel towards the south-east to destinations such as Dandenong. The majority of the remaining truck destinations are spread across the eastern suburbs such as Box Hill, Doncaster and Kew. While these are not typical freight centres, these trips represent trucks servicing shopping centres and dispersed light industry.

Figure 9-96 – Origins and destinations of trucks using North East Link, 2036 'with project'



9.5.1 Forecast freight volumes

Heavy vehicle kilometres travelled statistics are presented in Table 9-17. The percentage change relative to the 2036 ‘no project’ scenario is provided for each metric in brackets.

Total heavy vehicle kilometres travelled in the north-east are forecast to increase by approximately 9 per cent in the ‘with project’ scenario. This growth is predicted to occur entirely along the freeway network (M80 Ring Road–east of the Hume Freeway, Hume Freeway–south of Craigieburn Road, North East Link, Eastern Freeway and EastLink–north of Burwood Highway), which is forecast to increase by 67 per cent with North East Link. Truck travel along non-freeway links, including arterial and local roads is forecast to decrease by approximately 14 per cent. More broadly across metropolitan Melbourne, a 4 per cent increase in freeway truck travel and a 3 per cent decrease in non-freeway truck travel is predicted.

Table 9-17 – Forecast changes to heavy vehicle kilometres travelled, 2036 ‘with project’ vs 2036 ‘no project’

Heavy Vehicle Kilometres Travelled	Metropolitan Melbourne	North-east
Total	15,195,000 (-0.1%)	2,396,000 (+9%)
Freeway	6,738,000 (+4%)	1,040,000 (+67%)
Non-freeway	8,457,000 (-3%)	1,356,000 (-14%)

A comparison of the proportion of truck travel along freeways and non-freeways is presented in Table 9-18. In the ‘with project’ scenario the proportion of truck travel on non-freeway links in the north-east decreases from 72 per cent to 57 per cent, representing a large diversion away from arterial and local roads. This brings the north-east region closer in line with the metropolitan Melbourne average.

Table 9-18 – Heavy vehicle kilometres travelled, with freeway and non-freeway proportions, 2036 ‘with project’

Metric	Metropolitan Melbourne		North-east	
	2036 ‘no project’	2036 ‘with project’	2036 ‘no project’	2036 ‘with project’
Total heavy vehicle kilometres travelled	15,209,000	15,195,000	2,191,000	2,396,000
Freeway proportion	42%	44%	28%	43%
Non-freeway proportion	58%	56%	72%	57%

The forecast changes in truck volumes are provided in Figure 9-97 to Figure 9-99, with forecast daily volumes presented in Figure 9-100 to Figure 9-102. Note that EastLink has not been included in the traffic volume assessment as this data is commercially sensitive. The EastLink tunnels have been assessed for performance in the 2036 ‘with project’ scenario through microsimulation modelling, as outlined in Section 9.3.

Key observations include:

- While there are forecast increases in truck volumes south of the Eastern Freeway, the bulk of these increases are light commercial vehicles rather than large articulated trucks. Of the additional trucks along the following roads the proportion of light commercial vehicles are:
  - Elgar Road – 90 per cent
  - Surrey Road – 90 per cent
  - Springvale Road 80 per cent.
- The exception to this is Middleborough Road where 70 per cent of the predicted increases are heavy commercial vehicles. These vehicles are accessing the activity centre of Box Hill, with the majority using Middleborough Road outside the peak periods when there is spare capacity.
- Truck volumes are generally forecast to decrease across the north-eastern arterial road network. Large decreases are predicted along Greensborough Road (-7,400), Bulleen Road (-2,400), Manningham Road (-3,000) and Rosanna Road (-2,800). These reductions represent trucks diverting to North East Link.
- Truck volumes are forecast to increase along feeder routes to North East Link, including the M80 Ring Road (up to +8,200), the Eastern Freeway (up to +7,200) and Greensborough Bypass east of the M80 Ring Road (+200).
- A small increase in trucks is predicted along Erskine Road (+300) which may be caused by trucks travelling between North East Link and the La Trobe precinct. Most of these additional trucks (approximately 60 per cent) are anticipated to be light commercial vehicles. Given the primarily residential land uses adjoining this road demand for this route could be controlled via the implementation of truck bans by VicRoads.

Further analysis of truck volume reductions on the Rosanna Road corridor is presented in Section 9.5.4.

Figure 9-97 – Change in average weekday truck volumes (AWDT), 2036 'with project' versus 2036 'no project' – study area north

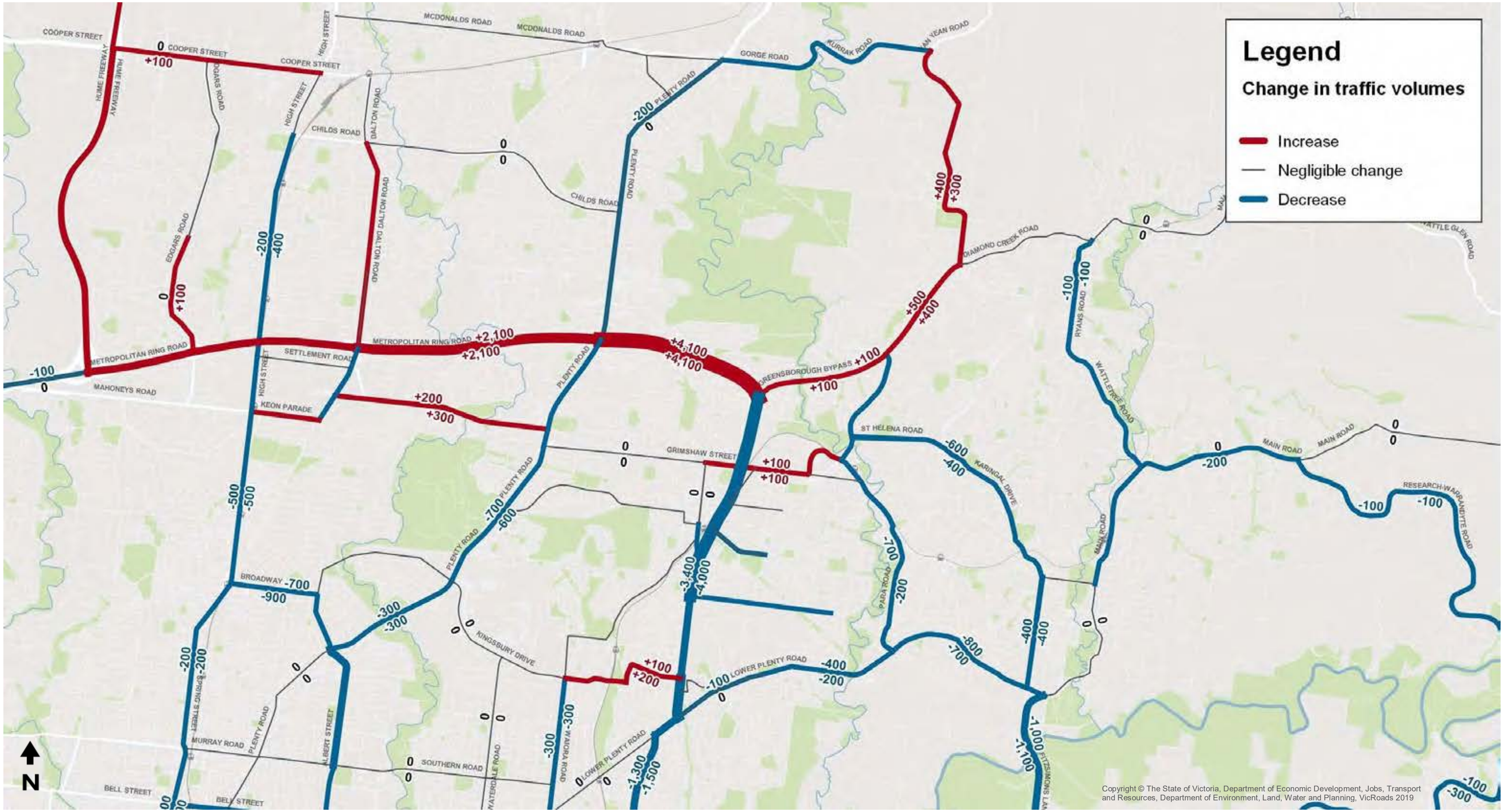


Figure 9-98 – Change in average weekday truck volumes (AWDT), 2036 ‘with project’ versus 2036 ‘no project’ – study area south

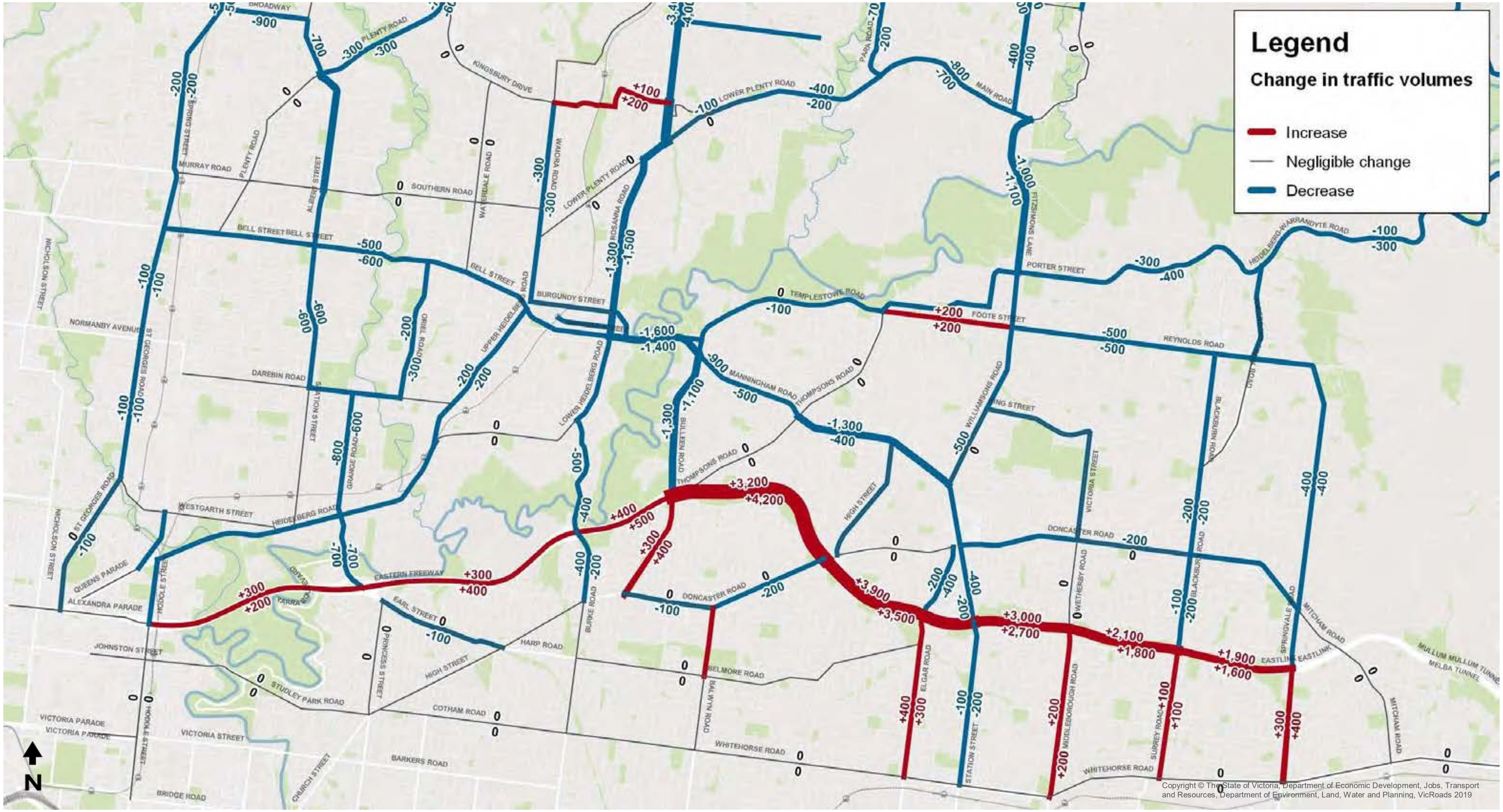


Figure 9-99 – Total average weekday truck volumes (AWDT), 2036 'with project' versus 2036 'no project' – study area east

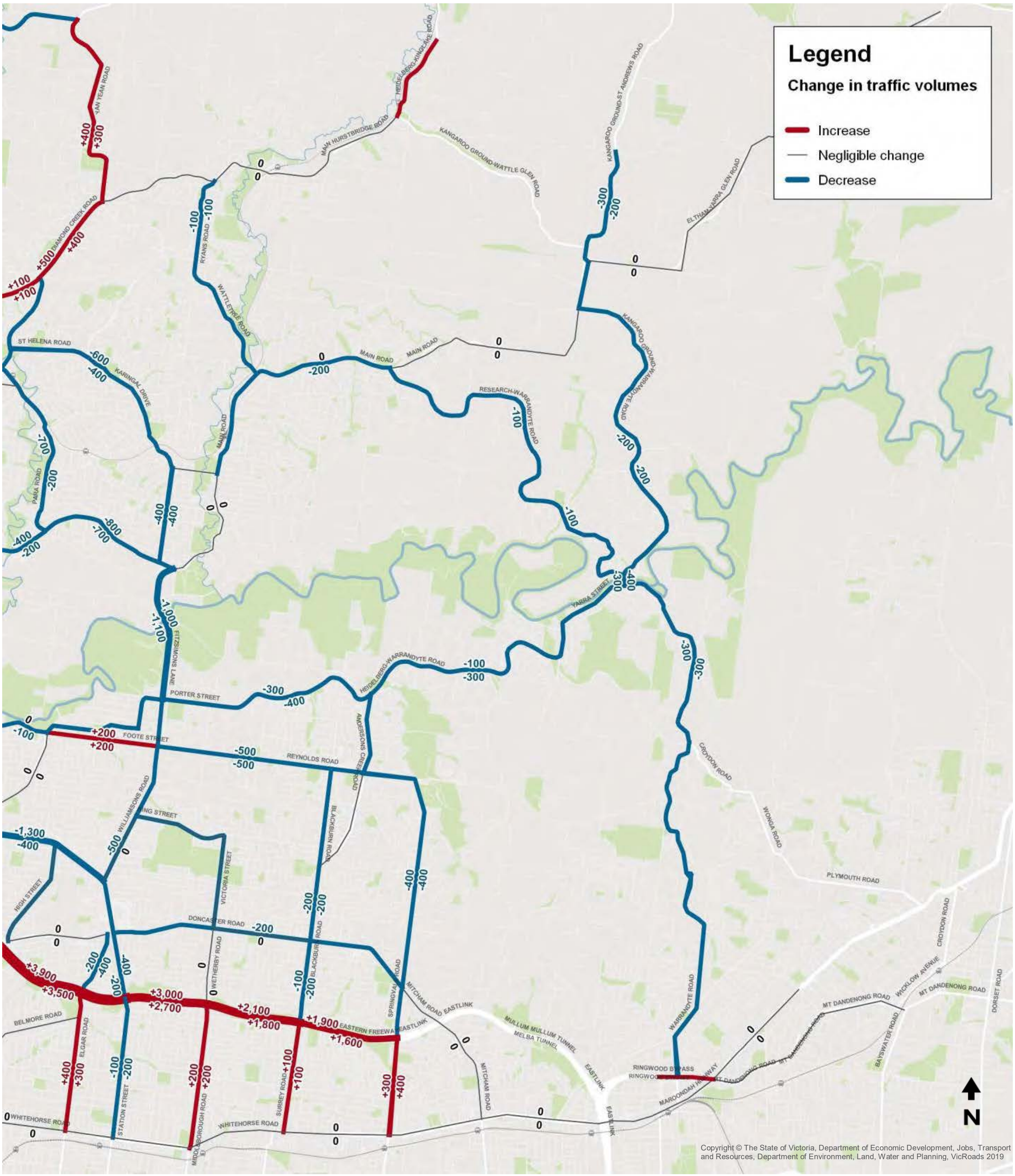


Figure 9-100 – Total average weekday truck volumes (AWDT), 2036 'with project' – study area north

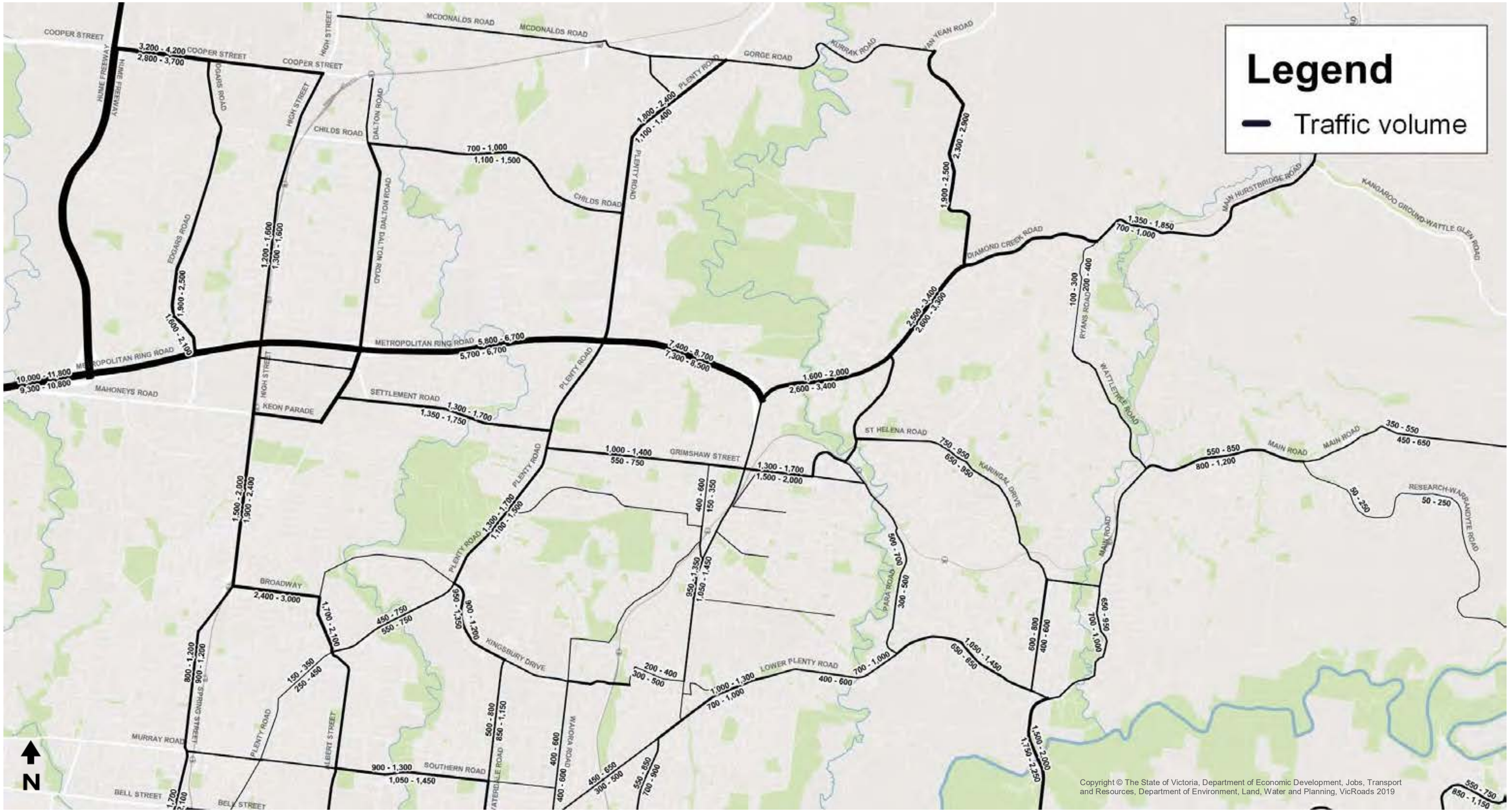


Figure 9-101 – Total average weekday truck volumes (AWDT), 2036 'with project' – study area south

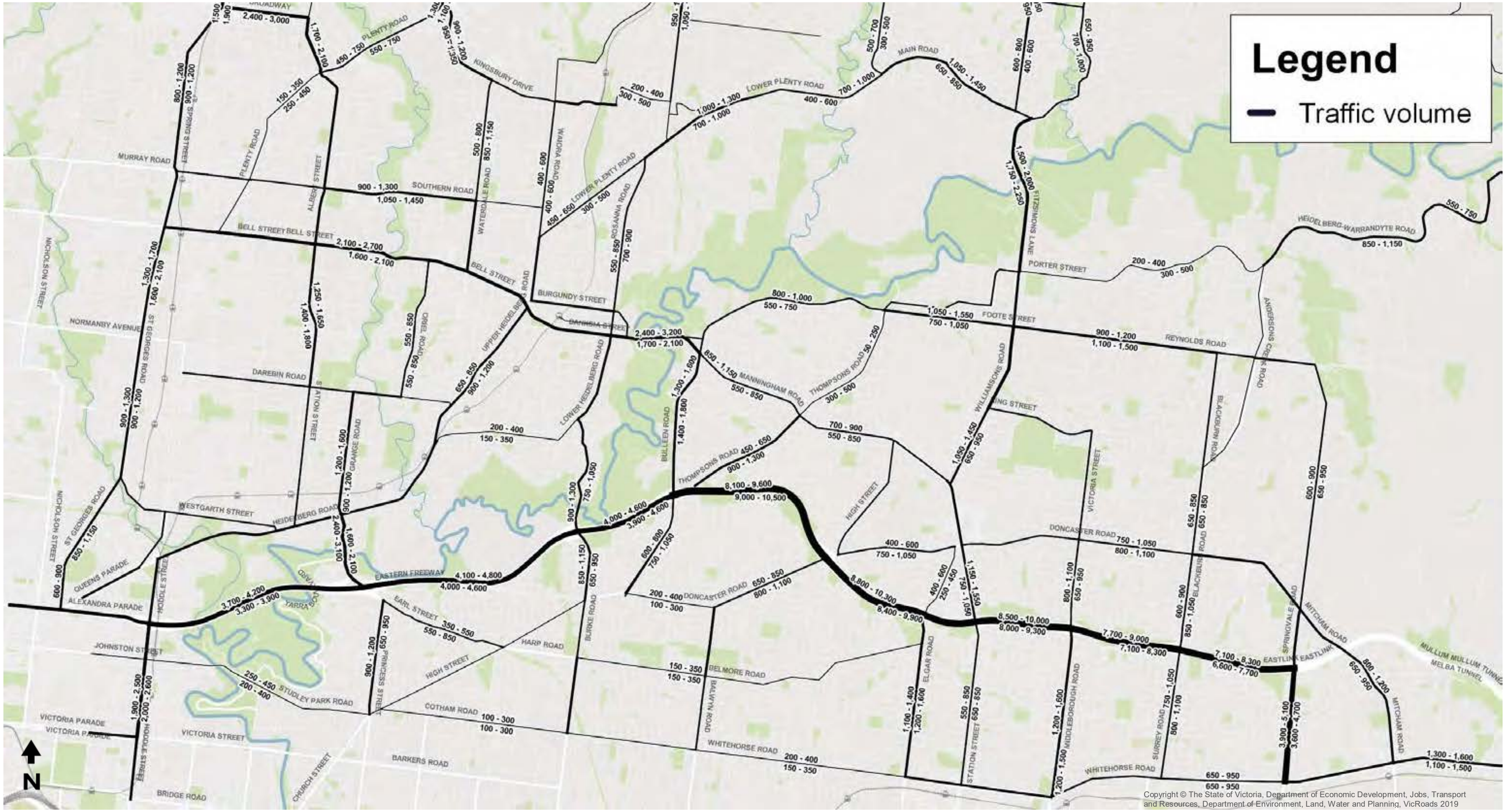
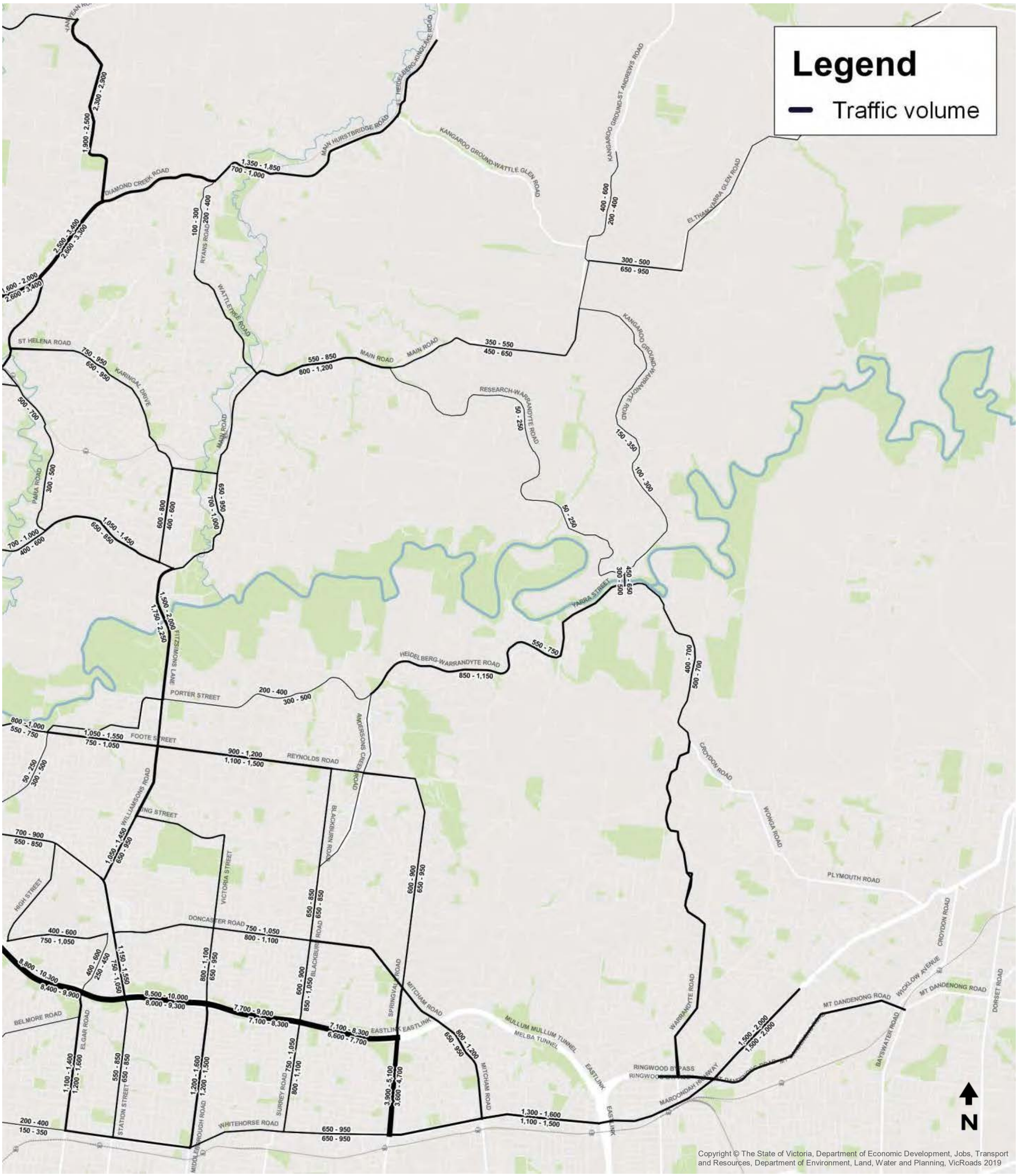


Figure 9-102 – Total average weekday truck volumes (AWDT), 2036 ‘with project’ – study area east



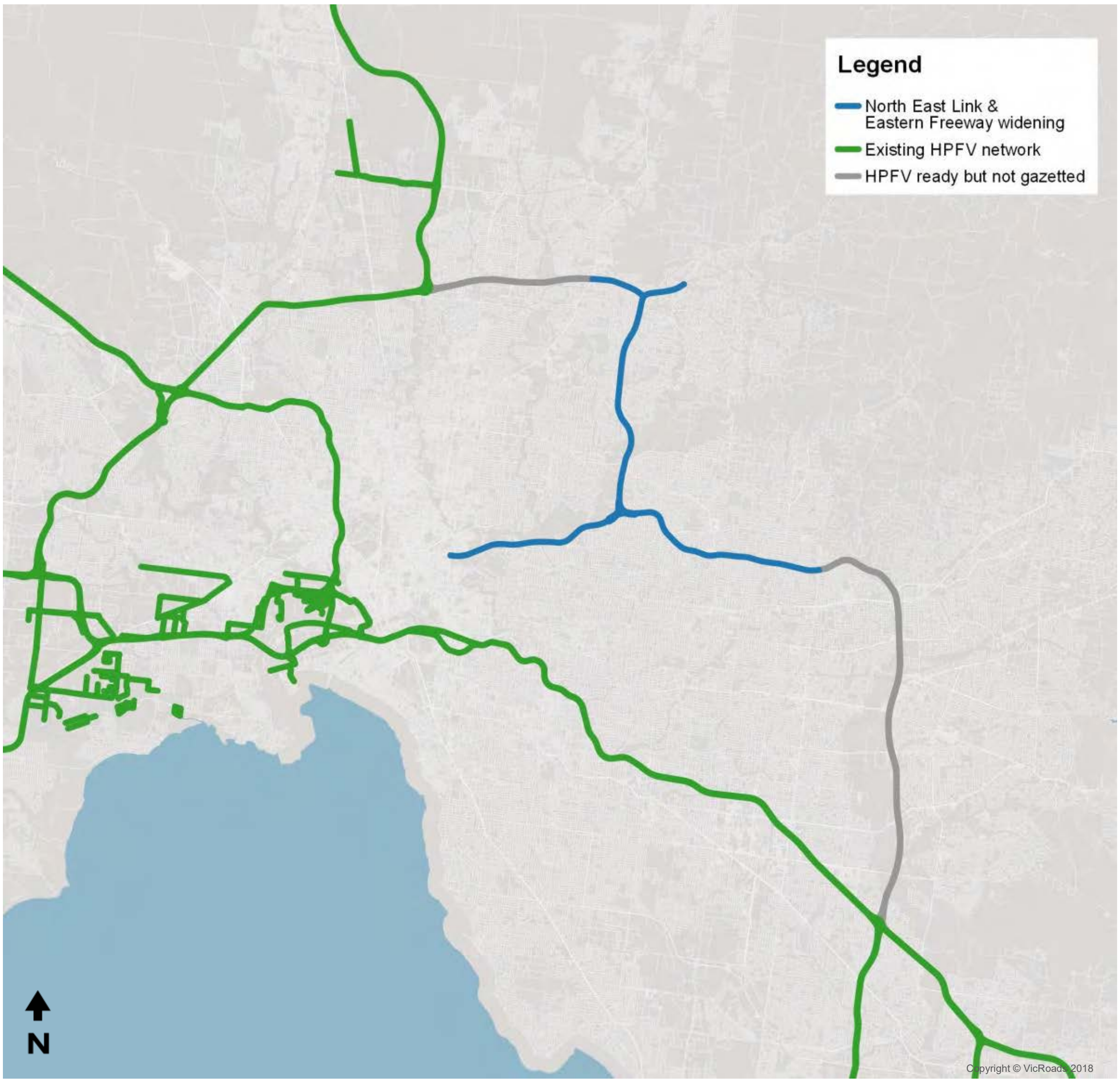
9.5.2 HPFV access

North East Link will be designed to SM1600 standard (able to carry trucks up to 160 tonnes) and will therefore be able to cater for the increasingly larger and heavier truck fleet that operates on Melbourne's road network. Connectivity to the project will be further enhanced by upgrading the Eastern Freeway to 75 per cent of SM1600 standard.

The project has also been designed to allow for A-Double trucks which includes sufficient lane widths on curves and intersection design to allow for their swept paths. This would assist in taking these larger vehicles off the arterial road network.

The extent of North East Link and the Eastern Freeway widening is presented along with the existing HPFV B-Double network in Figure 9-103 in blue and green respectively. The grey lines indicate parts of the freeway network which are 'HPFV ready' but have not yet been gazetted by VicRoads. These include the M80 Ring Road (between the Hume Freeway and Plenty Road) and EastLink (between Springvale Road and the Monash Freeway).

Figure 9-103 – Extent of North East Link and Eastern Freeway widening, with existing HPFV network



9.5.3 Over-height and placarded vehicles

Vehicles carrying placarded loads and OD vehicles will be limited to the above-ground and open sections of North East Link due to the limited vertical clearance and restrictions on placarded loads within tunnels. This means that OD vehicles will be required to use Greensborough Road south of Grimshaw Street.

These vehicles will still therefore likely use Bulleen Road and Rosanna Road. Note that truck classification surveys have shown that relatively few trucks (less than 2 per cent of the truck fleet) are expected to require detouring around the tunnel sections.

North East Link will replace arterial sections of the OD route 1 where these vehicles can use the new link. The proposed new OD route 1 is presented in Figure 9-104.

Figure 9-104 – Proposed OD route

9.5.4 Rosanna Road corridor

Rosanna Road was identified as a preferred north-south freight route through the north-east, as discussed in Section 6.4.

A comparison of the origins and destinations of truck traffic on Rosanna Road between the 2036 ‘no project’ and ‘with project’ scenarios is presented in Figure 9-105. The number and spread of truck origins and destinations decreases significantly in the ‘with project’ scenario, reflecting the significant diversion of trucks away from this corridor and onto North East Link. However, some trucks would still be required to use the corridor to service local retail and business precincts. The chart shows the remaining trucks are primarily anticipated to be undertaking local trips to the Heidelberg and Rosanna areas.

A summary of the predicted changes in truck volumes along Rosanna Road is presented in Table 9-19. Cross-city truck traffic on Rosanna Road is anticipated to reduce significantly as a result of North East Link, with volumes reducing up to approximately 75 per cent. The proportion of daily truck traffic is also forecast to reduce from 9 to 4 per cent between the ‘no project’ and ‘with project’ scenarios. Usage of the road by local (total) trips is forecast to increase from approximately 51 to 80 per cent with the project, reflecting the diversion of medium and longer, cross-city trips from the arterial road network onto North East Link.

Table 9-19 – Rosanna Road statistics, 2036 ‘with project’ vs 2036 ‘no project’

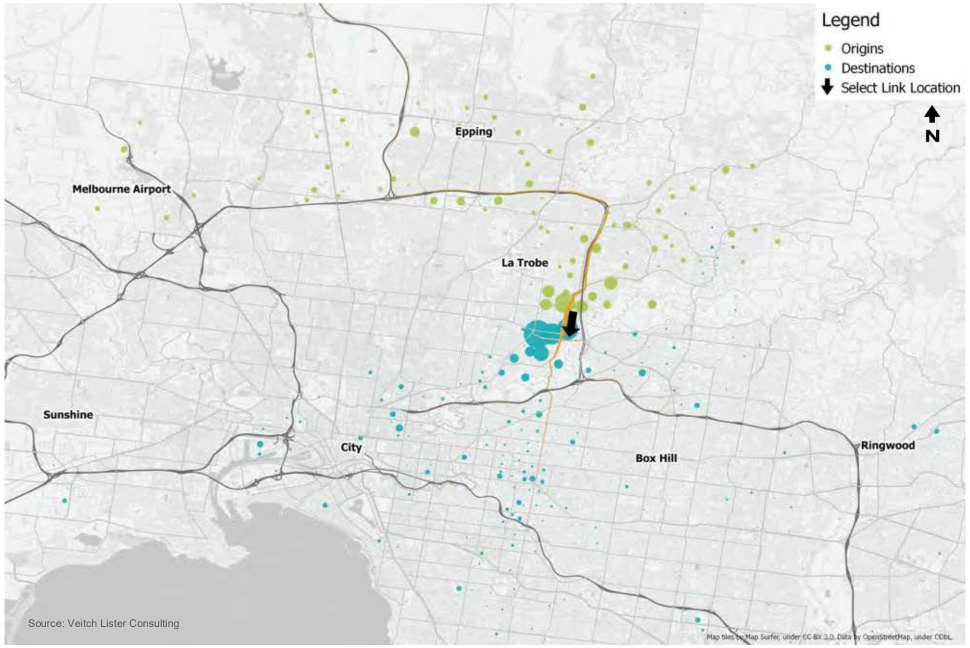
Metric	2017	2036 ‘no project’	2036 ‘with project’
Total volumes (daily, two-way)	39,000 – 50,000	41,000 – 54,000	31,000 – 41,000
Percentage trucks	7%	9%	4%
Proportion of local trips (daily)	57%	51%	80%

Rosanna Road will remain an OD route following the completion of North East Link, as these vehicles will not be permitted to use the North East Link’s tunnel sections. However, truck classification surveys have shown that relatively few trucks (less than 2 per cent of the truck fleet) are expected to require detouring along Rosanna Road.

Figure 9-105 – Origin and destinations of trucks using Rosanna Road in 2036 'with project' and 'no project' scenarios

2036 'no project'

2036 'with project'



9.6 Public transport

9.6.1 Scope

The existing bus lane configuration along the Eastern Freeway between Doncaster Road and Hoddle Street is presented in Figure 9-106. Buses currently utilise the freeway shoulders on a part-time basis but are required to merge and diverge with general traffic at every interchange due to the entry and exit ramps. In the inbound direction, buses are permitted to use these lanes between the hours of 7:00 am to 10:30 am with an advisory speed limit of 70 km/hr. In the outbound direction, the lanes operate between 4:00 pm to 7:30 pm with an advisory speed limit of 60 km/hr. These advisory speed limits account for the narrow width and curvature of the freeway shoulders.

The configuration of the Doncaster Busway in the project scenario is presented in Figure 9-107. The Doncaster Busway project will provide full-time, completely segregated bus lanes between Doncaster Road and Hoddle Street, and will not preclude future provision of Doncaster rail. The majority of the busway will be located north of the Eastern Freeway, with the westbound lane crossing over to the south of the freeway between Chandler Highway and Hoddle Street. The Busway will have a posted speed limit of 100 km/hr, with one lane in each direction. A shoulder will be provided to allow a broken-down bus to pull over without blocking other vehicles.

An at-grade connection at Thompsons Road will allow the 905 bus route to exit the freeway at this point, maintaining its existing alignment. No changes to the on-road bus network are proposed east of the Doncaster Park and Ride.

Service frequencies for DARTs would also increase in the ‘with project’ scenario, which is compared with the existing and ‘no project’ service frequencies in Table 9-20. The proposed ‘with project’ and ‘no project’ service frequencies have been developed by Transport for Victoria and represent a large increase in total passenger capacity, particularly in off-peak periods. Note the service frequencies presented are proposed and do not necessarily represent Victorian Government policy or commitments.

Bus services that travel along the Eastern Freeway between Blackburn Road and Doncaster Road will continue to do so. They will enter and exit the Doncaster Busway at the Doncaster Park and Ride.

Table 9-20 – Existing and proposed* DART service frequencies in the 'with project' scenario

DART route	Existing		2036 'no project' scenario		2036 'with project' scenario	
	Peak period service frequency	Off-peak period service frequency	Peak period service frequency	Off-peak period service frequency	Peak period service frequency	Off-peak period service frequency
905 – City – The Pines SC	Every 6 to 10 minutes	Every 15 minutes	Every 6 to 10 minutes	Every 10 to 15 minutes	Every 6 to 8 minutes	Every 10 minutes
906 – City – Warrandyte	Every 5 to 10 minutes	Every 15 minutes	Every 5 minutes	Every 10 minutes	Every 5 minutes	Every 7 to 8 minutes
907 – City – Mitcham	Every 6 to 10 minutes	Every 15 minutes	Every 5 minutes	Every 10 minutes	Every 5 minutes	Every 7 to 8 minutes
908–City – The Pines SC	Every 6 to 15 minutes	Every 15 minutes	Every 6 to 15 minutes	Every 15 minutes	Every 6 to 8 minutes	Every 10 minutes

**Note the service frequencies presented are proposed and do not necessarily represent Victorian Government policy or commitments.*

Figure 9-106 – Eastern Freeway bus lane configuration, existing layout

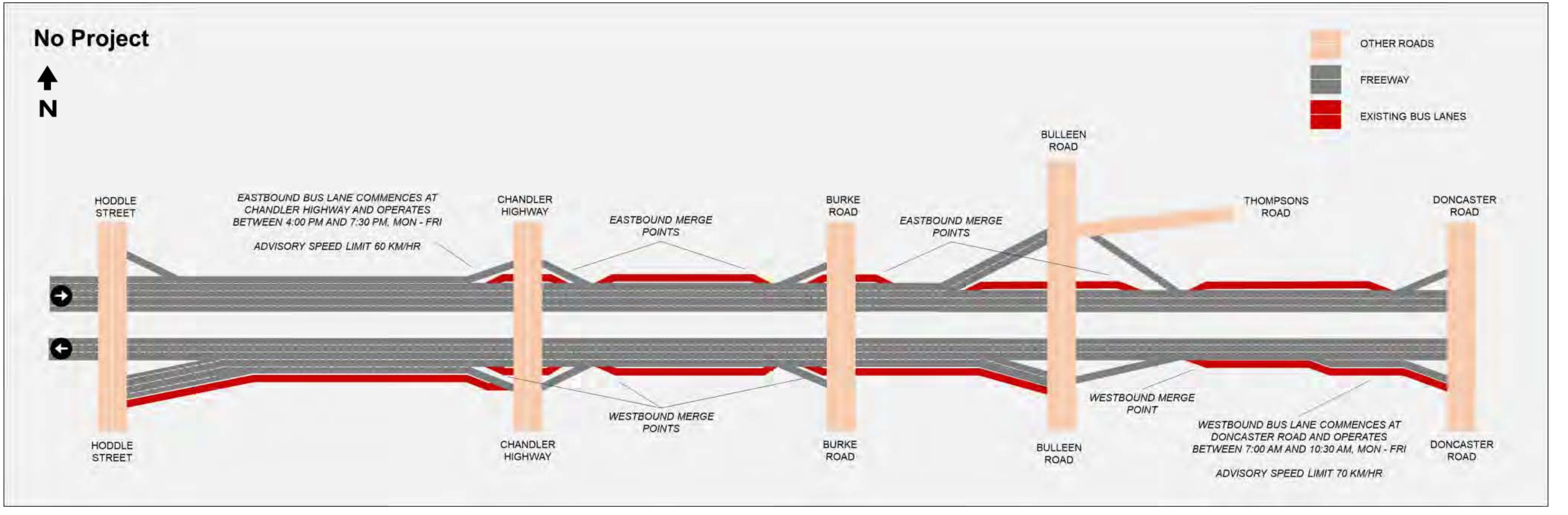
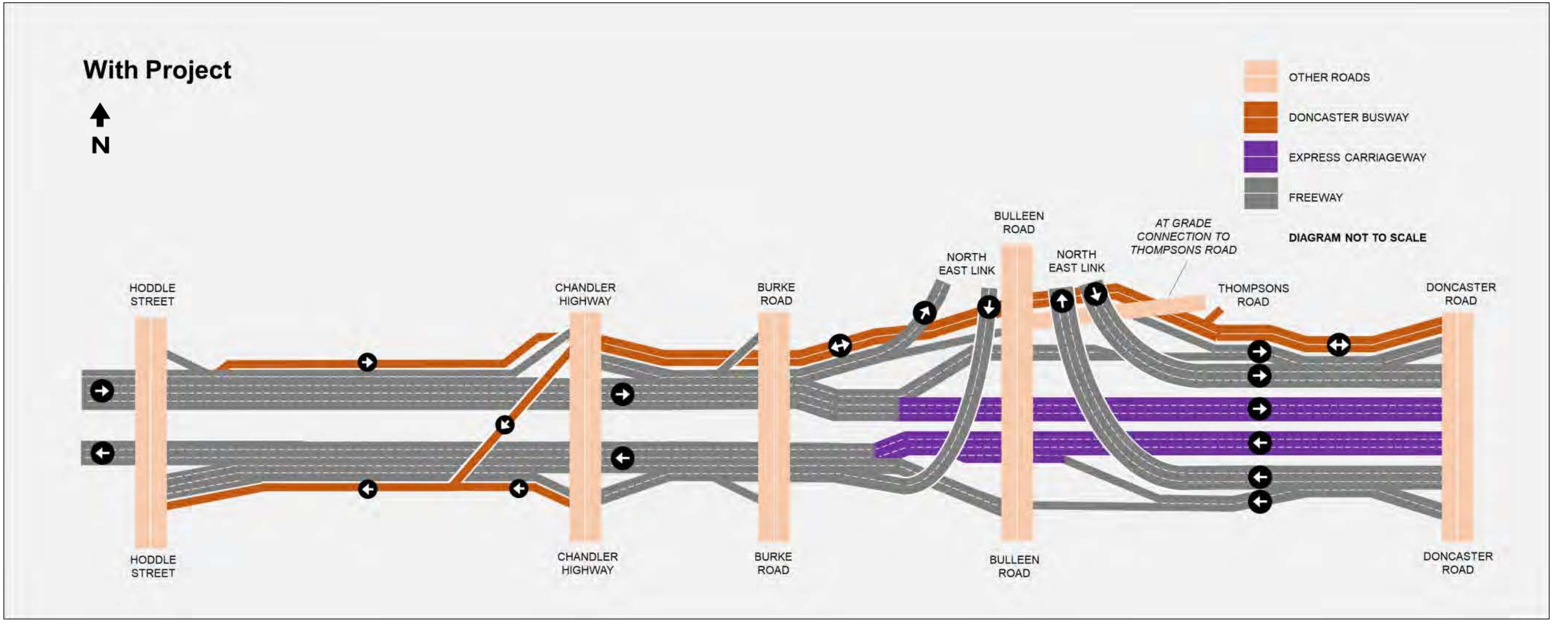


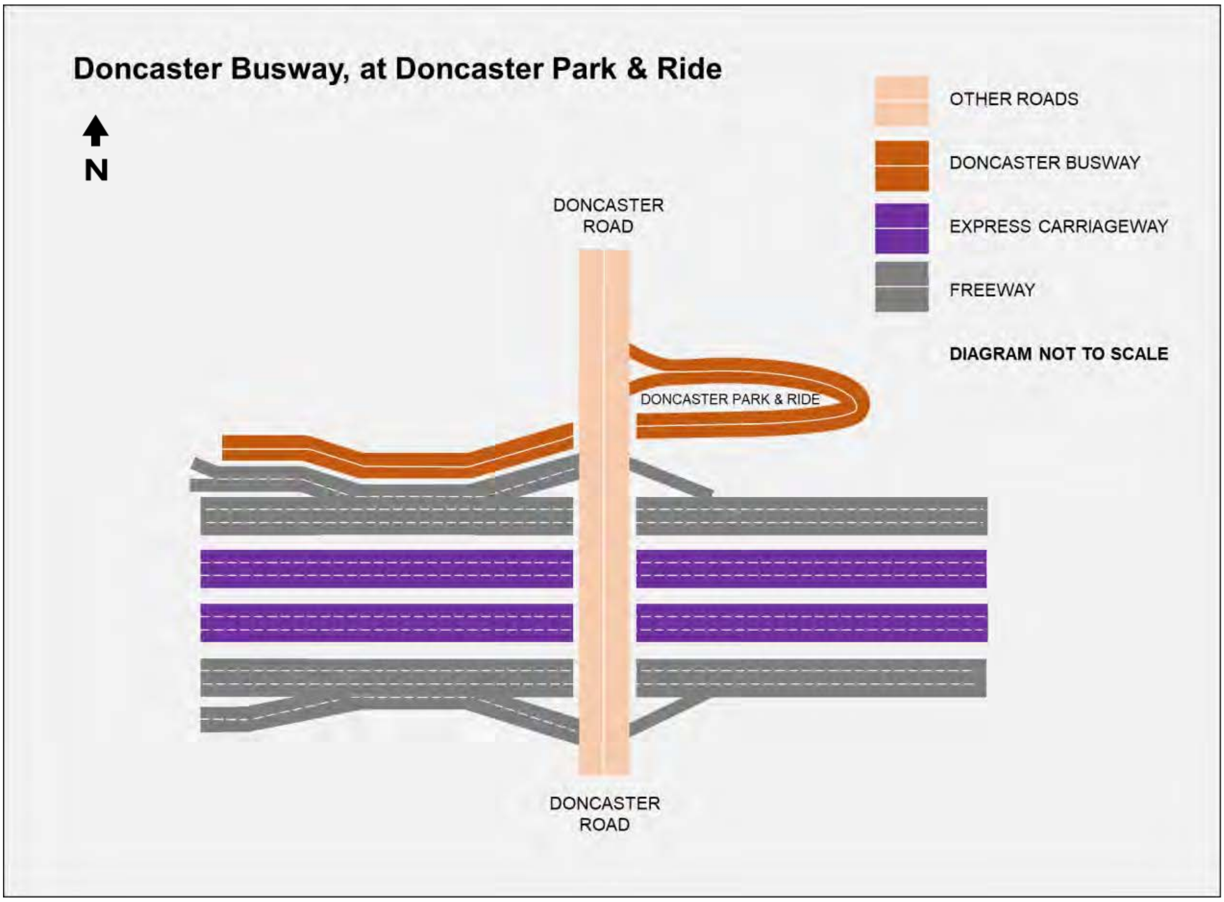
Figure 9-107 – Doncaster Busway layout, 'with project' scenario



As part of the Doncaster Busway upgrades, the intersection of the Doncaster Park and Ride, Doncaster Road and the Eastern Freeway will be reconfigured. Bus access to the Doncaster Busway will be via the Doncaster Park and Ride facility, as outlined in Figure 9-108. This will require buses to first enter the facility via Doncaster Road, before proceeding onto the Busway.

The reconstruction of the Doncaster Road and Grimshaw Street bridges additionally allows for the provision of queue-jump bus lanes at both intersections. This is anticipated to improve travel times for DART services accessing the Doncaster Park and Ride, as well as bus routes 506 and 902 at Grimshaw Street.

Figure 9-108 – Doncaster Park and Ride access, 'with project' scenario



9.6.2 Impacts across the study area

Public transport mode share is predicted to remain approximately static across the north-east in the 2036 'with project' scenario, as discussed in Section 9.2.1.

Travel times and speeds across all bus and tram services in the north-east are forecast to improve in the 2036 'with project' scenario. A summary of these changes relative to the 2036 'no project' scenario is presented in Table 9-21. Travel time changes to DART routes specifically are presented in the subsequent sections below.

Travel speeds across the bus and tram network in the north-east are forecast to increase by approximately 3 per cent in the AM and PM peaks, and by 2 per cent across the day. Travel times across the bus and tram network are predicted to decrease by approximately 9 per cent across the day. This reflects the local decongestion effects of North East Link on the study area.

Table 9-21 – Changes to public transport speeds and travel times, 2036 'with project' vs 2036 'no project'

Metric	AM peak	PM peak	Daily
Average speed	+3%	+3%	+2%
Travel time	-9%	-8%	-9%

9.6.3 Impacts to tram services

Forecast travel time changes inbound in the AM and PM peaks for tram routes in the study area is presented in Table 9-22. Tram travel times are not predicted to change significantly (typically between zero to 5 per cent quicker) as some sections of their routes are segregated from general traffic. Along these sections the trams can operate at a free-flow speed independently of traffic congestion levels.

Table 9-22 – Travel time changes inbound tram routes in the north-east, 2036 'with project' vs 2036 'no project'

Route	Description	AM peak inbound travel time change
11	West Preston – Victoria Harbour Docklands	0% to -5%
48	North Balwyn – Victoria Harbour Docklands	0% to -5%
86	Bundoora RMIT – Waterfront City Docklands	0% to -5%
109	Box Hill – Port Melbourne	0% to -5%

9.6.4 Impacts to bus services

Forecast travel time changes inbound in the AM peak for key bus routes is presented in Table 9-23. Travel times at the whole-of-route level are predicted to decrease by up to 10 per cent which reflects the general decongestion of the north-eastern arterial road network. Although a small number of intersection approaches worsen for bus routes in the 'with project' scenario, these delays are more than offset by decongestion elsewhere which leads to a general net reduction in travel times. This is discussed further in Section 9.3.3.

Table 9-23 – Travel time changes key inbound bus routes in the north-east, 2036 'with project' vs 2036 'no project'

Route	Description	AM peak inbound travel time change
200	Bulleen – City (Queen Street)	0% to -5%
207	Doncaster SC – City (Queen Street)	0% to -5%
250	La Trobe University – City (Queen Street)	-5% to -10%
302	Box Hill – City (Lonsdale Street)	0% to -5%
508	Alphington – Moonee Ponds	0% to -5%
513	Eltham–Glenroy via Lower Plenty	-5% to -10%
548	La Trobe University – Kew	-5% to -10%
550	La Trobe University – Northland SC	-5% to -10%
551	La Trobe University – Heidelberg	-10% to -15%
561	Macleod – Pascoe Vale	-5% to -10%

9.6.5 Impacts to SmartBus services

Forecast travel time changes inbound in the AM and PM peaks for non-DART SmartBuses in the study area are presented in Table 9-24. The buses presented are orbital routes with a broad catchment across Melbourne, and as such the travel time impacts have been restricted to roads within the study area. In general travel times on SmartBus routes 901, 902 and 903 within the north-east are predicted to be 5 to 10 per cent quicker in the 'with project' scenario due to decongestion along the arterial road network. As discussed in Section 9.3.3, although a small number of intersection approaches worsen for bus routes in the 'with project' scenario, these delays are more than offset by decongestion elsewhere leading to a general net reduction in travel times.

Table 9-24 – Travel time changes for inbound SmartBus (non-DART) routes in the north-east, 2036 'with project' vs 2036 'no project'

Route	Description	AM peak inbound travel time change	PM peak inbound travel time change
901	Frankston – Melbourne Airport	-5% to -10%	-5% to -10%
902	Chelsea – Airport West	-5% to -10%	-5% to -10%
903	Altona – Mordialloc	-5% to -10%	-5% to -10%

9.6.6 Impacts to DART services

Travel times on the Doncaster Busway along the Eastern Freeway between Doncaster Road and Hoddle Street are predicted to be approximately 20 to 30 per cent faster in the 'with project' scenario. This is achieved through the full separation of bus services from general traffic which results in the bypassing of entry and exit ramps and incidents on the Eastern Freeway, as well as an overall increase in bus operating speeds.

Travel times along the non-freeway segments (that is, in the inner city and in the eastern suburbs) are forecast to improve up to 15 per cent. These changes would be driven by general decongestion along the arterial road network as a result of the project. Travel time reductions for inbound DART bus routes are presented in Table 9-25 and Table 9-26 for the AM and PM peaks respectively. As discussed in Section 9.3.3, although a small number of intersection approaches worsen for bus routes in the 'with project' scenario, these delays are more than offset by decongestion elsewhere leading to a general net reduction in travel times.

Table 9-25 – DART bus routes change in inbound travel times, AM peak, 2036 'with project' vs 2036 'no project'

Route	Eastern Freeway segment	Non-Eastern Freeway segment
905	-30% to -35%	-5% to -10%
906	-20% to -25%	-10% to -15%
907	-30% to -35%	0% to -5%
908	-30% to -35%	-10% to -15%

Table 9-26 – DART bus routes change in inbound travel times, PM peak, 2036 'with project' vs 2036 'no project'

Route	Eastern Freeway segment	Non-Eastern Freeway segment
905	-25% to -30%	0% to -5%
906	-15% to -20%	-10% to -15%
907	-25% to -30%	0% to -5%
908	-25% to -30%	-10% to -15%

As a result of these time savings, as well as the increase in overall services, patronage across all four DART routes (905, 906, 907 and 908) are forecast to increase in the 2036 'with project' scenario, as presented in Table 9-27. The largest uplift in patronage is predicted along the route 908, which runs from The Pines Shopping Centre to the CBD via Templestowe and the Eastern Freeway.

Table 9-27 – Forecast changes to daily DART patronage

Route	Daily patronage changes
905	+15% to +20%
906	+5% to +10%
907	+10% to +15%
908	+25% to +30%

9.6.7 DART travel time reliability

The travel time reliability of buses has become increasingly important for users, with the attractiveness of the services undermined by unreliability. On-road congestion is typically a large contributor to travel time variability.

An assessment of the DART travel time reliability has been performed using the microsimulation model. This model takes into account delays at intersections as well as the impacts of merging on the freeway mainline. The average, minimum and maximum travel times across the existing, 2036 'no project' and 2036 'with project' models are presented in Table 9-28.

The assessment shows that currently there is a travel time variability of 230 seconds in the morning peak, which is predicted to increase to 457 seconds in the 2036 'no project' scenario. However, with North East Link and the Doncaster Busway, the variability is predicted to decrease to 116 seconds. This shows a significant improvement in the DART travel time reliability due to the project.

Table 9-28 – AM peak inbound travel time variability

Scenario	Average travel time (sec)	Minimum travel time (sec)	Maximum travel time (sec)	Variability (sec)
Existing	600	496	725	230
2036 'no project'	663	506	963	457
2036 'with project'	454	525	641	116

9.6.8 Doncaster Park and Ride and Watsonia railway station

Both the Doncaster Park and Ride and Watsonia railway station would be impacted by construction activities and as such would require reconstruction. The rebuilt facilities would meet the forecast demand for public transport, while also allowing for other modes such as walking and cycling and park and ride. The connections from these facilities to the surrounding road network would need to meet the performance targets of the project and are included in the microsimulation modelling presented in Section 9.3.

It is proposed to provide the following at the Doncaster Park and Ride:

- Maintain or increase the number of car parks within the facility with a multideck structure
- Maintain or increase the number of bus stops, with separate inbound and outbound stations
- Bicycle parking
- Taxi, kiss and ride and Disability Discrimination Act (DDA) compliant parking spaces
- Left-in/left-out access point onto Doncaster Road west of Hender Street
- Connection between the Doncaster Busway and the Doncaster Park and Ride.

It is proposed to provide the following at Watsonia railway station:

- Maintain or increase the number of car parks within the facility with a multideck structure
- Bicycle parking
- Taxi, kiss and ride and DDA-compliant parking spaces

- Maintain access at Elder Street, with the opportunity to provide a connection to Watsonia Road in the future if required
- Potential relocation of the bus bays from within the car park to a dedicated facility on Watsonia Road.

The potential relocation of the bus bays onto Watsonia Road is likely to impact on bus travel times and routes. Transport for Victoria is reviewing the bus routes in the area and will optimise these to take into consideration the proposed changes to the Watsonia railway station.

9.7 Walking and cycling

9.7.1 Scope

North East Link incorporates a broad program of 'core' and 'complementary' walking and cycling infrastructure upgrades across the study area. This assessment considers the 'core' walking and cycling scope associated with the project, which focuses on two separate corridors:

- The Greensborough Road path, which completes an entirely off-road shared use path between the M80 Ring Road and the Eastern Freeway
- New and upgraded shared use paths along the Eastern Freeway, including delivery of the North East Bicycle Corridor.

The new paths will be fully sealed and generally three metres wide, linking existing shared use paths to improve access to the Watsonia and Heidelberg town centres, as well as the community facilities along Bulleen Road. Where practicable, separated footpath and bicycle paths will be provided.

As North East Link will be in tunnels between Lower Plenty Road and Bulleen Road, severance throughout the Banyule Flats precinct would be minimised. New walking and cycling crossings will additionally be provided at multiple locations along the corridor to improve east-west connectivity.

The scope of each corridor is detailed further in the following sections.

Greensborough Road corridor

A shared use path will be constructed parallel to the above-ground sections of North East Link, completing the missing link in the Greensborough Road corridor. The upgrades along this corridor are presented in Figure 9-109 with new paths shown in pink and pedestrian and cyclist crossings over North East Link shown with dots.

The upgrade will complete the Banyule Shared Trail (B1), which was identified as part of the Northern Regional Trails Strategy as priority initiative for the City of Banyule. It will provide a connection from the M80 Ring Road to the Eastern Freeway using the existing Banyule Shared Trail/River Gum Walk trail between Lower Plenty Road and Manningham Road, completing a key component of the proposed SCCs and PBN.

A summary of the upgrades is provided below:

- An upgraded pedestrian bridge over the M80 Ring Road near Macorna Street, linking into the existing Metropolitan Ring Road path.
- Realignment of a short section of the Metropolitan Ring Road Path north of the M80 Ring Road to make allowances for the widening of the M80 Ring Road and the new North East Link interchange.

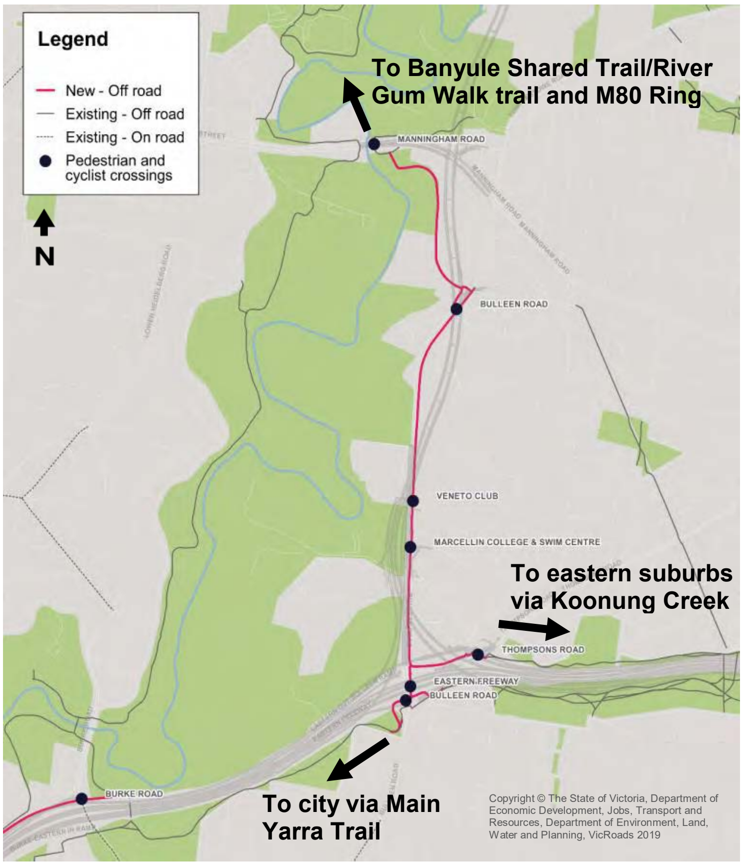
- A new shared use path on the southern side of the M80 Ring Road and western side of North East Link between Macorna Street and Grimshaw Street. This will link the existing bridge over the M80 Ring Road at Macorna Street to the Yando Street underpass, with grade separation over Kempston Street.
- New paths on the western and eastern sides of North East Link between Grimshaw Street and Watsonia Road.
- Grade-separated crossings on both sides of North East Link under Grimshaw Street.
- A new shared use path structure over North East Link, connecting near Elder Street to Watsonia railway station.
- A new shared use path between Watsonia Road and Yallambie Road as well as widening of the existing path between Yallambie Road and Lower Plenty Road.
- A new east-west shared use path in the reserve north of Drysdale Street between Greensborough Road and Lower Plenty Road as well as a grade-separated crossing of Lower Plenty Road to the Banyule Shared Trail/River Gum Walk trail, removing cyclists from the Lower Plenty Road interchange.
- Three new signalised crossings along Greensborough Road, at Drysdale Street, Strathallan Road and Wattle Drive.

Figure 9-109 – Greensborough Road corridor – walking and cycling scope

To complete the connection to the Eastern Freeway a new north-south shared use path will be constructed along Bulleen Road. These works are presented in pink in Figure 9-110 and include:

- A new shared use path at the Manningham Road interchange. This path crosses Bulleen Road at grade at the North East Link off-ramp intersection with Bulleen Road.
- A new shared use path along the eastern side of Bulleen Road between North East Link and Thompsons Road.
- A new footpath along the western side of Bulleen Road between Manningham Road and the Eastern Freeway.
- A new shared use path along Thompsons Road, between Bulleen Road and the Koonung Creek Trail east of the Thompsons Road outbound on-ramp.
- A new shared use path structure on the eastern side of the Bulleen Road overpass at the Eastern Freeway. This would enable safer and easier crossing of the freeway, linking the new Bulleen Road path with the residential areas south of the freeway.
- Three new signalised crossings along Bulleen Road, at the North East Link ramps, the Veneto Club and the Marcellin College access road.

Figure 9-110 – Bulleen Road shared use path



Eastern Freeway corridor

As part of the Eastern Freeway upgrades a new shared use path, known as the North East Bicycle Corridor, will be constructed between the Merri Creek and Chandler Highway. The extent of the new path is presented in pink in Figure 9-111. Its key components include:

- A connection to the Main Yarra Trail near Chandler Highway at the eastern end
- A connection back to the Main Yarra Trail at the Merri Creek crossing near Roseneath Street
- A new path under Chandler Highway parallel to the Eastern Freeway which will cross over the outbound off-ramp on a new bridge structure, before crossing Yarra Boulevard and Yarra Bend Road at grade.

The North East Bicycle Corridor is an endorsed proposal of the Northern Regional Trails Strategy. It addresses one of the key gaps within the SCC network.

Further upgrades to the remainder of the Eastern Freeway corridor include:

- A new bicycle path near the Burke Road interchange, to short-cut the existing trail which currently detours around the Burke Road Billabong Reserve
- Path upgrades to the existing Main Yarra Trail between Belford Road and Burke Road, which is generally in poor condition, narrow and steep in some sections.

Figure 9-111 – Proposed North East Bicycle Corridor alignment

9.7.2 Local accessibility

As discussed in Section 9.2.1, mode share across Melbourne is not anticipated to change materially as a result of the project. This is likely due to the infrastructure upgrades being completed across the road, public transport and active transport networks which leaves the relative attractiveness of each mode unchanged. However, the active transport upgrades would reduce interactions between cyclists and general traffic and improve linkages to the existing network of trails and paths.

The design of the project has considered 20-minute neighbourhoods. To maintain connectivity, land bridges will be provided across the trench along Greensborough Road and existing pedestrian bridges have been retained. As such, the project is not expected to impede the development of 20-minute neighbourhoods.

Greensborough Road corridor

The additional shared use path infrastructure along Greensborough Road would improve accessibility and safety for active travel throughout the corridor. A map showing the new paths (in pink) along with schools (purple precincts) and activity centres (orange dots) in the north-east is shown in Figure 9-111. The project will include 11 crossings for pedestrians and cyclists across Greensborough Road and Greensborough Bypass (shown in dark dots), to maintain east-west accessibility between residential areas and community facilities.

The paths along the northern segment will provide connectivity to a number of transport links, including:

- Watsonia railway station, via a new bridge near Elder Street
- The 513 bus along Greensborough Road
- The 566 and 902 buses along Grimshaw Street
- Macleod railway station, via the Erskine Street on-road lanes.

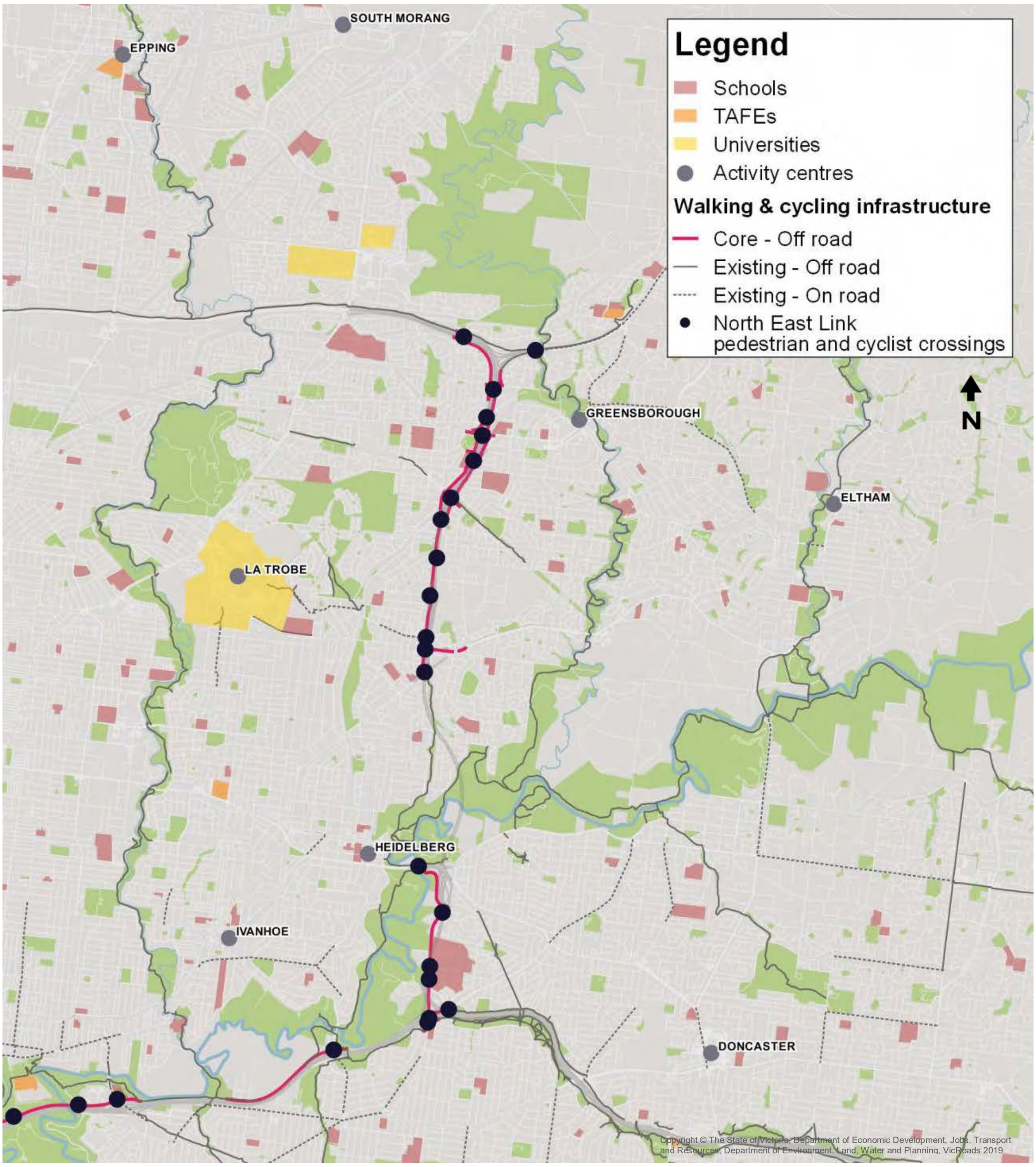
The paths also support connections to several educational and retail destinations including:

- Watsonia Primary School
- St Mary's Parish Primary School
- Watsonia Road shops
- Greensborough College
- Greensborough Plaza.

Further to the south along Bulleen Road, new off-road shared use paths will provide walking and cycling access to several community facilities including:

- Marcellin College
- Sports ovals for Trinity Grammar School and Carey Grammar
- The Veneto Club
- Bulleen Park
- The Manningham Hotel.

Figure 9-112 – Greensborough Road and Bulleen Road upgrades, with schools and activity centres



Eastern Freeway corridor

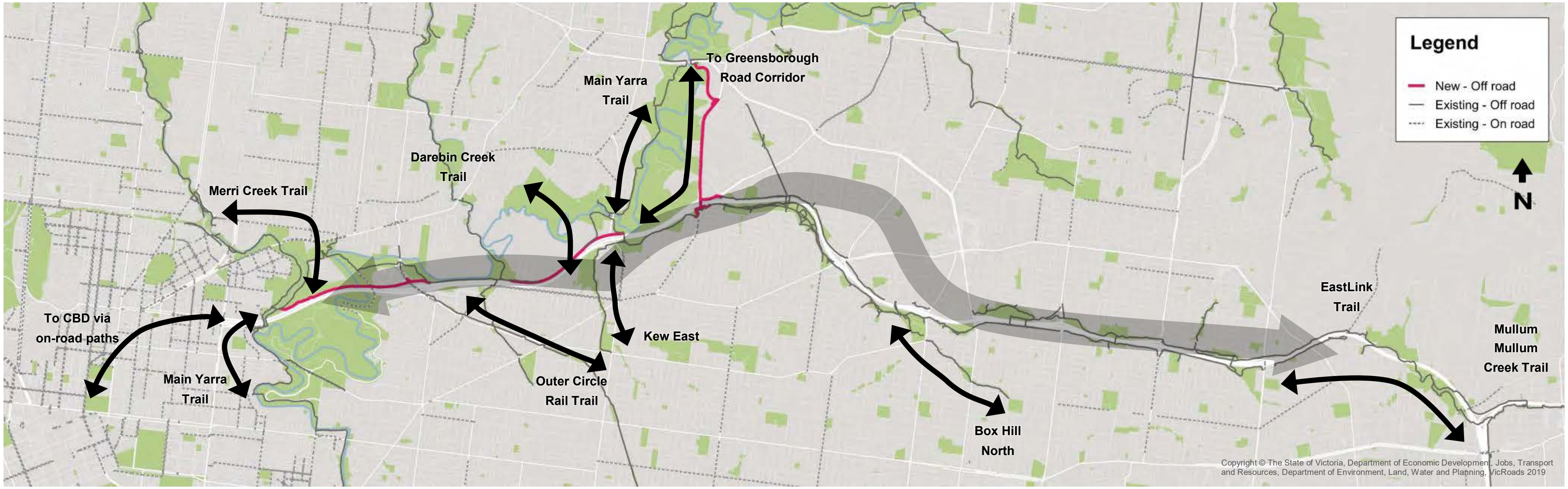
Supported by a connecting network of trails and on-road paths, the North East Bicycle Corridor will complete the final gap along the Eastern Freeway's fully segregated and parallel shared use path. This will create a more direct walking and cycling corridor between the city and eastern suburbs, compared with the existing creek and river trail network.

A map of the North East Bicycle Corridor along with its connecting paths is presented in Figure 9-111. The corridor will provide connectivity between the inner suburbs and all major cycling paths and trails throughout Melbourne's eastern and northern suburbs. It is anticipated the improved connectivity offered by the project would establish the Eastern Freeway as a commuter cyclist corridor between the east and the inner city.

A summary of the connecting trails and paths is provided below:

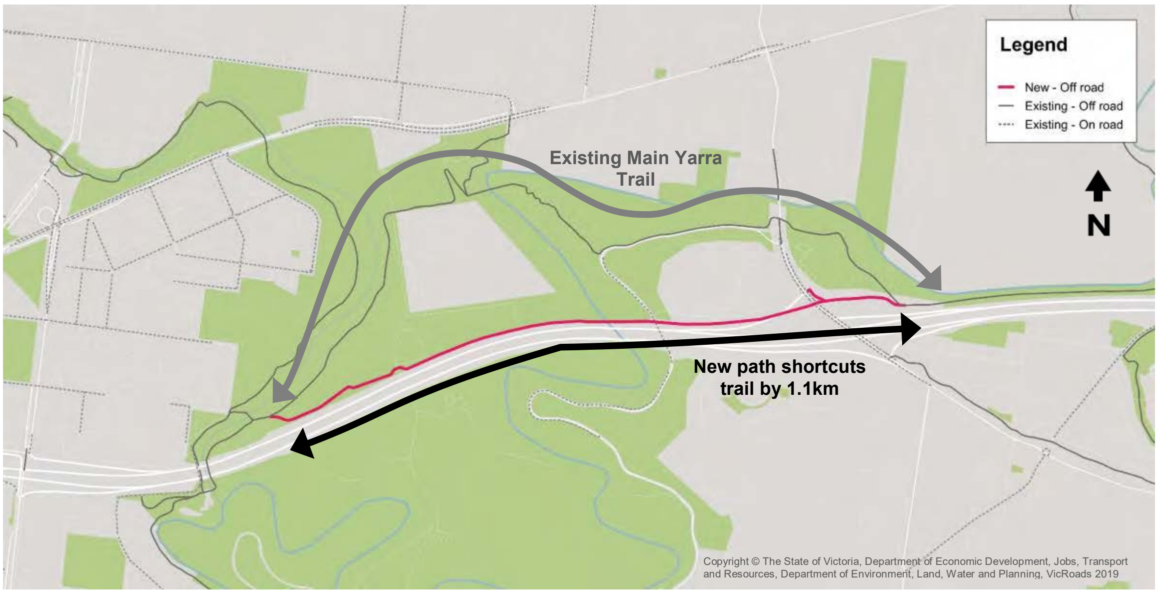
- Main Yarra Trail north of the Eastern Freeway, which connects to the Heidelberg town centre as well as the Plenty River and Diamond Creek Trails
- Main Yarra Travel south of the Eastern Freeway at Hoddle Street, which connects to Richmond and South Yarra
- Darebin Creek Trail to the north, which connects to the Preston-Northland activity centre, as well as the proposed La Trobe NEIC
- The Outer Circle Rail Trail which spans to Kew and Camberwell
- The EastLink and Mullum Mullum Creek trails near Ringwood
- The Greensborough Road corridor which will be upgraded as part of North East Link.

Figure 9-113 – North East Bicycle Corridor linkage to alternative trails



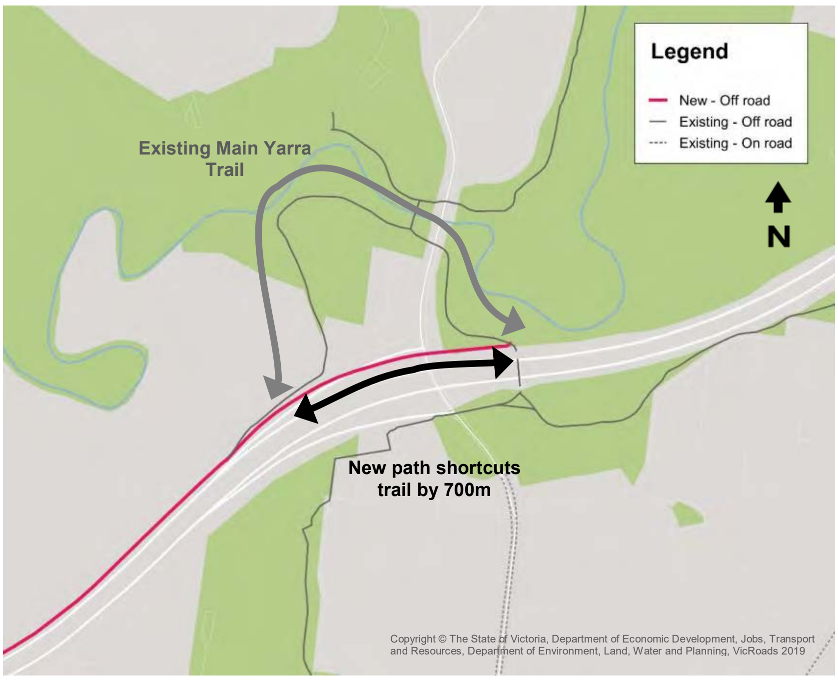
The Eastern Freeway upgrades are also predicted to offer time savings for cyclists, by supplementing the winding Main Yarra Trail with direct paths. Between the Chandler Highway and Hoddle Street, the North East Bicycle Corridor will shortcut the existing Main Yarra Trail (to the north of the freeway) by approximately 1.1 kilometres. This translates into a time saving of approximately four to five minutes for a cyclist.

Figure 9-114 – North East Bicycle Corridor at Chandler Highway



At Burke Road, the corridor will follow the Doncaster Busway alignment creating a direct path parallel to the Eastern Freeway. This will shortcut the existing Main Yarra Trail which encircles the Burke Road Billabong Reserve by approximately 700 metres. This equates to a three-minute travel time saving for a cyclist.

Figure 9-115 – North East Bicycle Corridor at Burke Road



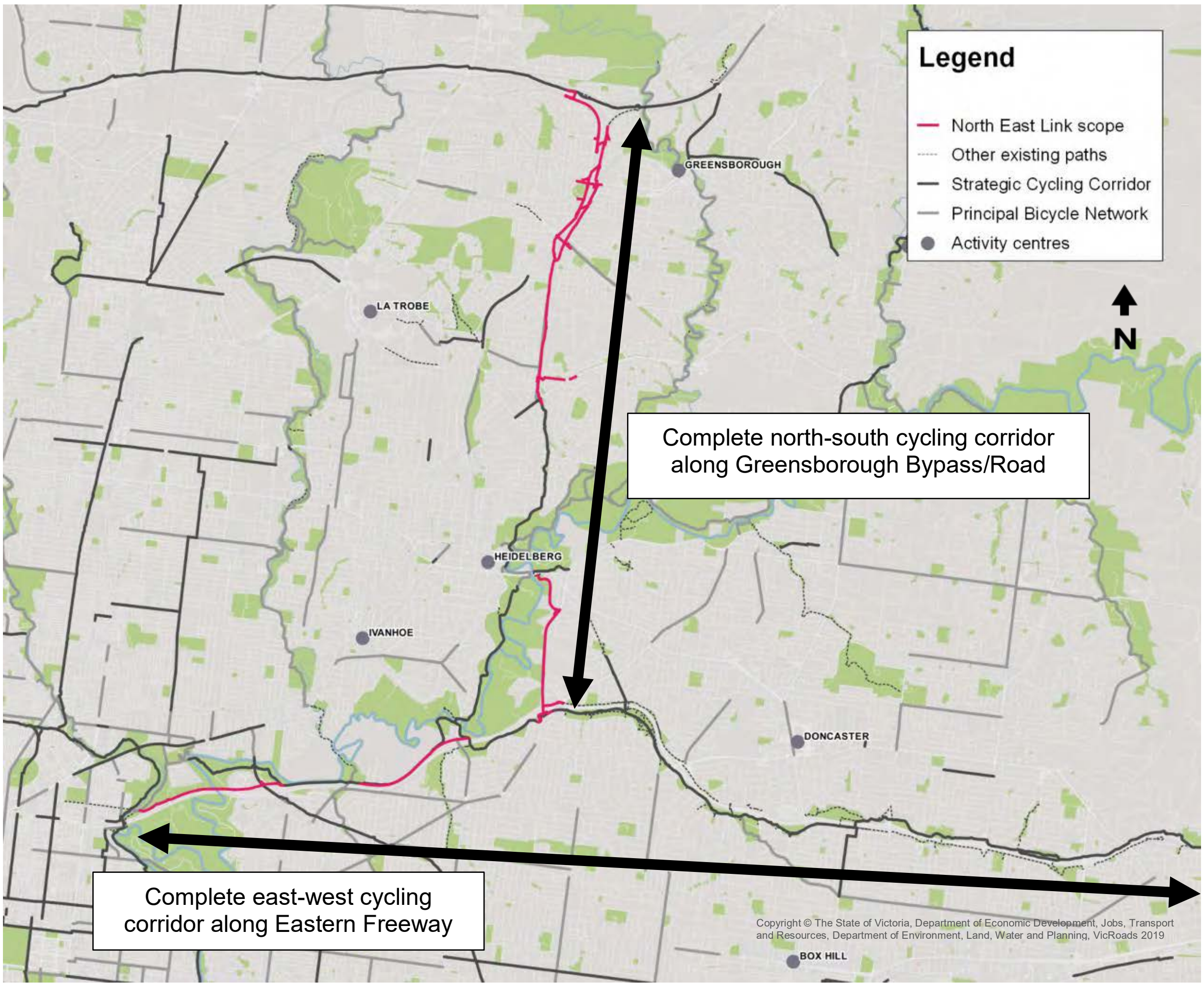
9.7.3 Strategic connectivity

North East Link walking and cycling infrastructure scope has been overlaid with the existing SCCs and PBN in Figure 9-116.

The North East Link scope fulfils a key gap in the existing SCC network by including a new north-south, off-road path between the M80 Ring Road and the existing shared use path near Lower Plenty Road. It would also strengthen the overall north-south connectivity of the SCC network through the north-east with new cycling paths along Bulleen Road. The North East Link scope also fills two gaps in the SCC network along the Eastern Freeway, near Burke Road and between Chandler Highway and Hoddle Street.

The above items relate to the core North East Link scope only. Further work is being undertaken by the NELP in consultation with local councils and other stakeholders to develop additional complementary projects which may address some residual gaps in the SCC network.

Figure 9-116 – North East Link walking and cycling scope with existing PBN and SCCs



9.7.4 Road safety

New shared use paths along Greensborough Road will eliminate the need for cyclists to complete their trip on-road. The separation of cyclists from general traffic would reduce the likelihood of incidents along the corridor and improve the overall amenity and comfort of these trips. The inclusion of frequent east-west crossings would also make walking trips across Greensborough Road easier to complete.

The project would also generally reduce traffic and truck volumes in the north-east, which would provide a 'lower stress' environment for pedestrians and cyclists. A summary of the changes to vehicle kilometres travelled along arterial and local roads is presented in Table 9-29. Total vehicle kilometres travelled along arterial and local roads in the north-east is forecast to reduce by 4 per cent, while heavy vehicle kilometres travelled are predicted to decrease by 14 per cent.

Table 9-29 – Vehicle kilometres travelled for non-freeway links, 2036 'with project' versus 2036 'no project'

Vehicle Kilometres Travelled	North-east
Total vehicles	21,920,000 (-4%)
Heavy vehicles	1,356,000 (-14%)

A net reduction in overall crashes in the north-east has been predicted, as presented in Section 9.2.7. This assessment has accounted for incidents involving pedestrians and cyclists.

10 Construction impacts

This section assesses the construction impacts of North East Link on the surrounding transport network and its users. The potential impacts during the construction of the project include:

- The quantity of trucks, particularly those carrying spoil, and how they affect the existing road network
- Traffic management associated with the construction of new lanes, ramps, tunnels, construction sites
- The combined impact of multiple construction sites operating at the same time.

The contractor delivering North East Link will be required to develop Transport Management Plans in consultation with relevant road authorities for works in all locations that affect pedestrian, bicycle, public transport or road users, as required by EPR T2. The full specification of EPR T2 is provided in Section 12.

Transport Management Plans must meet all relevant standards, guidelines and requirements of the responsible authorities before works commencing. These include (but are not limited to) VicRoads practices; the Code of Practice for Worksite Safety – Traffic Management of the Road Management Act; and Australian Standard Manual of Uniform Traffic Control Devices, Part 3 – Traffic Control for Works on Road (AS1742.3-2009).

These plans must identify how safe and efficient passage through or around construction sites will be provided, including details on proposed traffic control devices. The plans must demonstrate how they will minimise impact and maintain traffic flow on the surrounding road network. This includes details for all transport network users, including pedestrians, cyclists and public transport users, not just general traffic. They must also consider interactions with construction activities for other relevant major projects occurring concurrently. At the time of preparing this report, there is no commitment to undertake other significant works in the immediate vicinity of North East Link.

As part of EPR T3 the Transport Management Liaison Group (TMLG) will be created with representatives from the Victorian Government, VicRoads, NELP, local councils and the construction contractors. The primary function of the group will be to act as a forum for the exchange of information and issues associated with construction Transport Management Plans. The group will be required to meet regularly throughout the project's construction to review the co-ordination of traffic management activities across the entire North East Link project, as well as the appropriateness of the proposed measures and treatments.

The TMLG will be formed once the construction contract was awarded. The full specification of EPR T3 is provided in Section 12.

The project would likely be broken up into sections which would allow the sequencing of works to minimise the overall construction program. The construction impact assessment is based on an assumed construction methodology and timeline as developed at the time of writing this assessment. The successful contractor may propose a different methodology and timeline which would alter the impacts associated with the project's construction. For the purposes of this assessment, the project has been broken into segments as presented in Table 10-1.

Table 10-1 – Construction site segments

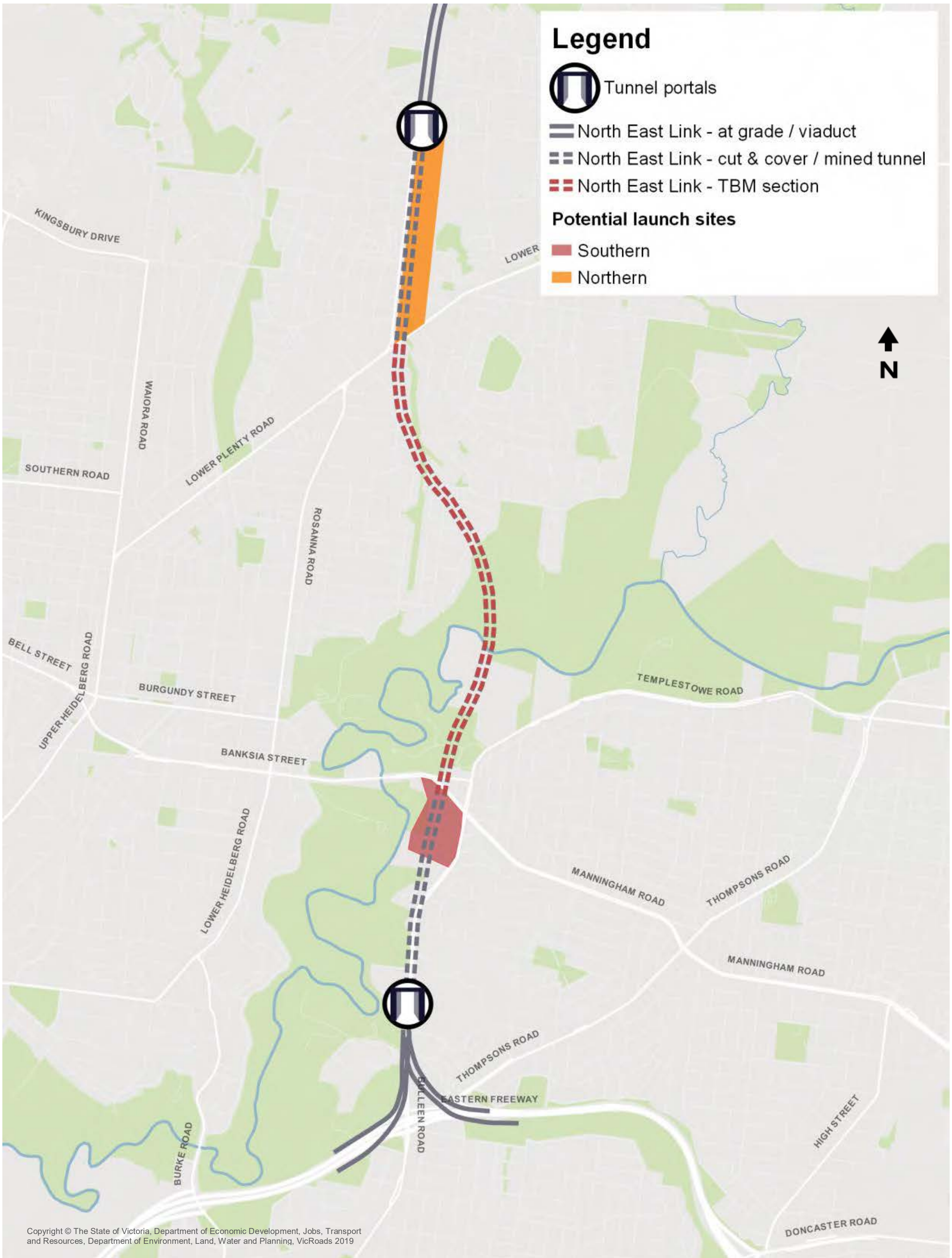
Site number	Site name
1	North East Link – M80 Ring Road interchange
2	North East Link – M80 Ring Road to Kempston Street
3	North East Link – Kempston Street to northern portal
4	North East Link – TBM
5	North East Link – Manningham Road interchange
6	North East Link – Bulleen Road mined tunnel
7	North East Link – Bulleen Road cut and cover
8	Eastern Freeway/North East Link interchange
9	Eastern Freeway – Burke Road to Bulleen Road
10	Eastern Freeway – Hoddle Street to Burke Road
11	Eastern Freeway – Bulleen Road to Doncaster Road
12	Eastern Freeway – Doncaster Road to Elgar Road
13	Eastern Freeway – Elgar Road to Tram Road
14	Eastern Freeway – Tram Road to Middleborough Road
15	Eastern Freeway – Middleborough Road to Blackburn Road
16	Eastern Freeway – Blackburn Road to Springvale Road

The Eastern Freeway works would likely require a number of stages to accommodate the existing traffic volumes and maintain traffic lanes to minimise impacts. Lane closures should only be permitted outside peak periods, while full closures should only be possible overnight.

The tunnelling methodology for North East Link would likely involve a combination of tunnel boring machines (TBM), cut and cover and mined tunnelling which typically uses a road header machine. Tunnelling works between Bridge Street and Avon Street, as well as between Rocklea Road and Bulleen Oval are likely to be cut and cover, while the section between Avon Street and Rocklea Road would be constructed via mining. TBMs are anticipated to be used between the Lower Plenty Road and Manningham Road interchanges.

There are two options for the launch site of the TBM: Manningham Road (reference project) or Lower Plenty Road (alternative design). This assessment provides forecast truck volumes for each option, but not every site would have different volumes due to the different TBM launch site options. The locations where differences would occur are mainly focused around construction sites north of Lower Plenty Road, but also affect the mined tunnel works at Bulleen Road. The two construction scenarios are referred to as the southern launch site (Manningham Road) and the northern launch site (Lower Plenty Road). These sites are presented in Figure 10-1.

Figure 10-1 – Possible TBM launch sites



For the purposes of this assessment, a number of assumptions have been made. These are:

- Forecast truck numbers, site workforce and the proposed construction program have been provided by NELP.
- All worksites north of Lower Plenty Road would haul north to locations along the M80 Ring Road and Hume Freeway.
- The construction sites at Manningham Road and Bulleen Road would haul to two locations: two-thirds of spoil would travel north to locations along the M80 Ring Road and the Hume Freeway, with the other third travelling south to locations near Dandenong. Trucks heading south would use EastLink to access Dandenong and be permitted to use the Mullum Mullum and Melba tunnels.
- The construction sites along the Eastern Freeway west of Doncaster Road would travel north to locations along the M80 Ring Road and Hume Freeway.
- The construction sites east of Doncaster Road on the Eastern Freeway would travel south to locations around Dandenong via EastLink.
- As the actual haulage routes have not been confirmed as yet, mitigating treatments at intersections along the haulage routes have not been developed. These will need to be developed as part of the Transport Management Plans that the construction contractor will produce before works commence.
- The construction sites may require the rephasing of traffic signals in the surrounding area to accommodate the construction vehicles.
- Trucks hauling spoil are Truck and Dog trailer combinations. These vehicles are typically 3–4 axle trucks towing a trailer with 3–4 axle trailers. An example of these vehicles is presented in Figure 10-2.

Figure 10-2 – Example truck and dog combinations

Source: National Heavy Vehicle Regulator

10.1 Key construction sites generating haulage vehicles

Estimates of the quantity of construction vehicles have been produced for each site, across both material delivery and spoil activity. The estimates for the southern TBM launch site are provided in Table 10-2, while the estimates for the northern TBM launch site are provided in Table 10-3.

Daily truck volumes for the peak construction activity month have also been provided, which shows the highest estimated truck volume generated by each site. The trip volumes provided below are both inbound and outbound (that is, a truck entering and exiting a site is two trips).

The largest generator of truck trips for both TBM launch options is the section from Kempston Street to the northern portal. This section of works incorporates the trench along Greensborough Road which would generate large amounts of spoil. This section of works would also generate the largest daily truck volumes of all the worksites.

Table 10-2 – Forecast construction truck trips by site – southern launch site

Site number	Site name	Construction duration (months)	Forecast peak period	Peak daily truck trips
1	North East Link – M80 Ring Road interchange	30	Q2–2022	290
2	North East Link – M80 Ring Road to Kempston Street	30	Q2–2023	670
3	North East Link – Kempston Street to northern portal	42	Q1–2023	1,730
4	North East Link – TBM	30	Q1–2024	960
5	North East Link – Manningham Road interchange	30	Q1–2024	760
6	North East Link – Bulleen Road mined tunnel	30	Q1–2025	630
7	North East Link — Bulleen Road Cut and Cover	42	Q3–2022	390
8	Eastern Freeway/North East Link interchange	42	Q3–2024	370
9	Eastern Freeway – Burke Road to Bulleen Road	42	Q1–2022	300
10	Eastern Freeway – Hoddle Street to Burke Road	24	Q4–2021	330
11	Eastern Freeway – Bulleen Road to Doncaster Road	42	Q4–2021	270
12	Eastern Freeway – Doncaster Road to Elgar Road	42	Q1–2022	170
13	Eastern Freeway – Elgar Road to Tram Road	42	Q4–2022	140
14	Eastern Freeway – Tram Road to Middleborough Road	30	Q2–2023	370

Site number	Site name	Construction duration (months)	Forecast peak period	Peak daily truck trips
15	Eastern Freeway – Middleborough Road to Blackburn Road	30	Q1–2023	270
16	Eastern Freeway – Blackburn Road to Springvale Road	30	Q1–2023	270

Table 10-3 – Forecast construction truck trips by site – northern launch site

Site number	Site name	Construction duration (months)	Forecast peak period	Peak daily truck trips
1	North East Link – M80 Ring Road interchange	30	Q2–2022	290
2	North East Link – M80 Ring Road to Kempston Street	30	Q2–2023	670
3	North East Link – Kempston Street to northern portal	42	Q3–2021	960
4	North East Link – TBM	30	Q4–2022	960
5	North East Link – Manningham Road interchange	30	Q3–2022	540
6	North East Link – Bulleen Road mined tunnel	12	Q3–2024	170
7	North East Link – Bulleen Road cut and cover	24	Q3–2022	390
8	Eastern Freeway/North East Link interchange	36	Q3–2024	370
9	Eastern Freeway – Burke Road to Bulleen Road	12	Q1–2022	300
10	Eastern Freeway – Hoddle Street to Burke Road	24	Q4–2021	330
11	Eastern Freeway – Bulleen Road to Doncaster Road	42	Q4–2021	270
12	Eastern Freeway – Doncaster Road to Elgar Road	30	Q1–2022	170
13	Eastern Freeway – Elgar Road to Tram Road	30	Q4–2022	140
14	Eastern Freeway – Tram Road to Middleborough Road	24	Q2–2023	370
15	Eastern Freeway – Middleborough Road to Blackburn Road	12	Q1–2023	270
16	Eastern Freeway – Blackburn Road to	12	Q1–2023	270

Site number	Site name	Construction duration (months)	Forecast peak period	Peak daily truck trips
	Springvale Road			

The truck profile associated with the project construction works have been provided for a six-year period, with different construction segments mobilising and demobilising throughout that time. Construction truck trips have been estimated for each month during this six-year period with truck volumes presented in Figure 10-3 for the southern launch option and Figure 10-4 for the northern launch option.

Construction activities for the southern launch option would peak in January 2023, with approximately 3,500 daily truck trips across the project. During this time, the haulage of spoil would peak while the haulage of materials would begin to rise.

The highest daily truck trips for the northern launch site would be approximately 3,700 in November 2022. A key difference between the two options is that the TBM and Kempston Street to northern portal sites would be operating at the same time for longer under this option, generating more truck trips.

Figure 10-3 – Forecast daily construction truck trips, all sites – southern launch site

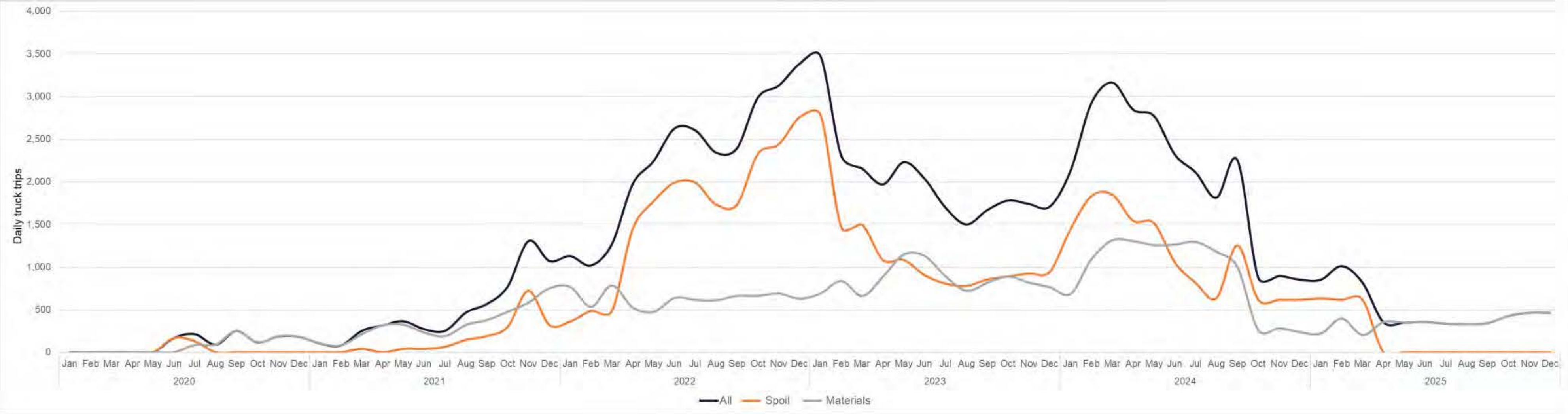
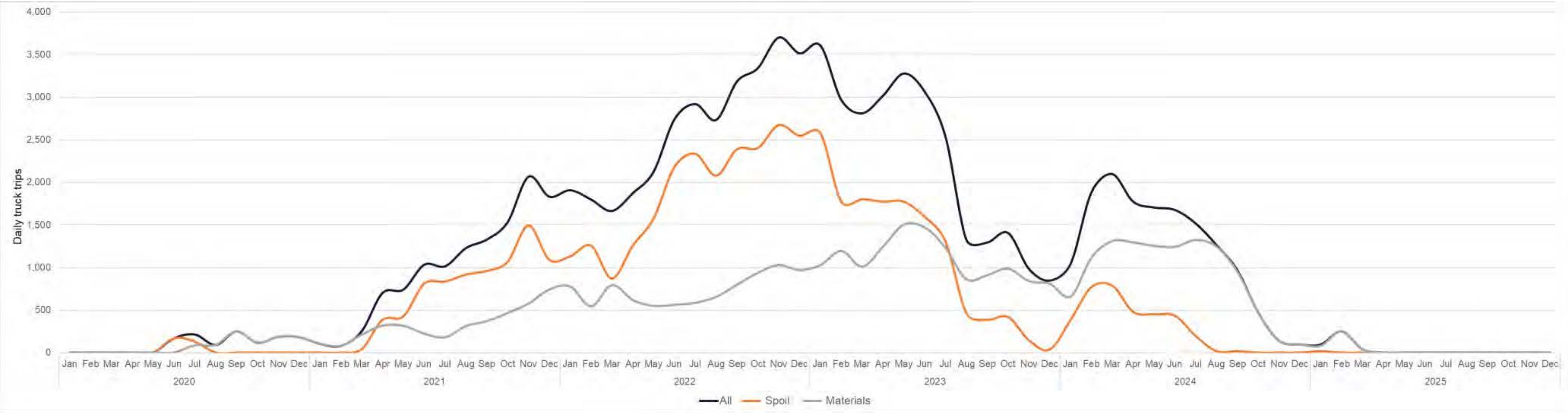


Figure 10-4 – Forecast daily construction truck trips, all sites – northern launch site



10.2 Proposed haulage routes

Of the 3,500 to 3,700 daily truck trips generated in the peak period of the construction activities, approximately 2,800 of those would be hauling spoil. The spoil from the works currently predicted to be hauled is:

- All worksites north of Lower Plenty Road would haul north to locations along the M80 Ring Road and the Hume Freeway
- The construction sites at Manningham Road and Bulleen Road would haul to two locations: two-thirds of all spoil would travel north to locations along the M80 Ring Road and the Hume Freeway, with the other third travelling south to locations near Dandenong via the Eastern Freeway and EastLink
- The construction sites along the Eastern Freeway west of Doncaster Road would travel north to locations along the M80 Ring Road and the Hume Freeway
- The construction sites east of Doncaster Road on the Eastern Freeway would travel south to locations around Dandenong via EastLink.

It is assumed that 5 per cent of all spoil material would be contaminated and would need to be hauled to the Dandenong area.

A map of the proposed haulage routes from each construction site to the M80 Ring Road/Hume Freeway interchange or to EastLink is presented in Figure 10-5. Sites north of Lower Plenty Road would use Greensborough Road and the Greensborough Bypass to access the M80 Ring Road.

Haulage from locations along Manningham Road, Bulleen Road and the Eastern Freeway west of Doncaster Road are anticipated to use Bulleen Road and Chandler Highway to access Bell Street. Burke Road is not proposed to be used for haulage as it is a restricted B-Double route.

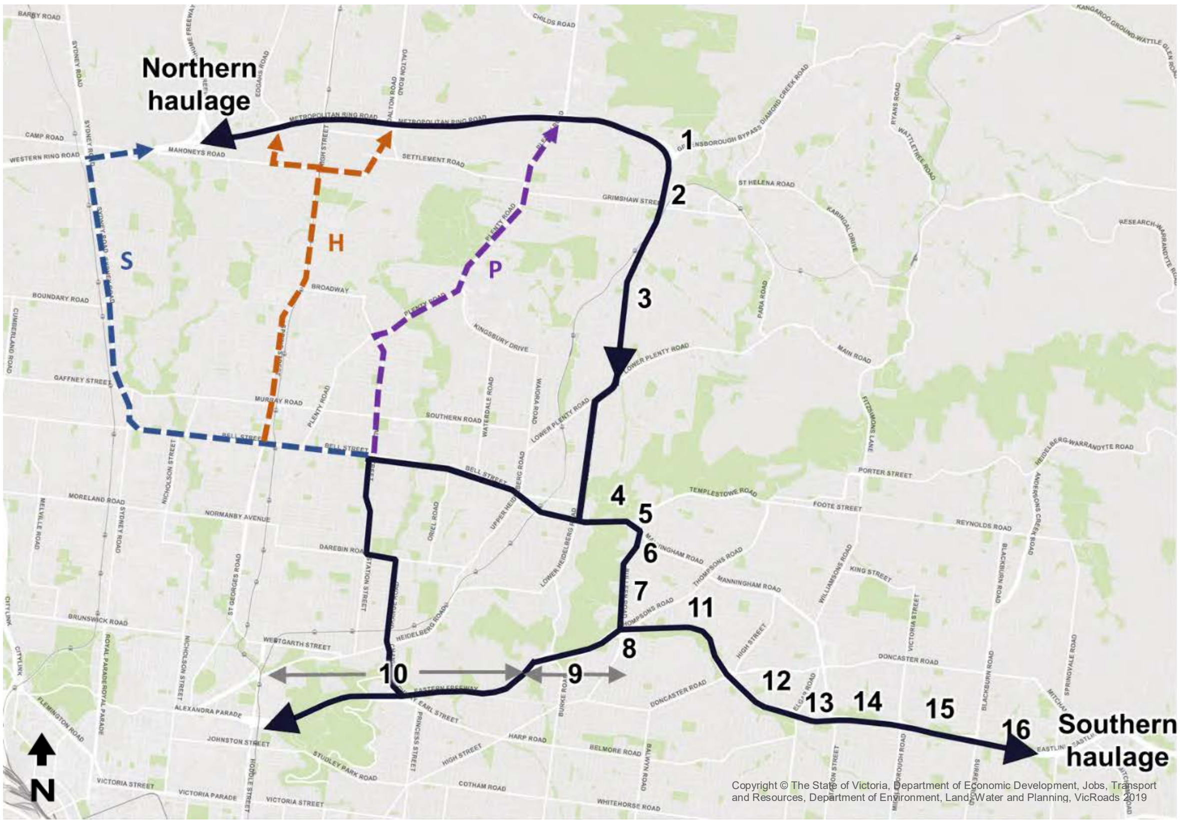
From Bell Street, there are three potential routes available to access the M80 Ring Road: Sydney Road (route S), High Street (route H) and Plenty Road/Albert Street (route P). It is not proposed that Rosanna Road would be used for hauling materials from the southern construction zones given high levels of congestion throughout the day.

Haulage from locations on the Eastern Freeway east of Doncaster Road are anticipated to use the Eastern Freeway and EastLink to access locations around Dandenong. It is not anticipated that spoil haulage vehicles would use the arterial or local road network south of the Eastern Freeway. However, material deliveries may use some of these roads if materials are sourced locally.

Vehicles hauling contaminated material from sites north of Lower Plenty Road are anticipated to use Rosanna Road to access Bulleen Road, the Eastern Freeway and EastLink to travel to Dandenong.

Each of the proposed haulage routes from Manningham Road, Bulleen Road and the western end of the Eastern Freeway are currently utilised by trucks and are approved B-Double truck routes.
The following provides a summary of each of the routes:

Figure 10-5 – Proposed construction sites and haulage routes



Route S – Sydney Road

- Currently carries 30,000 to 54,000 vehicles per day which includes up to 5,400 heavy vehicles.
- Provides four lanes Between Bell Street and Bakers Road, which includes on-street car parking and an on-road tram. Land use is a mix of residential and commercial properties.
- Provides four lanes from Bakers Road to Boundary Road with on-street car parking. Land use is a mix of residential and commercial properties.
- Provides six lanes north of Boundary Road with no on-street car parking. Land use is mainly commercial and industrial with some residential properties.

Route H – High Street

- Currently carries 23,000 to 39,000 vehicles per day which includes up to 3,700 heavy vehicles.
- Provides four lanes for its full length between Bell Street and Mahoneys Road, with on-street parking.
- Land use between Mahoneys Road and Queen Street is mainly residential. South of Queen Street land use is mainly commercial while north of Mahoneys Road land use is mainly industrial.
- North of Mahoneys Road, the route can use either Edgars Road or Plenty Road to access the M80 Ring Road. Edgars Road and Plenty Road both travel through industrial areas.

Route P – Plenty Road and Albert Street

- Currently carries 21,000 to 40,000 vehicles per day which includes up to 3,500 heavy vehicles.
- Provides four lanes along Albert Street, increasing to six lanes along Plenty Road. Plenty Road also has a separated tram route.
- Land use along Albert Street is mainly residential, with some commercial and industrial close to Bell Street.
- Land use along Plenty Road is mainly residential with some commercial and educational facilities.

Route S currently carries the highest volume of heavy vehicles and may be more suited to the haulage of spoil from the southern construction sites. However, it is heavily utilised throughout the day and may not have spare capacity to accommodate additional vehicles.

Route H and Route P both carry similar quantities of heavy vehicles, with Route H having more commercial and industrial land uses along it. However, Route P with its six lanes along Plenty Road has the greatest ability to carry the additional traffic volumes, particularly outside the peak periods.

The best solution for the management of this haulage task may be to spread the load across the three routes to distribute the impact of the construction activities across the road network.

It is not possible to assess the haulage routes of construction materials accessing the sites as these materials would come from a range of locations across Melbourne. The local impacts of these vehicles assessing the site is analysed in later sections.

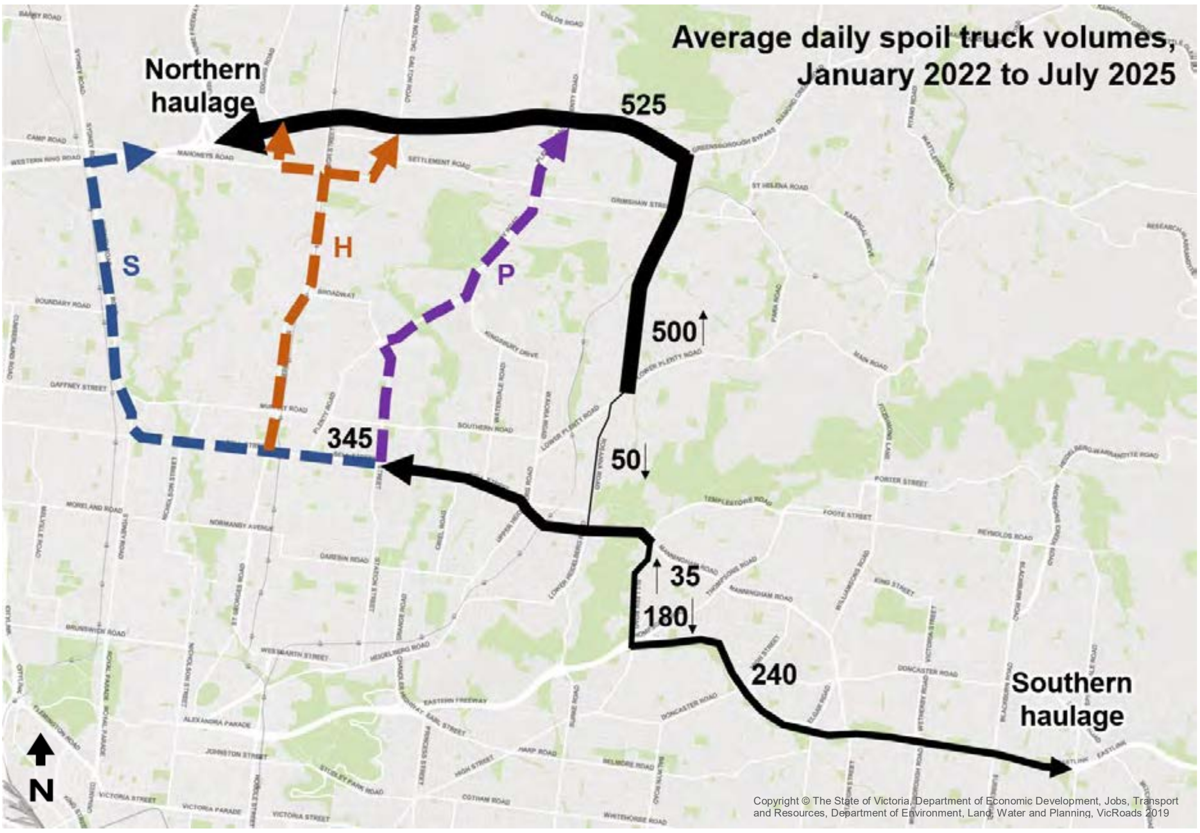
10.2.1 Peak haulage volumes

Southern launch site

A peak period of activity for the haulage of spoil is predicted to occur from approximately January 2022 to July 2025 when there would be an average of approximately 1,100 spoil truck movements per day. The average daily truck volumes on each of the proposed haulage routes are presented in Figure 10-6.

It is predicted that approximately 350 truck movements would occur on or be distributed across the three haulage routes (routes H, S and/or P), as well as 220 truck movements on Bulleen Road and another 500 on Greensborough Road.

Figure 10-6 – Average daily spoil truck volumes – January 2022 to July 2025 (two-way) – southern launch site

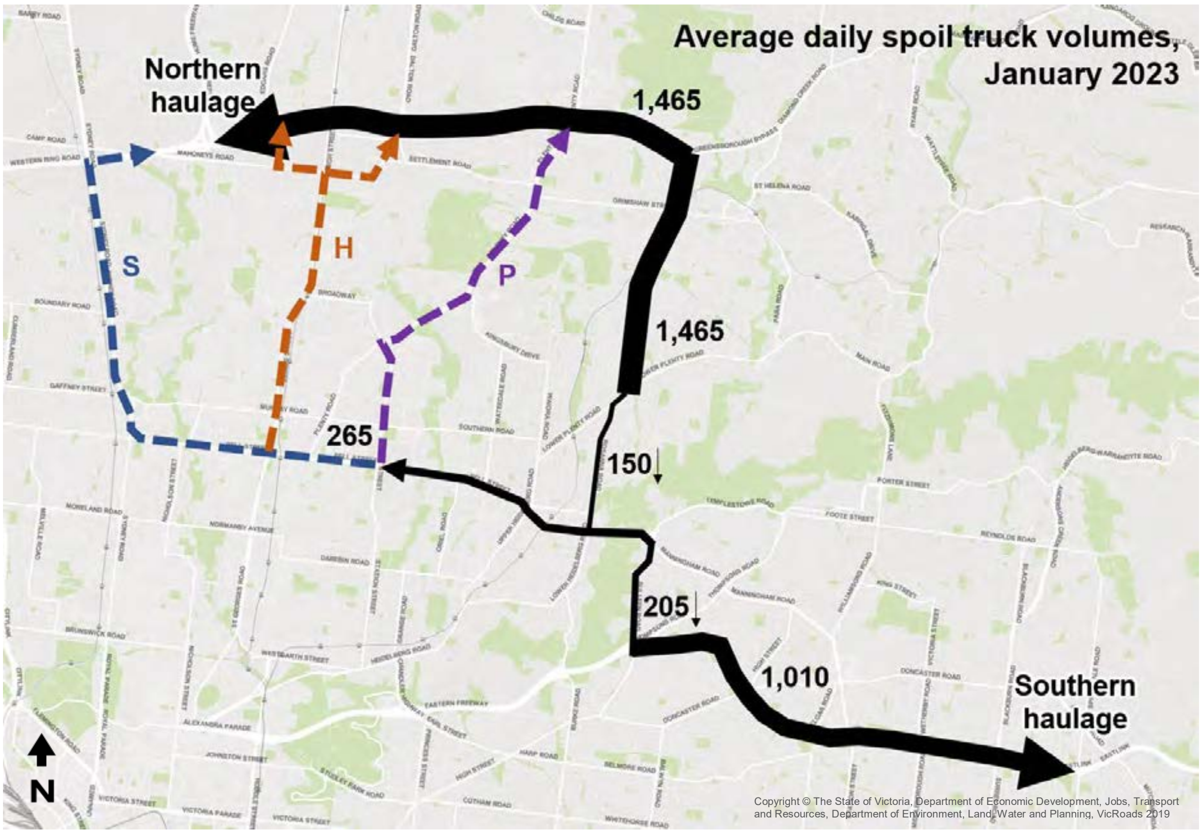


During the construction peak period there would be a significant ramp up of haulage activity, increasing to a peak of approximately 2,800 haulage trips per day in January 2023 carrying spoil. The forecast trips and their routes of this peak period are presented in Figure 10-7.

During this construction peak period, haulage works along the Eastern Freeway between Hoddle Street and Burke Road are predicted to end so there would be no haulage of material along Chandler Highway towards Bell Street. However, sites along the Eastern Freeway west of Doncaster Road would continue to haul spoil via Bulleen Road. This would combine with spoil from the tunnelling works, resulting in approximately 270 truck trips per day along Bell Street before heading off on one or multiple routes to access the M80 Ring Road.

Works north of Lower Plenty Road are predicted to generate approximately 1,470 truck trips per day along Greensborough Road which would travel along the M80 Ring Road to access their destinations.

Figure 10-7 – Average daily spoil truck volumes – peak month, January 2023 (two-way) – southern launch site

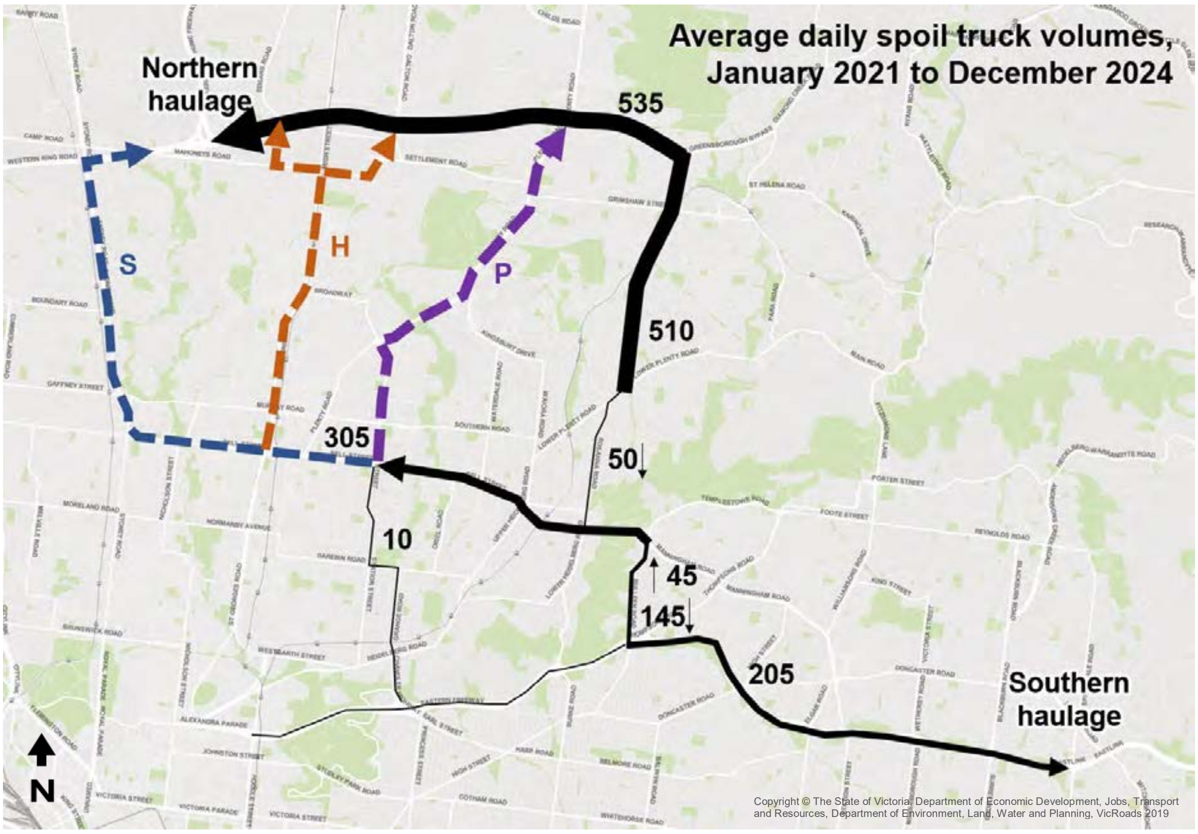


Northern launch site

A peak period of activity for the haulage of spoil is predicted to occur from January 2021 to December 2024 when there would be an average of approximately 1,050 spoil truck movements per day carrying spoil. The average daily truck volumes on each of the proposed haulage routes are presented in Figure 10-8.

It is predicted that approximately 310 truck movements would occur on or be distributed across the three haulage routes (routes H, S and/or P), as well as 190 truck movements on Bulleen Road and another 510 on Greensborough Road.

Figure 10-8 – Average daily spoil truck volumes – January 2021 to December 2024 (two-way) – northern launch site

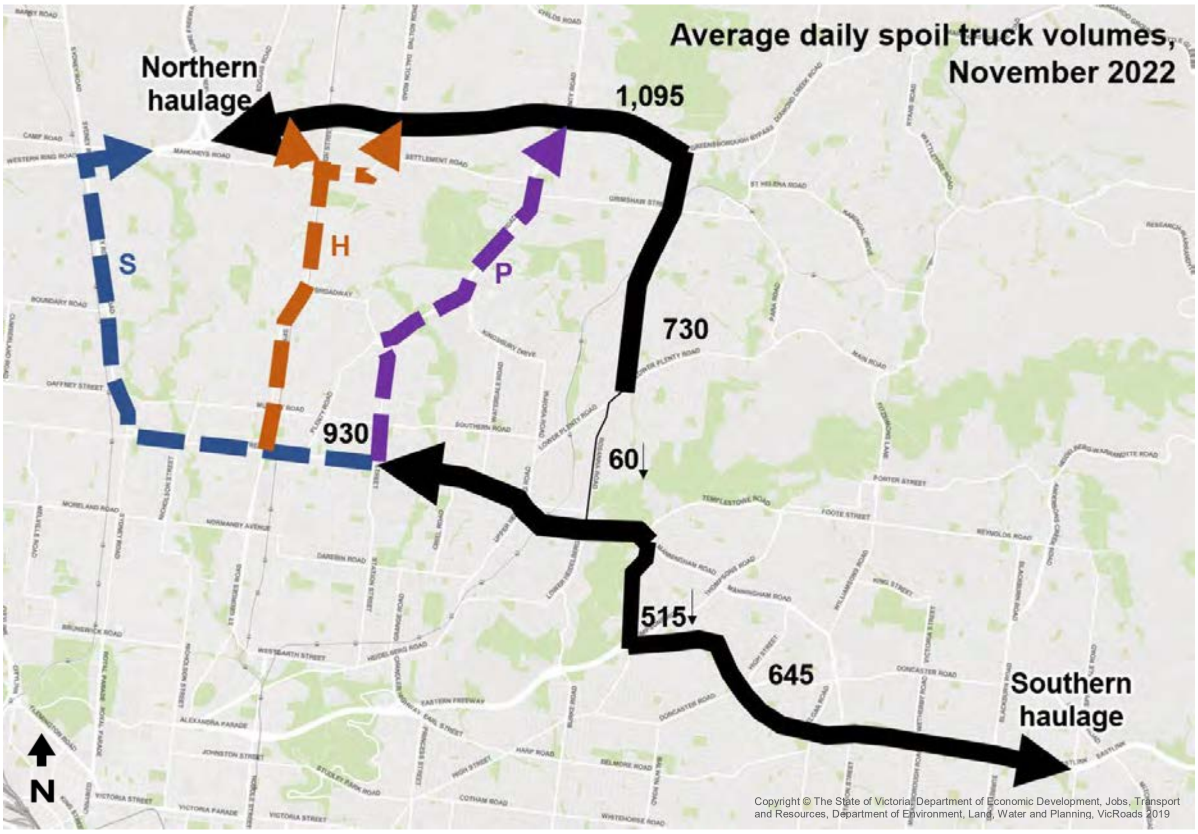


During the construction peak period there would be a significant ramp up of haulage activity, increasing to a peak of approximately 2,670 haulage trips per day in November 2022 carrying spoil. The forecast trips and their routes of this peak period are presented in Figure 10-9.

During this construction peak period, haulage works along the Eastern Freeway between Hoddle Street and Burke Road are predicted to end so there would be no haulage of material along Chandler Highway towards Bell Street. However, sites along the Eastern Freeway west of Doncaster would continue to haul spoil via Bulleen Road. This would combine with spoil from the tunnelling works, resulting in approximately 930 truck trips per day along Bell Street before heading off on one or multiple routes to access the M80 Ring Road.

Works north of Lower Plenty Road are predicted to generate approximately 1,100 truck trips per day along Greensborough Road which would travel along the M80 Ring Road to access their destinations.

Figure 10-9 – Average daily spoil truck volumes – peak month, January 2023 (two-way) – northern launch site



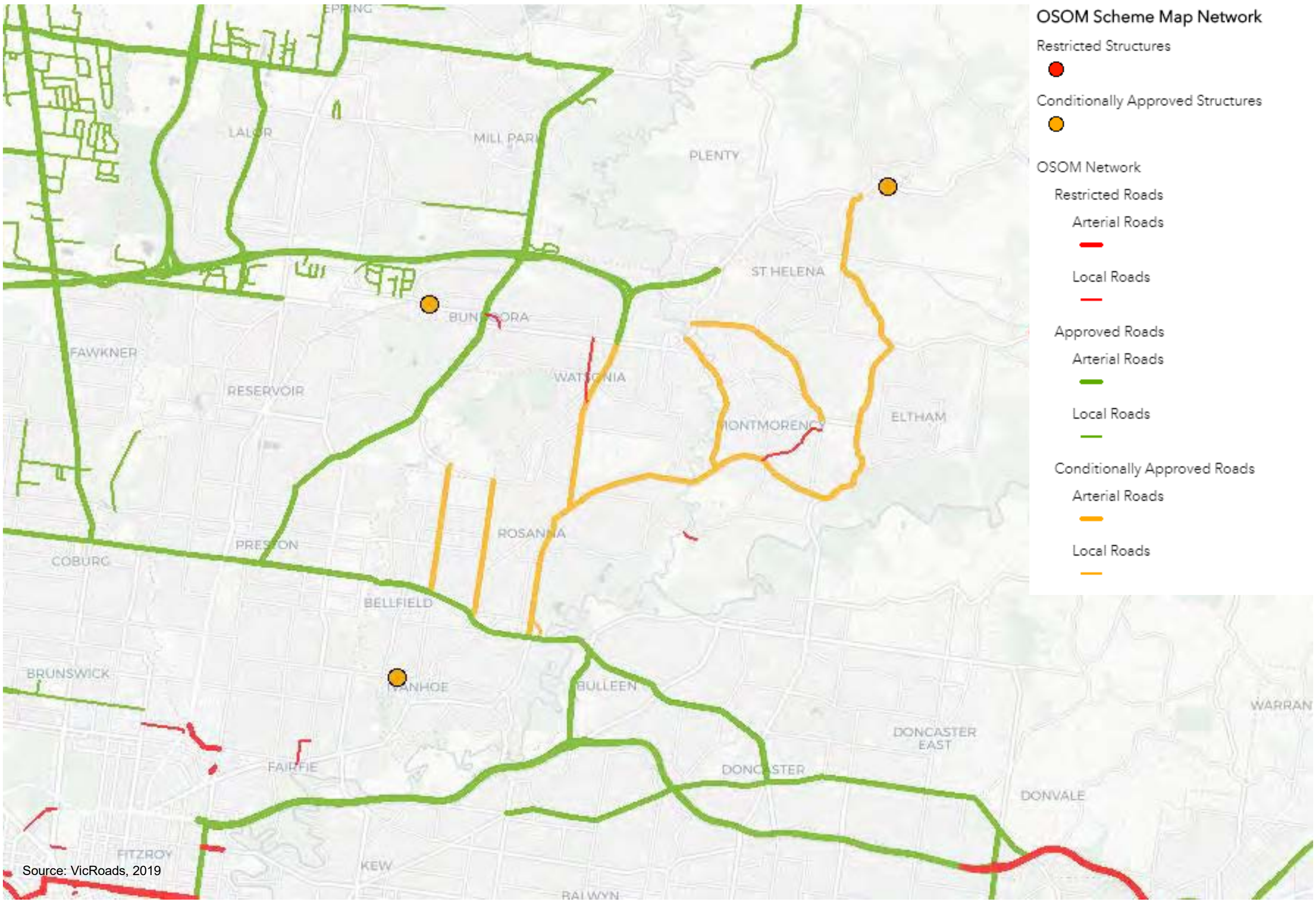
10.2.2 Oversize/overmass vehicles

Oversize/overmass vehicles may be used to deliver some materials to the construction sites. These vehicles would be allowed to use certain routes to access the construction sites without a permit, but they are still restricted in their size and weight. The current roads these vehicles are permitted to use in the north-east are presented in Figure 10-10.

It is possible that vehicles that exceed the over-dimensional vehicle criteria would be required to deliver materials to site, such as to deliver the TBM or bridge beams. These vehicles would require a specific permit to undertake travel on the road network. The permit would be issued by VicRoads and would be developed as part of a specific Transport Management Plan.

Given the size of these vehicles, it is likely they would travel on the road network overnight. The permit to use the road network would also allow these trucks to travel on roads with overnight curfews.

Figure 10-10 – Oversize/over-mass network



10.2.3 Additional haulage controls

To assist in limiting the impacts of construction trucks on roads such as Sydney Road, High Street and Plenty Road, the haulage task should be separated across each of the routes. This prevents an overloading of trucks on a particular route, which could adversely impact the road network.

This could be achieved through contractual arrangements for each of the construction packages, which would dictate which routes each site could use (or prescribe which routes they could not use).

This additional haulage control is specified in EPR T3 outlined in Section 12.

10.3 Site-specific construction vehicle impacts

Given the large number of construction vehicles required throughout the project, there would be some site-specific impacts. These may include changes to lane arrangements close to the construction sites, potential haulage along local roads or impacts to the operation of intersections. The following section focuses on key sites that are predicted to have impacts to access and the surrounding road network. The truck numbers provided are for both spoil and material haulage.

It has been assumed the existing number of traffic lanes would be maintained during construction activities throughout all the construction sites. Lane closures may only be permitted outside peak periods when road performance would not be materially impacted. EPR T2 identifies the requirements of Transport Management Plans for each construction site. These will need to be developed before any construction activity commenced in consultation with the relevant road authority.

Not all sites have been individually assessed as the truck volumes generated by some sites are low. Typically, sites that have a daily truck generation rate of less than 400 have not been assessed. A generation rate of 400 trucks equates to 200 trucks in each direction, or 30 trucks an hour if the sites are operating for eight hours per day. This volume of trucks can be accommodated in the surrounding road network.

The exception to this methodology is where multiple routes travel along the same corridor, resulting in a higher concentration of trucks. When this occurs, the combined impacts of the trucks have been assessed.

Workforce predictions are presented in Section 10.4.1.

10.3.1 North East Link – Kempston Street to northern portal

The works in the construction zone from Kempston Street to the northern portal involve construction of the North East Link main line, reconstruction of the Greensborough Bypass, construction of the Grimshaw interchange and construction of the trench from Watsonia railway station to the northern portal. This zone also includes the construction of land bridges and local access connections.

This construction site is within the existing curfew zone, although it is possible that construction trucks could be issued with an exemption allowing them to travel during the curfew period. An assessment of trucks operating for 20 hours per day (travelling through the curfew period) and eight hours per day (not travelling within the curfew period) has been performed. Materials would be delivered across an eight-hour period.

The forecast daily and hourly volumes for the southern TBM launch site and northern TBM launch site are provided in Table 10-4. The bulk of hourly truck movements are related to the haulage of spoil material, with trucks travelling to/from the north via the M80 Ring Road.

Table 10-4 – Forecast construction truck trips by scenario – Kempston Street to northern portal

TBM launch site option	Daily volume	Hourly volume (two-way)	Hourly volume (one-way)
Southern launch site – 20-hour spoil haulage	1,730	100	50
Southern launch site – 8-hour spoil haulage	1,730	220	110
Northern launch site – 20-hour spoil haulage	960	50	30
Northern launch site – 8-hour spoil haulage	960	120	60

The southern launch site results in the highest daily traffic volume in the Kempston Street to northern portal site. This is due to the scheduling of the works and the focused nature of the excavation works along the trench. Within the southern works option, the eight-hour haulage scenario generates the highest hourly traffic volume with 220 trucks predicted to access the site.

Site access

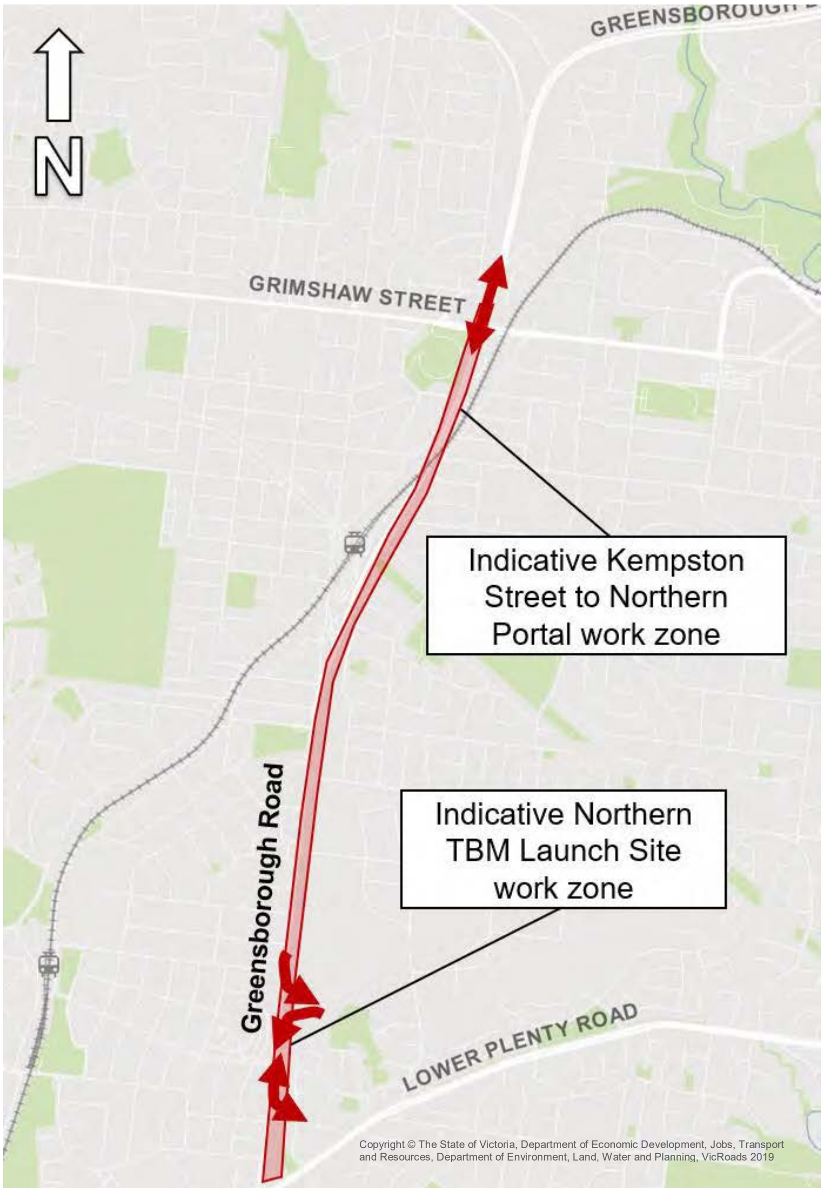
It has been assumed the bulk of the spoil removed from this worksite would travel north to the M80 Ring Road to minimise the number of trucks that use Rosanna Road. There are two main site access points along Greensborough Road: one at Drysdale Street and one north of Erskine Road.

The existing intersection would be utilised at Drysdale Street to access the site. As trucks would turn right out of the site to travel north, temporary traffic signals may be required. The access point north of Erskine Street would be a left-in/left-out arrangement which would only allow vehicles to travel southbound along Greensborough Road.

Works between Watsonia Road and Kempston Street would be at a similar level as the existing Greensborough Bypass and be accessed directly from the roadway.

The site access locations are presented in Figure 10-11.

Figure 10-11 – North East Link Kempston Street to northern portal site access



It is possible that some material extracted from this site would need to travel south if it is contaminated (that is, not suitable for the land fill locations in the north). It has been assumed that up to 5 per cent of the spoil material may need to travel south to locations around Dandenong. This could result in approximately 10 truck movements per hour travelling along Rosanna Road to access the Eastern Freeway.

Traffic performance

The intersection with Drysdale Street may require signalisation and would need to operate in coordination with the existing traffic signals along Greensborough Road to avoid any impacts to the corridor's performance. This coordination would need to take into consideration the queuing that can occur on Greensborough Road between Lower Plenty Road and Erskine Street throughout the day. Modelling of the proposed signals at Drysdale Street shows that during the peak period, when traffic volumes on Greensborough Road are at their highest, travel time are expected to increase an average of 10 seconds in both directions.

If construction vehicles were not permitted to operate during the curfew period, over twice as many trucks would be required to access the site per hour during the day. However, the Greensborough Road/Greensborough Bypass corridor could accommodate this demand (arising from either the curfew or non-curfew scenarios) outside the peak periods. In particular, the Greensborough Bypass and Grimshaw Street intersection would unlikely accommodate this additional truck traffic during peak periods. As such, the delivery of materials and spoil haulage should occur outside peak periods when there is spare capacity on the road network.

Analysis of the hourly traffic profile along the Greensborough Road (between Erskine Road and Strathallan Road), as presented in Table 10-5, shows the highest hourly volume for two-way traffic is approximately 4,150 vehicles per hour which would occur in the PM peak.

If it is assumed this is the road's maximum hourly capacity, it can be assessed whether there is spare capacity throughout the day. As presented in Table 10-5, between the AM and PM peaks there is potentially spare capacity on Greensborough Road of 600 vehicles an hour. This increases to over 2,650 vehicles per hour after the PM peak until the AM peak.

The maximum two-way traffic volume generated by this site would be 220 vehicles per hour, which therefore could be accommodated by Greensborough Road.

Table 10-5 – Greensborough Road potential spare capacity

Time period	Two-way hourly volume	Potential spare hourly capacity
AM peak	3,950	0
PM peak	4,150	0
Between AM and PM peaks	3,550	600
Between PM and AM peaks	1,500	2,650

Network upgrades

The intersection of Greensborough Road/Drysdale Street may require temporary signals to assist trucks accessing the site. The access point to the north of Erskine Street may require turn lanes in the southbound direction to minimise the impact to through traffic on Greensborough Road.

Consideration would need to be given to allowing the haulage of spoil during the curfew period to assist in minimising the hourly impacts onto the network.

10.3.2 TBM launch site – northern site

The northern TBM launch site would be located north of Lower Plenty Road and east of Greensborough Road. This construction site is within the existing curfew zone, however it is possible that construction trucks could be issued with an exemption allowing them to travel during the curfew period.

An assessment of trucks operating for 20 hours per day (travelling through the curfew period) and eight hours per day (not travelling within the curfew period) has been performed. Materials would be delivered across an eight-hour period.

The forecast daily and hourly volumes for the northern launch sites are provided in Table 10-6. The bulk of hourly truck movements are related to the haulage of spoil material, with trucks travelling to/from the north via the M80 Ring Road.

Material would be delivered directly to the site and not stored at another compound. This would reduce the need for double-handing and any additional truck movements.

Table 10-6 – Forecast construction truck trips by scenario – northern launch site

Scenario	Daily volume	Hourly volume (two-way)	Hourly volume (one-way)
Northern launch site – 20-hour spoil haulage	960	70	40
Northern launch site – 8-hour spoil haulage	960	120	60

Site access

The site access for the northern TBM launch site is planned to be along the trench created by the Kempston Street to northern portal worksite. This is partially due to the depth the TBMs would be launched at, but it is also possible that spoil could be transported along the trench by conveyor belt to a suitable location where it could be stockpiled and then hauled by truck.

As such, truck access to/from Greensborough Road could be between Erskine Road and Strathallan Road, with trucks entering the site from near Strathallan Road and exiting at either Strathallan Road or Erskine Road. Trucks exiting at Erskine Road could use the existing signalised intersection otherwise temporary signals may be required at Strathallan Road to assist trucks exiting the site.

The site location and proposed access points are presented in Figure 10-12.

Figure 10-12 – Northern TBM launch site access

Traffic performance

Trucks accessing the site from the north would be provided with a left-turn slip lane to turn in from Greensborough Road. Any material deliveries from the south would have to turn right into the site, which may require the construction of a dedicated right-turn lane so that turning vehicles do not impede through traffic.

If vehicles exited the site at Erskine Road, changes would be required to the existing traffic signals to allow a phase for haulage vehicles. If an eight-hour haulage scenario is adopted, this would result in one vehicle per minute exiting the site which should have a minimal impact on the operation of Greensborough Road outside peak periods.

Analysis of the hourly traffic profile along the Greensborough Road (between Erskine Road and Strathallan Road) is provided in Table 10-5. The analysis shows the highest hourly volume for two-way traffic is approximately 4,150 vehicles per hour which occurs in the PM peak.

If it is assumed this is the road's maximum hourly capacity, it can be assessed whether there is spare capacity throughout the day. As presented in Table 10-7, during the period between the AM and PM peaks there is potentially spare capacity on Greensborough Road of 600 vehicles per hour. This increases to over 2,650 vehicles per hour after the PM peak until the AM peak.

The maximum two-way traffic volume generated by this site would be 120 vehicles per hour, which therefore could be accommodated by Greensborough Road.

Table 10-7 – Greensborough Road potential spare capacity – north launch site

Time period	Two-way hourly volume	Potential spare hourly capacity
AM peak	3,950	0
PM peak	4,150	0
Between AM and PM peaks	3,550	600
Between PM and AM peaks	1,500	2,650

Network upgrades

Left-turn and potentially right-turn bays may be required on Greensborough Road for vehicles entering the site. If vehicles exited the site at Erskine Road, a new phase would be required at the existing signalised intersection to allow haulage vehicles to turn onto Greensborough Road.

If vehicles exited at Strathallan Road, temporary traffic signals may be required to facilitate turning movements. This could be combined with the entry point, having a single location rather than two access points.

10.3.3 Kempston Street to northern portal and northern TBM launch site combined impacts

There would be a period of time when the Kempston Street to northern portal and northern TBM launch sites are both operating and generating truck movements at the same time. For the purposes of this combined assessment, it has been assumed that both sites would be operating at their construction peak truck generation rates. However, as presented in Table 10-3, the construction peak periods occur at different times. This methodology provides a more conservative assessment of the combined impacts of these two worksites.

As discussed previously, these construction zones are within the curfew area and as such, there may be restrictions on when trucks can haul materials. This assessment considers a 20-hour haulage scenario, assuming that spoil trucks would be exempt from the curfews, and an eight-hour haulage scenario, assuming that trucks would not be exempt from the curfews. The forecast daily and hourly volumes are presented in Table 10-8.

Table 10-8 – Forecast combined construction truck trips by scenario

Scenario	Daily volume	Hourly volume (two-way)	Hourly volume (one-way)
20-hour spoil haulage	1,920	130	70
8-hour spoil haulage	1,920	240	120

The assessment shows the highest hourly truck volumes are generated under the eight-hour haulage scenario. This results in 240 truck trips, or 120 inbound and 120 outbound trips per hour.

Site access

Site access is as previously discussed in Sections 10.3.1 and 10.3.2.

Traffic performance

The traffic accessing the site would be across two to three access points: Drysdale Street, Erskine Road and potentially Strathallan Road. However, it is likely the left-in/left-out arrangement at Erskine Road would be changed to left-in/left-out and a right turn out at the Erskine Road traffic signals.

The TBM site works would likely use the Erskine Road exit, while the trenching works would likely be spread across the Drysdale Street and Erskine Road exits. As such, it is possible that approximately 90 trucks per hour could use the Erskine Road exit and approximately 30 trucks per hour could use the Drysdale Street exit.

Given the low hourly volumes using these exits, it is expected that both exits would operate without significant impacts to the performance of Greensborough Road.

Similar to Sections 10.3.1 and 10.3.2, an assessment of the hourly impacts of the combined truck movements along Greensborough Road has been performed.

Under both scenarios, Greensborough Road has the spare capacity throughout the day outside the peak periods to accommodate the forecast demands of up to 240 trucks per hour.

Network upgrades

The possible network upgrades are as previously discussed in Sections 10.3.1 and 10.3.2. No additional network upgrades would be required to accommodate the combined impacts of both sites operating at the same time.

10.3.4 TBM launch site – southern site

The southern TBM launch site is located in the industrial area west of Bulleen Road and south of Manningham Road. This site would be used to construct the Manningham Road interchange. These activities would generally need to occur separately, which means the combined construction period (across both the Manningham Road construction and TBM launch sites) would be up to 47 months.

The forecast daily and hourly volumes for the southern launch sites are provided in Table 10-9. The bulk of hourly truck movements are related to the haulage of spoil material, with two-thirds of trucks travelling to/from the north via the M80 Ring Road. The remaining third are assumed to travel south to Dandenong via the Eastern Freeway.

Table 10-9 – Forecast construction truck trips by southern launch site

Scenario	Daily volume	Hourly volume (two-way)	Hourly volume (one-way)
Construction truck generation	960	80	40

Approximately 620 truck movements would involve the removal of spoil from the site, which are anticipated to head north towards the M80 Ring Road. This haulage task would take place for up to 20 hours per day. The remaining 340 truck movements would be for materials and would typically occur during daylight hours, which is assumed to occur over an eight-hour period.

The existing land uses within this industrial precinct currently generate their own truck traffic. Surveys performed adjacent to the site show that the site generates approximately 200 truck trips each day (100 inbound and 100 outbound). These trips would be eliminated as the construction works would require the acquisition of this precinct. As such, the net increase of material truck movements throughout the day would be 140 movements. Spoil movements would remain at 620 truck movements per day.

Materials would be delivered directly to the site and not stored at another compound. This would reduce the need for double-handling and any additional truck movements.

Site access

Access to the site would be via two locations: the existing intersection on Bulleen Road at Greenaway Street which would provide for movements in all directions, and a left-in/left-out at the existing intersection on Manningham Road with Greenaway Street. These locations are presented in Figure 10-13.

Figure 10-13 – Manningham Road site access

Traffic performance

The intersection of Bulleen Road and Greenaway Street would require temporary signalisation to allow access from all directions. This signalised intersection would operate in the shadow of the existing signalised intersection of Bulleen Road and Manningham Road.

Operating in the shadow of the adjacent intersection means it would allow vehicles to access Greenaway Street while the right-turn phases are operating for Bulleen Road/Templestowe Road. It would provide gaps in the queues that currently form along Bulleen Road, and would lead to no adverse impacts on the performance of traffic along Bulleen Road.

Trucks hauling spoil travelling north toward the M80 Ring Road could utilise the exit point on Manningham Road, avoiding the traffic signals at the intersection of Bulleen Road/Manningham Road. However, trucks returning to the site from the north would need to travel through the Bulleen Road/Manningham Road intersection. This would add up to 30 trucks per hour (taking into account the trucks that currently access the site) to the intersection which would have a minimal impact on the performance of the intersection, and would be within the typical hourly fluctuations of truck volumes.

Southbound trucks would use the temporary signals at Bulleen Road and Greenaway Street to head towards Dandenong via the Eastern Freeway and EastLink.

Workers would be on site in two shifts, typically commencing at 7:00 am and 7:00 pm. This means that workers would be accessing the site outside peak periods (arriving before 7:00 am) when there is spare capacity on the road network. This would have a minimal impact on the performance of the surrounding network.

Analysis of the hourly traffic profile along the Manningham Road (at the Yarra River crossing) presented in Table 10-10 shows the highest hourly volume for two-way traffic would be approximately 5,400 vehicles per hour in the PM peak.

If it is assumed this is the road's maximum hourly capacity, it can be assessed whether there is spare capacity throughout the day. As presented in Table 10-5, between the AM and PM peaks there is potentially spare capacity on Greensborough Road of 1,100 vehicles an hour. This increases to over 3,750 vehicles per hour after the PM peak until the AM peak.

The maximum two-way traffic volume generated by this site is 75 vehicles per hour, which could be accommodated by Manningham Road.

Table 10-10 – Manningham Road potential spare capacity

Time period	Two-way hourly volume	Potential spare hourly capacity
AM peak	5,200	-
PM peak	5,400	-
Between AM and PM peaks	4,300	1,100
Between PM and AM peaks	1,650	3,750

Network upgrades

The intersection of Bulleen Road and Greenaway Street would require temporary traffic signals to allow access to the site. The existing right turn bay from Bulleen Road into Greenaway Street may need to be lengthened slightly to accommodate two trucks waiting to access the site. The existing painted chevron island could be used to extend the available storage space without requiring any widening of the roadway. No other network upgrades would be required to facilitate access to the site.

10.3.5 Bulleen Road mined tunnels

The Bulleen Road mined cover worksite would extend from Bulleen Road to Rocklea Road. This site would be used to construct the mined section of the tunnels, with works taking place for up to 30 months.

The forecast daily and hourly volumes for the mined tunnels site are provided in Table 10-11. The bulk of hourly truck movements are related to the haulage of spoil material, with two thirds of trucks travelling to/from the north via the M80 Ring Road. The remaining trucks are assumed to head south to Dandenong via the Eastern Freeway.

Table 10-11 – Forecast construction truck trips by scenario – Bulleen Road cut and cover

TBM launch site option	Daily volume	Hourly volume (two-way)	Hourly volume (one-way)
Northern launch site	170	20	10
Southern launch site	630	40	20

Site access

Site access would be via the southern TBM launch site as discussed in Section 10.3.4.

Traffic performance

The truck generation rate by this worksite would be significantly lower than those generated by the southern TBM launch site, with the impacts of this worksite discussed in Section 10.3.4. As such, it is expected the road network would able to accommodate the trucks generated by this worksite.

Network upgrades

No additional network upgrades would be required for this worksite.

10.3.6 The Eastern Freeway

The Eastern Freeway worksites would not individually generate large volumes of trucks, with each worksite predicted to generate less than 400 trucks per day during their peak activity, as presented in Table 10-12 (noting that the figures are consistent between the southern and northern TBM launch options). As such, the sites have not been individually assessed.

Table 10-12 – Forecast construction truck trips by scenario – Eastern Freeway

Section	Daily volume	Hourly volume (two-way)	Hourly volume (one-way)
Hoddle Street to Burke Road	330	40	20
Burke Road to Bulleen Road	300	40	20
Bulleen Road to Doncaster Road	270	40	20
Doncaster Road to Elgar Road	170	20	10
Elgar Road to Tram Road	140	20	10
Tram Road to Middleborough Road	370	50	30
Middleborough Road to Blackburn Road	270	40	20
Blackburn Road to Springvale Road	270	40	20

However, as presented in Section 10.2, there are predicted to be combined impacts along the Eastern Freeway due to multiple worksites operating at the same time and hauling along the Eastern Freeway towards Dandenong. This is predicted to be approximately 1,010 trucks travelling between Blackburn Road and Springvale Road in the peak month during the southern TBM launch site scenario.
The impacts of these 1,010 trucks has been assessed.

Site access

Site access to all worksites along the Eastern Freeway would be via the main carriageway. Deceleration and acceleration lanes would be provided for trucks to access the worksites and minimise impacts to the through traffic on the Eastern Freeway.

Traffic performance

The predicted 1,010 construction trucks travelling along the Eastern Freeway would come from multiple locations with different hours of operation. They can be summarised as:

- 130 trucks from the southern TBM site – hauling for 20 hours per day
- 800 trucks from worksites along the Eastern Freeway – hauling for eight hours per day
- 80 trucks from the northern sites hauling contaminated spoil – hauling for eight hours per day.

These truck operating hours would result in 120 trucks per hour; 60 trucks per hour each direction. This volume of trucks could be accommodated by the Eastern Freeway, especially if they occurred outside peak periods.

10.4 Site compound access

A number of site compounds have been identified along the North East Link corridor and Eastern Freeway to enable the storage of materials before they are required on-site. These sites could be accessed directly from the freeway mainline, arterial roads or local roads depending on where they were located. The following provides a summary of the sites, the roads that may be used to access them and the forecast number of daily deliveries. The routes used to access the site compounds would need to be discussed and agreed with the relevant authority.

The forecast delivery volumes discussed in this section are included in the volumes presented in Section 10.1; that is, they are not additional truck volumes to those already discussed.
This assessment has been performed to provide finer detail on the extent of deliveries away from the main construction sites.

10.4.1 Work force predictions

Workforce predictions for each of the construction sections have been developed. These predictions include office-based workers (designers, support staff) as well as on-site workers. At this stage of the project's planning, it is difficult to provide detailed forecasts of the number of workers as this would likely change depending on the contractor's construction methodology. However, based on the methodology developed for this assessment, the predicted workforce numbers are presented in Table 10-13.

Table 10-13 – Predicted workforce numbers

Site number	Site name	Predicted workforce numbers
1	North East Link – M80 Ring Road interchange	300
2	North East Link – M80 Ring Road to Kempston Street	
3	North East Link – Kempston Street to northern portal	750
4	North East Link – TBM	280
5	North East Link – Manningham Road interchange	
6	North East Link – Bulleen Road mined tunnel	350
7	North East Link – Bulleen Road cut and cover	
8	Eastern Freeway/North East Link interchange	
9	Eastern Freeway – Burke Road to Bulleen Road	330
10	Eastern Freeway – Hoddle Street to Burke Road	
11	Eastern Freeway – Bulleen Road to Doncaster Road	250
12	Eastern Freeway – Doncaster Road to Elgar Road	350
13	Eastern Freeway – Elgar Road to Tram Road	
14	Eastern Freeway – Tram Road to Middleborough Road	200
15	Eastern Freeway – Middleborough Road to Blackburn Road	
16	Eastern Freeway – Blackburn Road to Springvale Road	

The workers presented in Table 10-13 are often spread across large construction zones and therefore would not all be concentrated in a single area. For example, the 750 workers predicted in the Kempston Street to northern portal would be spread across four kilometres of worksite with six site compounds, as presented in the following sections.

The majority of worksites would operate for nine hours per day (hauling for eight hours), typically from 7:00 am to 5:30 pm. This means the workforce would arrive before the AM peak and exit during or after the PM peak.

In the worksites that may operate for 24 hours per day (hauling for 20 hours), office-based staff would work from 7:00 am to 4:00 pm, however the on-site workers would typically work in two 12-hour shifts from 7:00 am to 7:00 pm and 7:00 pm to 7:00 am. This means the workforce would arrive before the AM peak (arriving before 7:00 am) and exit during or after the PM peak.

10.4.2 North East Link corridor

There would be seven site compounds along the North East Link corridor (Eastern Freeway to the M80 Ring Road) used for storage. These are separate to the actual construction sites previously been discussed in Section 10.1. The seven North East Link corridor storage compounds would be:

- Site 1 – AK Lines Reserve. This site is proposed to be accessed via the existing entry/exit on Grimshaw Street opposite Frye Street.
- Site 2 – Simpson Barracks. This site is proposed to be accessed via a new access road from Drysdale Street.
- Site 13 – Gabonia Avenue Reserve. This site is proposed to be accessed via Frensham Road and Manfred Street from Elder Street.
- Site 14 – Winsor Reserve. This site is proposed to be accessed via Somers Avenue.
- Site 15 – Coles Express petrol station. This site is proposed to be accessed via Yallambie Road.
- Site 19 – North of the M80 Ring Road interchange. This site is proposed to be accessed via the M80 Ring Road with an exit onto the Greensborough Bypass.
- Site 20/22 – Bridge Street. This site is proposed to be access via Bridge Street.

Each of these sites are presented in Figure 10-14 to Figure 10-16 which also shows how they are proposed to connect back to the arterial or freeway network.

Estimated delivery volumes have been produced for all the sites along the North East Link corridor as site-specific detail is not available yet. As such, average daily delivery volumes have been estimated across the construction program.

It is estimated these sites would receive approximately 100 deliveries per day (100 inbound and 100 outbound trucks), which when spread across the sites would be approximately 20 deliveries per site. These deliveries would occur during daylight hours which would result in approximately two deliveries per hour. These could be accommodated by the surrounding road network and as such, are not expected to create adverse impacts.

Figure 10-14 – Site compounds M80 Ring Road to Watsonia

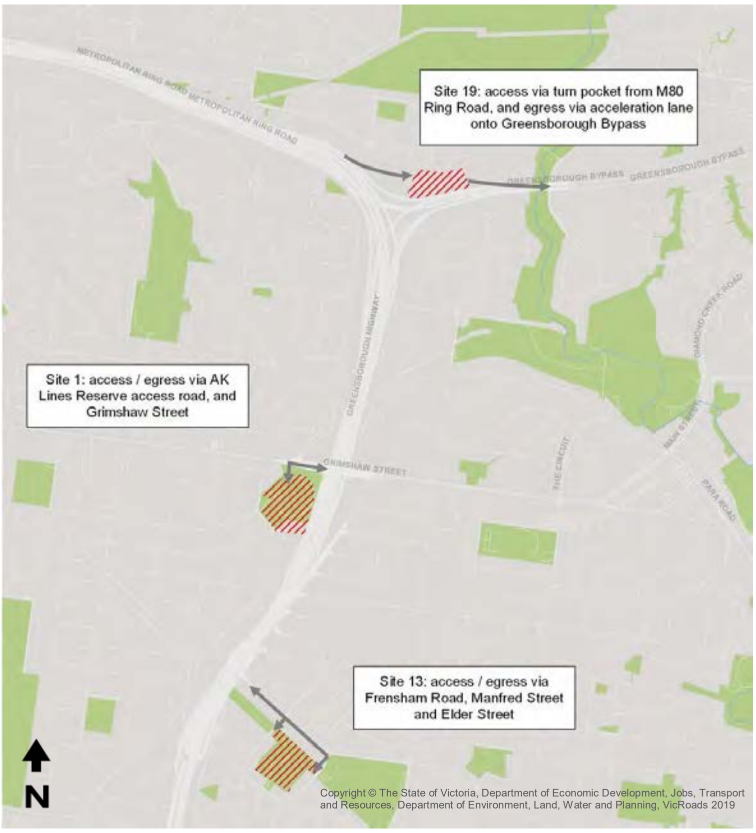


Figure 10-15 – Site compounds Watsonia to Lower Plenty Road

Figure 10-16 – Site compounds Manningham Road to Eastern Freeway

10.4.3 Eastern Freeway corridor

There would be 12 site compounds along the Eastern Freeway corridor (Hoddle Street to Springvale Road) used for storage. These would be separate to the actual construction sites previously discussed in Section 10.1.

The 12 Eastern Freeway storage compounds would be:

- Site 3 – Chandler Highway interchange south-west corner. This site is proposed to be accessed via Chandler Highway with an exit onto the Eastern Freeway entry ramp.
- Site 4 – Chandler Highway interchange north-west corner. This site is proposed to be accessed via the Eastern Freeway exit ramp with an exit onto Chandler Highway.
- Site 5 – Chandler Highway interchange north-east corner. This site is proposed to be accessed via Chandler Highway with an exit onto the Eastern Freeway entry ramp.
- Site 6 – Burke Road interchange north-east corner. This site is proposed to be accessed via Burke Road.
- Site 7 – Burke Road interchange south-east corner. This site is proposed to be accessed via Burke Road.
- Site 8 – Eastern Freeway Linear Reserve. This site is proposed to be accessed via the Springvale Road entry ramp.

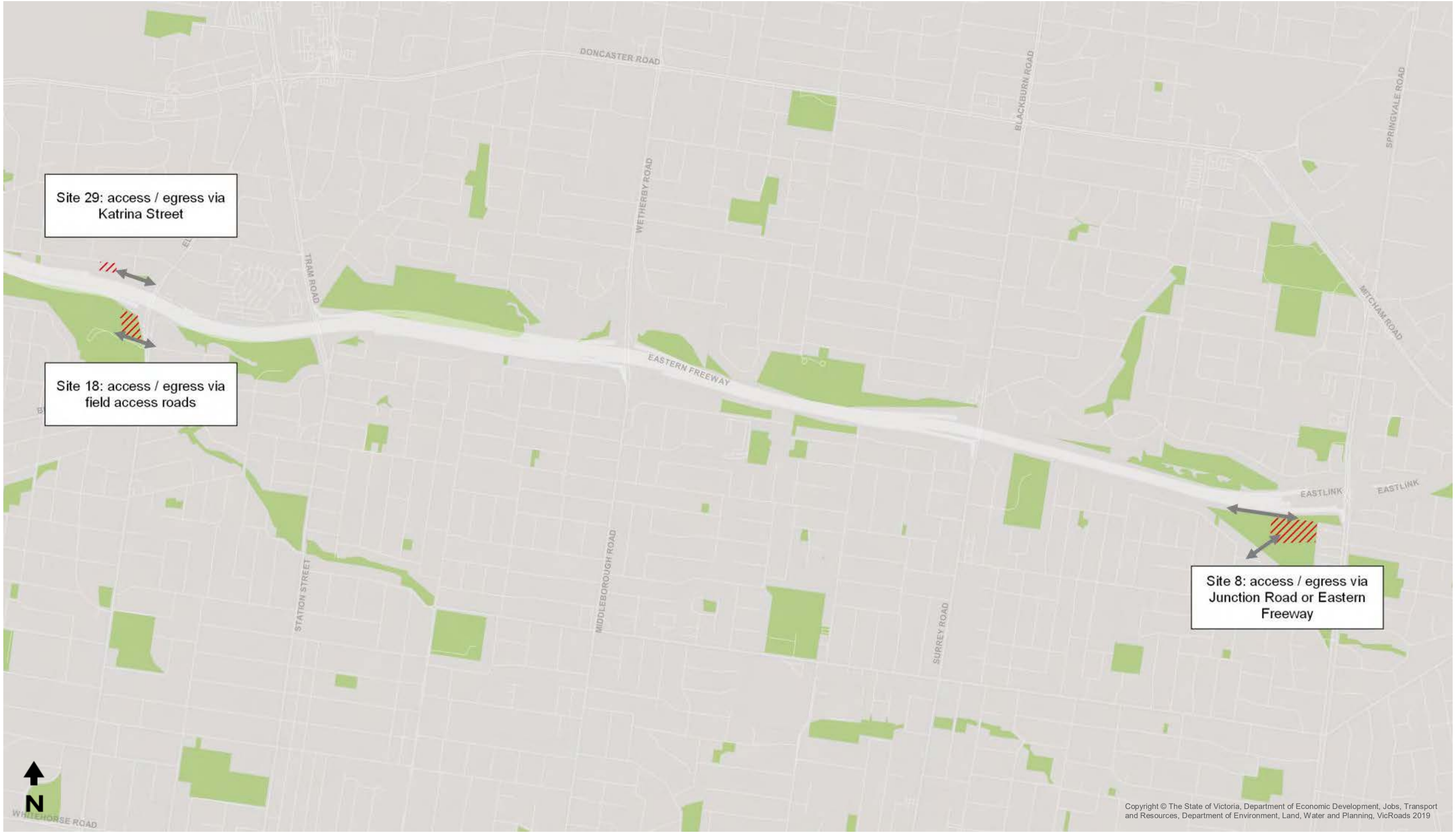
- Site 9 – Koonung Creek Reserve. This site is proposed to be accessed via Larbert Avenue and Walnut Road with connections to Doncaster Road.
- Site 10 – Doncaster Road interchange north-west corner. This site is proposed to be accessed via Doncaster Road with an exit onto the Eastern Freeway entry ramp.
- Site 11 – Doncaster Park and Ride. This site is proposed to be accessed via the existing entry on Doncaster Road.
- Site 12 – Kampman Street. This site is proposed to be accessed via Kampman Street.
- Site 18 – Elgar Park, north-east oval. This site is proposed to be accessed via the existing field access road, opposite Paul Avenue.
- Site 29 – Katrina Street Reserve. This site is proposed to be accessed via Katrina Street which connects to Elgar Road.

Each of these sites are presented in Figure 10-17 and Figure 10-18 which also shows how they are proposed to connect back to the arterial or freeway network. Estimated delivery volumes have been produced for all the sites along the Eastern Freeway corridor, however site-specific detail is not yet available. As such, average daily delivery volumes have been estimated across the construction program.

It is estimated these sites would receive approximately 150 deliveries per day (150 inbound and 150 outbound trucks), which when spread across the sites would be approximately 10 deliveries per site. These deliveries would occur during daylight hours which would result in approximately 2 deliveries per hour. These could be accommodated by the surrounding road network and as such, are not expected to create adverse impacts.

Figure 10-17 – Site compounds Chandler Highway to Doncaster Road

Figure 10-18 – Site compounds Doncaster Road to Springvale Road



10.5 Closures and diversions

Closures and diversions would be required for the project's construction. These closures and diversions would need to be undertaken in a way to minimise the impact to the surrounding area, while allowing sufficient space for the safe construction of the project.

This section provides an overview of a potential construction methodology developed for the purposes of this impact assessment. It is highly likely the construction methodology would change through the tendering process which would alter the impacts of construction. The project contractor will be required to develop Transport Management Plans for all construction activities to minimise the impacts of the works.

10.5.1 Closures for construction activity

Closures for construction works have been broken up into short-term and long-term. The following sections identifies the locations where these closures may be required.

Short-term closures

It is likely that some roads would require short-term closures to allow for construction activities. This would normally occur where works are taking place close to or above existing traffic lanes. These short-term closures would normally occur overnight or possibly over long weekends depending on the staging of the works.

The delivery and installation of concrete beams or bridge sections are the most likely to require short-term closures. These would be required at:

- M80 Ring Road interchange with North East Link
- North East Link interchange with the Eastern Freeway
- Kempston Street bridge
- Hurstbridge rail line tunnel under Greensborough Road
- North East Link interchange with Manningham Road
- Bulleen Road north of the Eastern Freeway
- Busway works at Chandler Highway and Burke Road
- Doncaster Road interchange with the Eastern Freeway
- Braided ramps between Tram Road and Middleborough Road
- Pedestrian bridges along the Eastern Freeway, North East Link (near Watsonia) and along the M80 Ring Road.

The scheduling of these closures would be incorporated with the larger construction program at each individual worksite. Construction staging should be scheduled so that multiple roads are not closed at the same time to allow for traffic to detour around construction sites.

Short-term closures may have impacts on traffic flows. To minimise these impacts, Transport Management Plans will be developed for the closures to identify detour routes, and develop and undertake traffic engineering assessments. If required, mitigating measures will be developed to address any adverse impacts.

Long-term closures

Long-term closures would be required to allow for construction activities such as bridge construction, road widening or excavation works. The key locations for these long-term closures are presented in Table 10-14. The proposed treatment and diversion routes are discussed in the following sections.

Table 10-14 – Construction site segments

Project section	Element	Works description	Duration	Closure type
M80 Ring Road – Plenty Road to North East Link	Macorna Street pedestrian bridge	Demolition and reconstruction of pedestrian bridge	26 weeks	Pedestrian bridge closure
North East Link – M80 Ring Road to Grimshaw Street	Kempston Street	Demolition of bridge	1 week	Detour via Yando Street to The Circuit
North East Link – Grimshaw Street to Watsonia Road	Greensborough Bypass	Construction of new bridge and trough structure tie-in	52 weeks	Temporary detour on ramps with speed restrictions, 2 lanes each direction
North East Link – Grimshaw Street to Watsonia Road	Grimshaw Street	Construction of new rail bridge	26 weeks	Temporary diversion onto side track, 2 lanes in each direction
North East Link – Watsonia Road to Lower Plenty Road	Drysdale Street	Construct new interchange	132 weeks	Detour via Coleen Street and Crew Street to Lower Plenty Road
North East Link – Manningham Road interchange	Manningham Road	Construction of new bridge structures	26 weeks	Eastbound reduced to 1 lane, westbound reduced to 2 lanes, with speed restrictions.
North East Link – Manningham Road interchange	Bridge Street	Construction of new bridge structures	6 weeks	Road closure, not concurrent with above restrictions
North East Link – Bulleen Road	Trinity Grammar School Marles Playing Fields	Construction of tunnel	52 weeks	Diversion via Barak Street to Thompsons Road
Eastern Freeway – Burke Road to Doncaster Road	Doncaster Road	Demolition and reconstruction of bridge	52 weeks	Reduction in turn lane capacity, maintain two through lanes
Eastern Freeway – Doncaster Road to Elgar Road	Koonung Creek Wetlands	Construction of pedestrian bridge	12 weeks	Shared use path closure
Eastern Freeway – Middleborough Road to Tram Road	Boronia Grove Reserve	Construction of pedestrian bridge	12 weeks	Shared use path closure
Eastern Freeway – Blackburn Road to Springvale Road	Busana Way	Construction of pedestrian bridge	12 weeks	Shared use path closure

Pedestrian bridges not listed in this section are currently proposed not to be closed during construction. The current construction phasing allows for the replacement bridge to be built adjacent to the existing bridge before its removal.

10.5.2 Macorna Street pedestrian bridge

The existing Macorna Street pedestrian bridge would be reconstructed to allow the widening of the M80 Ring Road and to upgrade it to current DDA standards. This may require the existing bridge to be removed for approximately 26 weeks.

Transport impacts

As discussed in Section 6.5, walking and cycling volumes along the Macorna Street pedestrian bridge are small. The survey results have been reproduced in Table 10-15 below, which indicate 17 and 24 users of the bridge during the AM and PM peak hours respectively.

Table 10-15 – Pedestrian and cyclist counts using Macorna Street bridge, AM and PM peak hour

Mode	AM peak hour	PM peak hour
Pedestrians	10	14
Cyclists	7	10
Total	17	24

Mitigating treatments

Despite these small volumes a detour route would need to be developed. This could be via the existing pedestrian underpass at the M80 Ring Road/Plenty Road interchange, which could then connect to the underpass at Yando Street, or via the existing pedestrian facilities at Plenty Road.

Both routes would result in a long diversion route, depending on the origin and destination of the trip. A long diversion route is not ideal, however there are limited alternative options available for the diversion route and construction methodology. It may be possible to provide a short-term treatment where the existing DDA-compliant ramps were replaced with stairs, however these may only be in place for a few weeks until the main bridge structure was removed.

Signage should be placed at Plenty Road and Plenty River highlighting the closure of the pedestrian bridge and the detour route.

10.5.3 Kempston Street

The existing Greensborough Bypass bridge over Kempston Street would be reinstated as part of the project. To allow these demolition works Kempston Street would need to be closed. This closure may span approximately one week.

Transport impacts

During the closure, traffic that would have travelled along Kempston Street would need to detour via Yando Street to The Circuit and then to Grimshaw Street. This may be problematic in the peak periods when traffic volumes are high on Grimshaw Street, particularly turning into/out of Frye Street due to queuing which may require traffic controllers to assist turning vehicles.

Mitigating treatments

The development of the Transport Management Plans will identify the proposed treatment which would minimise traffic impacts due to the works.

10.5.4 Greensborough Bypass

The North East Link carriageway will be constructed between Watsonia Road and Grimshaw Street with an underpass beneath Grimshaw Street. To allow for these works, north-south traffic on Greensborough Bypass would need to be diverted to side-tracks constructed adjacent to the road. These would be two lanes in each direction which slightly reduce current capacity. This diversion may be required for 52 weeks.

To accommodate the redistribution of traffic away from the worksite on Greensborough Road, it is proposed to provide a double right-turn lane for vehicles turning from Greensborough Bypass onto Grimshaw Street in the westbound direction. This would require the removal of a through lane (north to south) along Greensborough Bypass, however this would match into the two-lane side track south of Grimshaw Street.

Transport impacts

The reduced north-south capacity along Greensborough Bypass would redistribute traffic away from the corridor. This traffic would be redistributed to alternative routes such as Watsonia Road, Para Road and Plenty Road, as presented in Figure 10-19.

Figure 10-19 – Greensborough Bypass worksite daily traffic impacts and travel time zones

An analysis of the travel time impacts of the proposed treatment has been performed. This analysis takes into account the redistribution of traffic in the peak periods, as well as the additional capacity associated with the proposed double right turn from the Greensborough Bypass into Grimshaw Street westbound. The signalised intersection of the Greensborough Bypass and Grimshaw Street has been rephased to allow for the changes in traffic distribution. The origin and destination zones for the travel time analysis are presented in Figure 10-19.

The results of the travel time analysis are provided in Table 10-16 and Table 10-17.

Table 10-16 – AM peak travel time impacts (seconds)

Origin		1	2	3	4
Grimshaw Street at Dunn Street	1		80	110	110
Greensborough Bypass at Yando Street	2	45		70	90
Grimshaw Street at McDowell Street	3	5	240		40
Greensborough Road at Somers Avenue	4	-155	-170	-60	

Table 10-17 – PM peak travel time impacts (seconds)

Origin		1	2	3	4
Grimshaw Street at Dunn Street	1		-40	-70	-10
Greensborough Bypass at Yando Street	2	-425		5	15
Grimshaw Street at McDowell Street	3	-315	-225		-255
Greensborough Road at Somers Avenue	4	-195	-200	-100	

The analysis shows that in both peak periods there would be a mix of increases and decreases in travel times along Greensborough Road, Greensborough Bypass and Grimshaw Street.

The increases in travel time relate to reductions in capacity, particularly in the southbound direction along Greensborough Bypass (from zone two to four), or due to increases in traffic demand, such as along Grimshaw Street (from zone three to two). The bulk of the increases in travel time would occur in the AM peak period.

The decreases in travel time would be due to reduced traffic demand, as well as the provision of a double right-turn lane from Greensborough Bypass into Grimshaw Street westbound. This additional capacity means the traffic signals could rephased, giving more green time to other movements at the Greensborough Bypass/Grimshaw Street intersection. This would reduce travel times, particularly in the PM peak period. During the PM peak, the bulk of the travel demand would be heading northbound, however this is already limited to two lanes before the intersection with Grimshaw Street.

Mitigating treatments

To minimise the likelihood of traffic diversion to local roads such as Watsonia Road, traffic signal changes could be implemented at the intersections of Watsonia Road/Greensborough Bypass and Watsonia Road/Grimshaw Street to discourage this route for through vehicles. This would result in more traffic remaining on the Greensborough Bypass.

Advanced signage should be placed beyond the worksite to inform motorists of the changes along Greensborough Road and the potential impacts to travel times. Where possible, it should be encouraged that motorists avoid the area and use alternative routes such as Plenty Road or Para Road to access their destinations.

10.5.5 Grimshaw Street

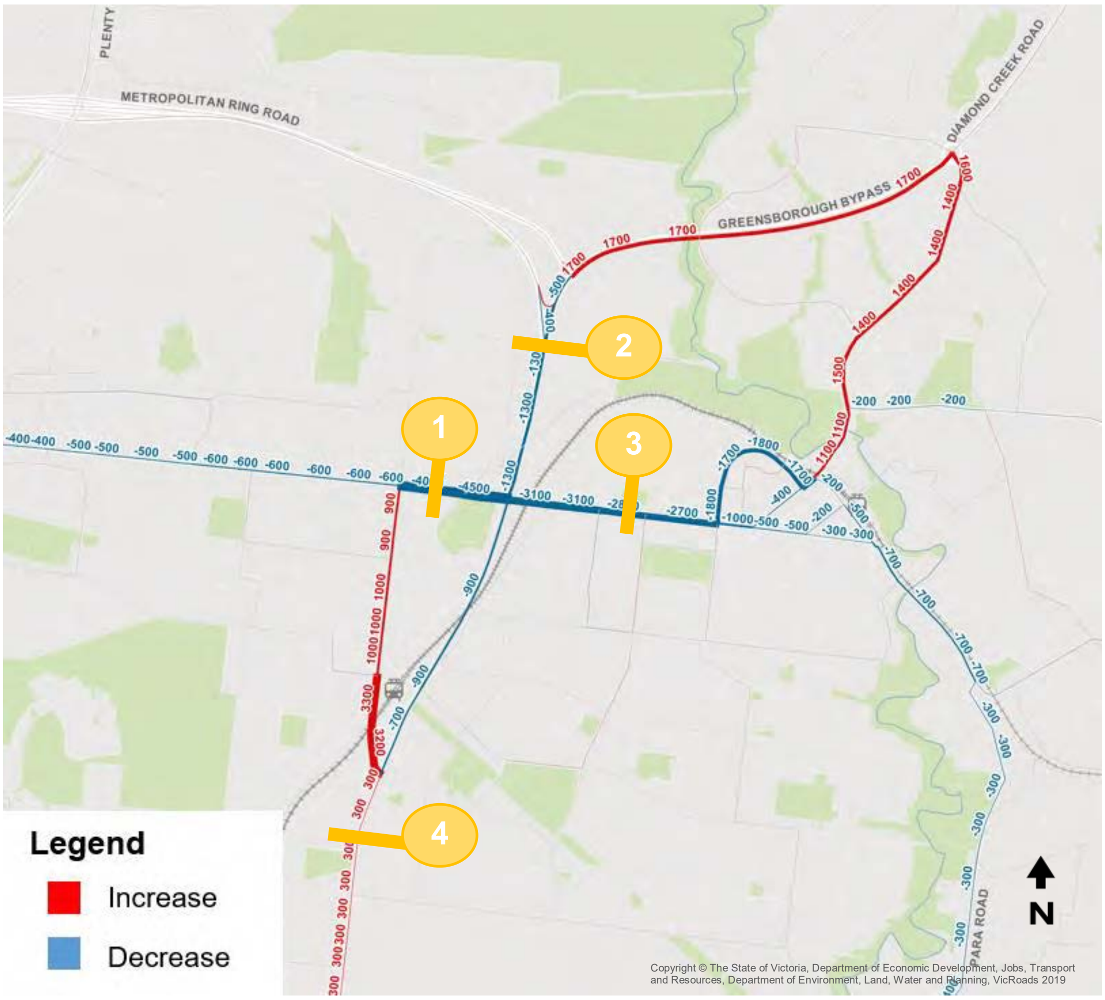
The construction of the Grimshaw Street interchange would require the replacement of the existing signalised intersection. To allow for the construction of this interchange, travel along Grimshaw Street would need to occur on a side track. This side track would likely run on the southern side of Grimshaw Street and provide two lanes in each direction. While two lanes would be maintained in each direction, traffic capacity could be slightly reduced due to the lower speed limit (typically 40 km/hr through a worksite) and the need for vehicles to deviate onto the side track. Turning movements from Grimshaw Street onto the Greensborough Bypass would be maintained, however it is possible this would occur at a reduced capacity. Works at this location may last up to 26 weeks.

Transport impacts

The strategic transport model has been used to assess the impacts of the reduced capacity along Grimshaw Street and the potential redistribution of traffic across the network. The results of the modelling are presented in Figure 10-20 and shows the changes in daily traffic volumes due to the worksite. The modelling predicts traffic diverting away from the construction site, using Grimshaw Street, the Greensborough Bypass and Diamond Creek Road to access their destinations.
The impacts can be summarised as:

- Watsonia Road – Increase of up to 1,000 vehicles per day (two-way) on the northern section of Grimshaw Street as traffic avoids the worksite. The model also predicts an increase of up to 3,000 vehicles per day on the southern section near Greensborough Bypass.
- Greensborough Bypass – Increase of up to 1,700 vehicles per day (two-way). This would likely be traffic to/from the M80 Ring Road that have used Grimshaw Street to access their destination. They would likely use Diamond Creek Road to access their destination.
- Diamond Creek Road – Increase of up to 1,400 vehicles per day (two-way). This would likely be traffic to/from the M80 Ring Road.

Figure 10-20 – Grimshaw Street worksite daily traffic impacts and travel time zones



An analysis of the travel time impacts of the proposed treatment has been performed. This analysis takes into account the redistribution of traffic in the peak periods, and the proposed changes to the number of turn lanes. The signalised intersection of the Greensborough Bypass and Grimshaw Street has been rephased to allow for the changes in traffic distribution. The origin and destination zones for the travel time analysis are presented in Figure 10-20.

The results of the travel time analysis are provided in Table 10-18 and Table 10-19.

Table 10-18 – AM peak travel time impacts (seconds)

Origin		1	2	3	4
Grimshaw Street at Dunn Street	1		0	0	5
Greensborough Bypass at Yando Street	2	125		10	5
Grimshaw Street at McDowell Street	3	30	15		20
Greensborough Road at Somers Avenue	4	80	75	60	

Table 10-19 – PM peak travel time impacts (seconds)

Origin		1	2	3	4
Grimshaw Street at Dunn Street	1		15	25	60
Greensborough Bypass at Yando Street	2	-325		5	-5
Grimshaw Street at McDowell Street	3	10	0		20
Greensborough Road at Somers Avenue	4	45	40	45	

The analysis shows that travel times are generally predicted to increase due to the construction works at Grimshaw Street. The majority of the increases in travel time are low; typically less than one minute. However, there would be some larger increases such as the right turn from Greensborough Bypass into Grimshaw Street westbound in the AM peak. This movement would see a larger increase in travel time due to the reduced turning capacity along Grimshaw Street, which then requires more green time.

Mitigating treatments

To maintain traffic performance and to reduce adverse impacts, the following treatments could be applied. These would be developed as part of a Transport Management Plan (EPR T2) in consultation with the relevant authorities:

- Change traffic signal phasing at the intersection of Grimshaw Street and Watsonia Road to restrict the amount of traffic diverting along this route, rather than travelling through the worksite
- Review the operation of the signalised intersection of The Circuit and Main Street to facilitate traffic around Greensborough
- Monitor traffic volumes for routes parallel to Grimshaw Street to assess if rat-running is occurring. Implement local area traffic management to prevent this if required.

Advanced signage should be placed beyond the worksite to inform motorists of the changes along Greensborough Road/Greensborough Bypass and the potential impacts to travel times. Where possible, it should be encouraged that motorists avoid the area and use alternative routes such as Plenty Road or Para Road to access their destinations.

10.5.6 Drysdale Street

Drysdale Street between Greensborough Road and Borlase Street would require closure to allow for the tunnelling and trenching works along the eastern side of Greensborough Road. Given the large amount of works that would occur in this location, this section of Drysdale Street could be closed for up to 132 weeks.

Transport impacts

This section of Drysdale Street has low volumes, typically carrying between 800 and 900 vehicles per day, with a peak of approximately 90 vehicles an hour. These vehicles would need to detour to Lower Plenty Road via Coleen Street and Crew Street. These low volumes could be accommodated on this proposed diversion route.

Mitigating treatments

No mitigating treatments anticipated for general traffic, however access to properties will need to be maintained. This will be managed through Transport Management Plans (EPR T2) developed by the contractor.

10.5.7 Manningham Road

The number of lanes along Manningham Road would be reduced to allow for the construction of the Manningham Road interchange. The proposed treatment is:

- Eastbound traffic reduced to one lane to provide for right-turning vehicles at Bulleen Road
- Two lanes eastbound for through movements diverted via a widened Bridge Road – these would then turn left at Manningham Road to continue the through trip
- Westbound reduced to two lanes between Greenaway Street and Bridge Street
- Bridge Street converted to two lanes eastbound
- Temporary signals at the intersection of Bridge Street and Templestowe Road.

This proposed treatment may be in place for approximately 26 weeks.

Transport impacts

Traffic would need to be diverted around the works as listed above. This treatment has been tested using a microsimulation model which shows it would operate successfully during the AM and PM peak periods. The results of the modelling are presented in Table 10-20.

The modelling shows that while some approaches to the signalised intersections have a Level of Service F, overall the performance of the three intersections is predicted to operate at a Level of Service of D or better in both peak periods.

An analysis of the travel time impacts of the proposed treatment has been performed. This analysis takes into account the redistribution of traffic in the peak periods, and the proposed changes traffic lanes as highlighted previous. All signalised intersections have been rephased to allow for the changes in traffic distribution. The origin and destination zones for the travel time analysis are presented in Figure 10-21. The results of the travel time analysis are presented in Table 10-21 and Table 10-22.

The analysis shows that in both peak periods there would be a mix of increases and decreases in travel times along all roads assessed. The greatest impact to travel times is the movement turning right from Templestowe Road into Banksia Street in the AM peak period. This is due to additional traffic travelling through the intersection of Bridge Street and Templestowe Road which increases delays for Templestowe Road traffic. Southbound traffic on Templestowe Road currently has priority at this intersection, which would be removed due to the temporary signals.

Table 10-20 – Manningham Road diversion Level of Service

Approach	AM peak	PM peak
Manningham Road/Bridge Street		
Manningham Road West	E	A
Manningham Road East	A	A
Bridge Street North-east	F	F
Whole intersection	***D***	***B***
Manningham Road/Bulleen Road		
Manningham Road West	E	F
Bulleen Road	B	C
Manningham Road East	F	E
Templestowe Road	C	A
Whole intersection	***D***	***C***
Templestowe Road/Bridge Street		
Templestowe Road South	C	E
Bridge Street	B	B
Templestowe Road North	D	D
Whole intersection	***C***	***B***

Figure 10-21 – Manningham Road worksite travel time zones

Table 10-21 – AM peak travel time impacts (seconds)

Origin		1	2	3	4
Banksia Street at Yarra River	1		-5	20	-20
Templestowe Road at Heide access	2	250		-20	130
Manningham Road at Helene Street	3	-10	0		-15
Bulleen Road at Greenaway Street	4	-5	40	55	

Table 10-22 – PM peak travel time impacts (seconds)

Origin		1	2	3	4
Banksia Street at Yarra River	1		0	5	130
Templestowe Road at Heide access	2	90		30	20
Manningham Road at Helene Street	3	0	85		-10
Bulleen Road at Greenaway Street	4	-5	70	35	

Mitigating treatments

Advanced signage should be placed beyond the worksite to inform motorists of the changes along Manningham Road and the potential impacts to travel times.

10.5.8 Bridge Street

Bridge Street may be closed for approximately six weeks for the construction of the Manningham Road interchange ramps.

There are potentially two traffic management options for the closure of Bridge Street:

- A full closure which would require the diversion of traffic between Manningham Road and Templestowe Road. This would be undertaken via the signalised intersection of Manningham Road and Bulleen Road.
- Construction of a diversion side track along the southern side of Bridge Street after the existing buildings have been removed.

Transport impacts

A full closure of Bridge Street would likely have large impacts to the performance of the Bulleen Road and Manningham Road intersection due to the large volume of vehicles that would need to travel between Templestowe Road and Manningham Road. It is likely the only way to make this treatment work would be to encourage a large diversion of traffic away from the area.

The least impact to traffic performance would be the construction of the side track along the southern side of Bridge Street. This would enable all the traffic to remain in the area, avoiding adverse impacts at other locations.

Mitigating treatments

The development of the Transport Management Plans will identify the proposed treatment which would minimise traffic impacts due to the works. Any treatment in this area would likely require the rephasing of the traffic signals to allow for the redistribution of traffic.

10.5.9 Trinity Grammar School Marles Playing Fields

The road that provides access to the Marles Playing Fields at Trinity Grammar School may be closed for approximately 52 weeks to allow for the construction of the North East Link tunnels. A diversion route may not be possible via the existing Marcellin College access road, however a connection may be possible via Barak Street. This may require an upgrade of the internal access road.

Transport impacts

Traffic volumes would increase on Barak Street during the school drop off and pick up phases of the day. This may result in some congestion on the local road network during these periods.

Mitigating treatments

Consultation should be held with the schools regarding their access during construction. To minimise local impacts, providing two access points may be preferable.

10.5.10 Doncaster Road

The Doncaster Road bridge over the Eastern Freeway would need to be removed and reconstructed to allow for the additional lanes along the Eastern Freeway. The works would need to occur over multiple stages, realigning traffic to different sides of the bridge to provide sufficient space for the construction works. To allow for the construction activities, the proposed treatment is:

- Reduce traffic lanes over Doncaster Road bridge to two lanes in each direction with one turn lane
- This would reduce the turning capacity from two lanes to one, which would only impact the city-bound turn lane as the outbound turn lane is currently a single lane
- Entry and exit ramps would remain the same as existing.

The construction activity on the Doncaster Road bridge could take approximately 52 weeks, however the capacity reduction would not be in place for all this time. The ultimate timing of the proposed treatment would depend on the final construction methodology.

During construction works, temporary ramps to/from the Eastern Freeway may be used to allow for the construction of the ultimate ramps. These temporary ramps would maintain the function of the existing ramps.

Transport impacts

The reduction in turning capacity at the Doncaster Road interchange would likely impact on the traffic performance of this location, potentially resulting in some redistribution. However, this redistribution is typically associated with the peak periods when traffic demands are their highest. Outside the peak periods, minimal redistribution away from the interchange is predicted.

The reduced capacity only affects the right turn from Doncaster Road onto the Eastern Freeway, reducing the capacity by half. Existing turning movement counts indicate the current turning volume in the peak periods is up to 400 vehicles an hour, so it is possible that up to 200 vehicles in the peak periods would need to redistribute to other locations.

The closest alternative entry to the Eastern Freeway is Elgar Road. It currently provides a single right-turn lane with a capacity of up to 400 vehicles per hour. However, existing turning movement counts indicate that approximately 100 vehicles an hour make this movement. It may be possible to redistribute the turning vehicles from Doncaster Road to Elgar Road to assist in reducing the impacts of the lane closure.

Mitigating treatments

To maintain traffic performance, some of the right-turning vehicles from Doncaster Road onto Elgar Road may need to be redistributed. This would require signage near the intersection of Doncaster Road and Elgar Road to encourage this alternative.

10.5.11 Koonung Creek Wetlands Pedestrian Bridge

The existing pedestrian bridge at the Koonung Creek Wetlands (near Heyington Avenue) would be reconstructed to allow for the widening of the Eastern Freeway and to upgrade it to current DDA standards. This may require the existing bridge to be removed for approximately 12 weeks. The long-term closure of the structure is not ideal, however there are limited opportunities to avoid this as the new bridge would be constructed in the same location as the existing bridge. It may be possible to provide a short-term treatment with the existing DDA-compliant ramps replaced with stairs, however these may only be in place for a few weeks until the main bridge structure is removed.

Transport impacts

Walking and cycling volumes along the Heyington Avenue pedestrian bridge are relatively small. The survey results have been reproduced in Table 10-23, which indicate 112 users of the bridge during the AM and PM peak hours respectively.

Table 10-23 – Pedestrian and cyclist counts using Heyington Avenue bridge, AM and PM peak hour

Mode	AM peak hour	PM peak hour
Pedestrians	59	41
Cyclists	53	71
Total	112	112

Mitigating treatments

The closest crossing of the Eastern Freeway is at Elgar Road, and a further crossing at Doncaster Road. Both should be highlighted as diversion routes to cater for pedestrians and cyclists with different origins and destinations.

Signage should also be placed at Elgar Road and Doncaster Road advising of the closure of the pedestrian bridge.

10.5.12 Boronia Grove Reserve Pedestrian Bridge

The existing pedestrian bridge at the Boronia Grove would be reconstructed to allow for the widening of the Eastern Freeway and to upgrade it to current DDA standards. This may require the existing bridge to be removed for approximately 12 weeks.

Transport impacts

Walking and cycling volumes along this bridge are anticipated to be small, however the diversion route will increase travel time for these users.

Mitigating treatments

The closest alternative crossing of the Eastern Freeway is at Blackburn Road, with a slightly further crossing at Middleborough Road. Both should be highlighted as diversion routes to cater for pedestrians and cyclists with different origins and destinations. Signage should also be placed at Blackburn Road and Middleborough Road advising of the closure of the pedestrian bridge.

10.5.13 Busana Way Pedestrian Bridge

The existing pedestrian bridge at Busana Way will be reconstructed to allow for the widening of the Eastern Freeway and to upgrade it to DDA standards. This may require the existing bridge to be removed for approximately 12 weeks.

Transport impacts

Walking and cycling volumes along this bridge are anticipated to be small however the diversion route will increase travel time for these users.

Mitigating treatments

The closest crossing of the Eastern Freeway is at Springvale Road. Signage should also be placed at Springvale Road and Blackburn Road advising of the closure of the pedestrian bridge.

10.5.14 Eastern Freeway

The Eastern Freeway will be widened between Springvale Road and Chandler Highway. It is possible that all sections of the Eastern Freeway could be under construction at the same time, however the staging of these works may also occur.

Transport impacts

The traffic lanes on the Eastern Freeway would be realigned to provide sufficient space for construction activities. As specified by EPR T2, transport capacity must be maintained during the peak periods, meaning the existing traffic lanes must be maintained at least in the AM and PM peaks. This is particularly important for the Eastern Freeway given the lack of east-west capacity on alternative routes, such as Whitehorse Road and Doncaster Road to accommodate any significant diversion.

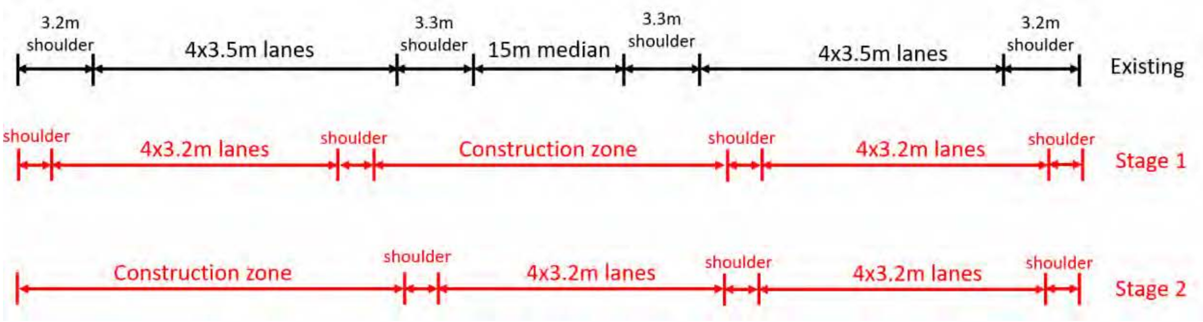
Speed reductions along the Eastern Freeway are likely throughout the day due to construction activity. While this will not impact peak direction travel times, counter and off-peak travel times may increase slightly. If the full length of the Eastern Freeway was reduced to 80 km/h, a vehicle travelling this full distance would have its travel time increase by three minutes. This increase in travel time is considered minimal.

Mitigating treatments

Maintaining the number of traffic lanes along the Eastern Freeway should result in minimal diversion away from the corridor due to the construction works.

An example of the possible staging of the construction works is presented in Figure 10-22 for a typical section of the Eastern Freeway. Detailed Transport Management Plans will need to be generated for all sections of the Eastern Freeway before construction works started.

Figure 10-22 – Possible staging of the Eastern Freeway works



10.5.15 Watsonia railway station

The existing Watsonia railway station car park would be impacted by the project. Car park space adjacent to Greensborough Bypass would be required for construction works and to provide a local connection between Watsonia Road and Grimshaw Street. These proposed works would require reconfiguration of the car park entrance and layout.

It is likely that at least half the existing car park at the railway station would be removed and require relocation during the project's construction. Alternative car parking could be provided within the 45-metre wide high voltage easement to the east of Watsonia railway station. Subject to the requirements of the owner, Ausnet, up to 534 bays could be accommodated while leaving sufficient area around the electricity towers for access by the owner. It is possible this relocation would remain in place for two to three years.

Transport impacts

Traffic impacts associated with relocating half the parking spaces into the high voltage easement are expected to be minor with the existing signalised intersection of Greensborough Bypass and Elder Street. Depending on the access arrangements to the temporary car park, traffic volumes along Elder Street and Frensham Road could increase during the peak periods.

If it is assumed the full 534 parking spaces were relocated to the high voltage easement and that half of this arrived/left the site in a single hour, 267 additional vehicles could be travelling along Elder Street and Frensham Road per hour in the peak periods. Both these roads have sufficient spare capacity and would be able to accommodate the potential increase.

The temporary parking in the high voltage easement would provide sufficient space to relocate the parking provided at Watsonia railway station. Currently, the furthest parking space from the pedestrian access to the station is 270 metres. If parking could be provided within the high voltage easement the furthest parking space could be 580 metres.

Walking distances between the temporary car park and Watsonia railway station would therefore increase up to 310 metres, equating to approximately six additional minutes. However, pedestrians would need to cross Greensborough Bypass which would further increase travel times by approximately two minutes, increasing the journey time by up to eight minutes.

Mitigating treatments

Parking restrictions within surrounding local streets should be reviewed to prevent drivers parking in these rather than the relocated car park.

10.5.16 Doncaster Park and Ride

The existing park and ride facility at Doncaster Road interchange accommodates approximately 400 car spaces and also includes bicycle storage and a bus stop with turn-around space. The construction of North East Link would impact on the park and ride facility due to:

- Reconstruction of the Doncaster Road bridge
- Construction of the Doncaster Busway
- Changing the vertical grade of Doncaster Road at the intersection of High Street and the entrance to the park and ride.

Relocating the existing park and ride facility to a temporary alternative location would allow reconstruction of the Doncaster Bridge and interchange as well as reconstruction of the existing facility to its ultimate design. The relocated facility would provide the same number of car parks and bus bays as the existing Doncaster Park and Ride.

Several alternatives could be considered and include:

- Maintaining the current facility on a smaller footprint with reduced car parking This is not desirable as bus commuters may park in local streets
- Temporarily relocating the facility to Doncaster Shopping Town – this would require negotiations with Westfield
- Temporarily relocating the facility to the Koonung Creek Reserve (area bounded by Doncaster Road, Gardenia Road and the Eastern Freeway).

Relocating the facility to the Koonung Creek Reserve is the most likely solution given its proximity to the existing Doncaster Park and Ride and its access to the Eastern Freeway. This open space is expected to provide the same number of bays along with a bus turn-around. It is possible this relocation would remain in place for two to three years.

Traffic impacts

The impacts to through traffic on Doncaster Road would be minimised through the coordination of traffic signals. However, buses would need to travel further to access the relocated park and ride facility. The relocated facility adds approximately 400 metres travel distance for buses, which in itself is not significant. However, buses would need to travel through up to three additional sets of traffic lights (combining the inbound and outbound trip from the relocated park and ride) which could increase the bus travel time by up to three minutes.

Mitigating treatments

Temporary works would be required to provide an equivalent priority service provided to the existing site. This would include a dedicated bus lane on Doncaster Road on the approach to the new park and ride, installation of temporary signals to the new entrance and the rephasing of the signals at Gardenia Road/Doncaster Road and Greythorn Road. A new intersection would be created on Doncaster Road (east of the Gardenia Road/Greythorn Road intersection) for buses and cars to access the temporary facility.

The proposed new park and ride site may also provide space for a temporary ramp during construction of the Doncaster Road bridge as discussed in Section 10.5.10. It is anticipated these two temporary arrangements could be accommodated within this area.

10.5.17 Hurstbridge rail line

There may be some disruptions to passenger rail services on the Hurstbridge rail line to allow for the following construction activities:

- Strengthening or extension of the section of Grimshaw Street that crosses the Hurstbridge rail line
- Works to lengthen the existing rail underpass of Greensborough Road south of Grimshaw Street to accommodate a widened road formation for additional lanes as part of North East Link. These works would include changes to existing signalling arrangements and overhead electrical layouts.

It is anticipated these works would require the occupation of the railway due to the nature of the work and close proximity to the active rail line. The Hurstbridge rail line may therefore need to be closed for approximately six weeks to accommodate these works. Replacement buses are expected to be used to transfer passengers between stations during service disruptions.

10.6 TBM retrieval

There are two potential TBM retrieval locations, depending on the launch site chosen. The reference project assumes that the TBMs are launched from the Manningham Road interchange site (southern launch option) which would result in the TBMs being retrieved to the north of Lower Plenty Road. However, if the northern launch option was undertaken the TBMs would be retrieved from a site to the north of Bridge Street in Bulleen.

The routes that would be used to transport the TBMs to and from either site has not been confirmed. A Transport Management Plan will need to be developed by the project contractor prior to retrieval activities. It will need to specify the TBM haulage route and any necessary permits for oversize/over-dimensional vehicles (as previously discussed in Section 10.2.2). It will also include details such as the permitted hours of operation and consideration of truck curfews in the area.

The following sections summarises how each of these retrieval sites would operate.

10.6.1 Retrieval at Lower Plenty Road – southern launch

The retrieval location at Lower Plenty Road would be within the trench created for the North East Link carriageway. There would be minimal additional spoil removed from this location to facilitate the TBM retrieval. The TBM would be removed in sections with the use of cranes onto over-dimensional vehicles for transport to a suitable location.

Although the TBM haulage route has not been confirmed it is likely to travel north to make use of the M80 Ring Road, and for transport to occur overnight to minimise the impacts on the surrounding road network. The route will be confirmed as part of a Transport Management Plan prepared by the project contractor, which will require approval from the applicable road authorities.

10.6.2 Retrieval at Bridge Street – northern launch

The retrieval location would be north of Bridge Street within Banksia Park. The site would likely be 80 metres wide by 90 metres long. Access to the site would be directly via Bridge Street and Banksia Street/Manningham Road with vehicles removing spoil travelling south towards the Eastern Freeway. It is possible that some spoil could be hauled north similar to the works at the Manningham Road interchange site. If hauling north, trucks could use Sydney Road, Plenty Road or High Street to access their destination.

The worksite is likely to be operational for approximately eight months.

The retrieval works would require the construction of two shafts to reach the TBMs. This excavation would generate additional spoil haulage and material deliveries to that assessed in Section 10.3. This would result in an additional 170 two-way truck movements per day in the vicinity of the Manningham Road interchange site. However retrieval of the TBMs would occur prior to works commencing at the Manningham Road interchange site, which would minimise the overlap of construction vehicles at these sites.

The analysis undertaken in Section 10.3.4 showed that Manningham Road had a spare capacity of 1,100 vehicles per hour between the AM and PM peak periods and as such, would be able to accommodate an additional 170 truck movements associated with the retrieval of the TBMs.

11 Sensitivity testing

Strategic transport models estimate traffic demand based on a wide range of assumptions about the future. If the input assumptions to the model do not accurately reflect the future, it could potentially change the findings of this assessment.

To understand the potential variations in modelling outcomes, a number of sensitivity tests have been performed on the 2036 'with project' scenario. These tests include:

- **Low population and land use scenario (2031)**: A land use scenario reflecting 2031 conditions was tested. The results of this test reflect the potential traffic impacts of population and employment being slower than forecast.
- **High population and land use scenario (2041)**: A land use scenario reflecting 2041 conditions was tested. The results of this test reflect the potential traffic impacts of population and employment being faster than forecast.
- **+20 per cent tolls**: a 20 per cent increase on all North East Link toll gantries was tested.
- **-20 per cent tolls**: a 20 per cent decrease on all North East Link toll gantries was tested.
- **E6 project**: The E6 project was included in the road network assumptions as a sensitivity test. This project comprises a new freeway commencing at the M80 Ring Road between Dalton Road and Plenty Road, and terminating at the Hume Freeway north of Donnybrook Road.
- **North-east truck curfews (24 hours)**: This test involved extending the existing north-east truck curfews to 24-hour operation.
- **Manningham Road interchange alternative design**: This test involved the assessment of an alternative Manningham Road interchange layout which would provide slightly different connectivity to the reference project layout assumed in this impact assessment.
- **Project land use**: This test included the effects of land use uplifts arising from North East Link.

The impact of each test on daily car and truck volumes for a selection of roads in the north-east are presented in Table 11-1 and Table 11-2 respectively. Where a test reduced volume on a given road link by 5 per cent or more the cell has been coloured blue. Where a test increased volume on a given road link by 5 per cent or more the cell has been coloured red.

A summary of the key findings is shown below:

- The traffic forecasts are most sensitive to the land use sensitivity tests. In the 2031 land use scenario car volumes generally decreased up to 8 per cent, while truck volumes generally decreased up to 12 per cent. The results for the 2041 land use scenario were generally inverted, with car volumes generally increasing up to 10 per cent, and truck volumes generally increasing up to 12 per cent.
- The ±20 per cent toll tests were found to have minimal impact on arterial roads, with no increases or decreases larger than 5 per cent recorded. Car volumes on North East Link itself increased by approximately 5 per cent in the -20 per cent toll test and decreased by approximately 5 per cent in the +20 per cent toll test. Trucks were generally even less sensitive than cars which reflects their higher value of time.
- A key outcome of the E6 test were changes to car and truck volumes along North East Link, which increased by up to 8 and 3 per cent respectively.

- The 24-hour curfew test saw a general decrease in truck volumes from curfewed roads, to curfew-free arterial roads and North East Link. Truck volumes were estimated to decrease on roads such as Greensborough Road and Main Road, and divert to curfew-free roads such as, Manningham Road and North East Link. Changes to car volumes were generally immaterial.
- The Manningham Road Interchange alternative design had a negligible impact on daily car traffic, with all locations recording a change in volume of 3 per cent or less. Truck volume changes were similar with the exception of Bulleen Road, where a 10 per cent reduction was recorded due to a small diversion to North East Link.
- Land use uplift effects arising from North East Link were found to be small (generally up to a 2 per cent increase) across daily car and truck volumes. This is because the population and employment uplifts are dispersed across a broad geographical area with the demand uplift supported by a range of arterial roads and freeways.

Table 11-1 – Sensitivity test results – daily car volumes

Name	Location	2036 'with project' scenario	2031 land use	2041 land use	+20% tolls	-20% tolls	E6	24 hour truck bans	Alt. Manningham Rd interchange	Project land use uplift
Banksia St/ Manningham Road	At Yarra River	60,000–78,000	-5%	5%	0%	-1%	0%	-1%	1%	1%
Bulleen Rd	Eastern Fwy to Manningham Rd	42,000–56,000	-3%	2%	1%	0%	0%	-1%	-3%	0%
Bulleen Rd	Doncaster Rd to Eastern Fwy	17,000–21,000	-4%	4%	-1%	1%	1%	0%	-1%	0%
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	29,000–38,000	-5%	4%	2%	-2%	1%	0%	0%	1%
Burke Rd	Doncaster Rd to Eastern Fwy	26,000–34,000	-7%	5%	1%	-1%	1%	0%	0%	0%
Chandler Hwy	Eastern Fwy to Heidelberg Rd	55,000–71,000	-6%	5%	0%	-1%	0%	0%	0%	0%
Diamond Creek Road	St Helena Rd to Greensborough Bypass	25,000–33,000	-5%	5%	1%	-2%	0%	0%	0%	2%
Doncaster Rd	East of Eastern Fwy	22,000–29,000	-7%	6%	-1%	1%	0%	0%	0%	0%
Doncaster Rd	Between Balwyn Rd to Eastern Fwy	26,000–34,000	-6%	8%	0%	0%	0%	0%	0%	0%
Eastern Fwy	Middleborough Rd to Tram Rd	219,000–255,000	-3%	3%	0%	0%	1%	0%	0%	0%
Eastern Fwy	Tram Rd to Elgar Rd	191,000–222,000	-3%	3%	0%	0%	1%	0%	0%	0%
Eastern Fwy	Elgar Rd to Doncaster Rd	219,000–256,000	-4%	4%	0%	0%	0%	0%	0%	0%
Eastern Fwy	Doncaster Rd to Bulleen Rd	227,000–264,000	-4%	4%	0%	0%	0%	0%	0%	0%
Eastern Fwy	Bulleen Rd to Burke Rd	159,000–186,000	-4%	3%	0%	0%	0%	0%	0%	0%
Eastern Fwy	Burke Rd to Chandler Hwy	173,000–202,000	-4%	3%	0%	0%	0%	0%	0%	0%
Eastern Fwy	Chandler Hwy to Hoddle St	139,000–162,000	-3%	3%	0%	0%	0%	0%	0%	0%
Elgar Rd	Between Belmore Rd to Whitehorse Rd	30,000–39,000	-4%	2%	0%	0%	0%	0%	0%	0%
Fitzsimons Ln	At Yarra River	47,000–60,000	-6%	6%	2%	-2%	0%	1%	0%	1%
Greensborough Bypass	Between M80 Ring Road interchange to Diamond Creek Rd	60,000–78,000	-5%	5%	0%	0%	-1%	0%	0%	1%
Greensborough Rd	Between Erskine Rd to Strathallan Rd	32,000–40,000	-5%	6%	3%	-4%	0%	2%	1%	1%
Grimshaw St	Watsonia Rd to Greensborough Bypass	24,000–30,000	-7%	7%	1%	0%	-1%	-2%	1%	2%
Hoddle St	Between Johnston St to Victoria St	81,000–104,000	-4%	3%	0%	0%	0%	0%	0%	0%

Name	Location	2036 'with project' scenario	2031 land use	2041 land use	+20% tolls	-20% tolls	E6	24 hour truck bans	Alt. Manningham Rd interchange	Project land use uplift
Lower Plenty Rd	Between Rosanna Rd to Greensborough Rd	52,000–66,000	-5%	5%	1%	-1%	2%	1%	1%	1%
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	156,000–182,000	-3%	4%	-1%	1%	14%	0%	0%	1%
Main Rd	At Plenty River	27,000–35,000	-7%	8%	0%	0%	-1%	2%	0%	2%
Manningham Rd	Between Bulleen Rd to Thompsons Rd	26,000–34,000	-8%	10%	0%	0%	3%	-1%	0%	1%
Middleborough Rd	Between Whitehorse Rd to Eastern Fwy	31,000–39,000	-3%	2%	0%	0%	0%	0%	0%	0%
North East Link	Eastern Fwy to Manningham Rd	90,000–99,000	-5%	4%	-5%	5%	5%	0%	2%	1%
North East Link	Manningham Rd to Lower Plenty Rd	103,000–113,000	-5%	4%	-5%	5%	6%	-1%	-1%	1%
North East Link	Lower Plenty Rd to Grimshaw St	95,000–105,000	-5%	5%	-5%	5%	8%	-1%	0%	1%
Rosanna Rd	Between Brown St to Reid St	31,000–40,000	-4%	4%	2%	-2%	1%	0%	1%	1%
Templestowe Rd	Near Birrarrung Park	24,000–30,000	-8%	9%	0%	1%	1%	-2%	0%	1%
Victoria Pde	Hoddle St to Lansdowne St	47,000–61,000	-6%	4%	0%	0%	0%	0%	0%	0%
Watsonia Rd	Between Princes St to Bungay St	15,000–20,000	-4%	3%	3%	-2%	3%	3%	-1%	1%

Table 11-2 – Sensitivity test results – daily truck volumes

Name	Location	2036 'with project' scenario	2031 land use	2041 land use	+20% tolls	-20% tolls	E6	24-hour truck bans	Alt. Manningham Rd interchange	Project land use uplift
Banksia St	At Yarra River	4,100–5,300	-7%	7%	1%	0%	0%	9%	0%	1%
Bulleen Rd	Eastern Fwy to Manningham Rd	2,700–3,400	-3%	2%	1%	-1%	0%	5%	-10%	-1%
Bulleen Rd	Doncaster Rd to Eastern Fwy	1,350–1,850	-9%	4%	1%	-2%	3%	2%	-4%	1%
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	1,650–2,350	-8%	8%	-4%	2%	0%	-2%	1%	2%
Burke Rd	Doncaster Rd to Eastern Fwy	1,500–2,100	-8%	8%	-2%	2%	0%	-2%	1%	0%
Chandler Hwy	Eastern Fwy to Heidelberg Rd	4,000–5,200	-7%	6%	0%	0%	0%	0%	0%	1%
Diamond Creek Road	St Helena Rd to Greensborough Bypass	1,850–2,550	-5%	6%	0%	0%	1%	18%	0%	3%
Doncaster Rd	East of Eastern Fwy	1,150–1,650	-5%	8%	0%	0%	0%	5%	1%	0%
Doncaster Rd	Between Balwyn Rd to Eastern Fwy	1,450–1,950	-6%	10%	1%	0%	0%	-1%	1%	1%
Eastern Fwy	Middleborough Rd to Tram Rd	16,300–19,000	-6%	6%	0%	0%	0%	1%	0%	1%
Eastern Fwy	Tram Rd to Elgar Rd	15,600–18,200	-6%	6%	0%	0%	0%	1%	0%	1%
Eastern Fwy	Elgar Rd to Doncaster Rd	16,200–18,900	-6%	6%	0%	0%	1%	0%	0%	1%
Eastern Fwy	Doncaster Rd to Bulleen Rd	17,100–19,800	-6%	6%	0%	0%	1%	0%	0%	1%
Eastern Fwy	Bulleen Rd to Burke Rd	7,900–9,200	-7%	6%	0%	0%	2%	0%	0%	0%
Eastern Fwy	Burke Rd to Chandler Hwy	8,100–9,400	-7%	6%	0%	0%	2%	0%	0%	1%
Eastern Fwy	Chandler Hwy to Hoddle St	7,000–8,100	-6%	6%	0%	0%	1%	0%	0%	0%
Elgar Rd	Between Belmore Rd to Whitehorse Rd	1,950–2,650	-6%	6%	0%	0%	0%	-1%	0%	0%
Fitzsimons Ln	At Yarra River	3,250–4,250	-8%	9%	-2%	1%	1%	-20%	0%	3%
Greensborough Bypass	Between M80 Ring Road interchange to Diamond Creek Rd	4,200–5,400	-6%	7%	0%	0%	-2%	11%	0%	2%
Greensborough Rd	Between Erskine Rd to Strathallan Rd	1,100–1,500	-10%	11%	3%	-3%	-6%	-43%	0%	3%
Grimshaw St	Watsonia Rd to Greensborough Bypass	2,400–3,200	-8%	9%	0%	0%	0%	33%	6%	4%
Hoddle St	Between Johnston St to Victoria St	3,900–5,100	-7%	9%	0%	0%	0%	0%	0%	0%

Name	Location	2036 'with project' scenario	2031 land use	2041 land use	+20% tolls	-20% tolls	E6	24-hour truck bans	Alt. Manningham Rd interchange	Project land use uplift
Lower Plenty Rd	Between Rosanna Rd to Greensborough Rd	1,950–2,650	-7%	4%	0%	0%	3%	-1%	1%	2%
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	15,500–18,200	-5%	5%	0%	0%	6%	0%	0%	1%
Main Rd	At Plenty River	1,100–1,600	-12%	6%	0%	0%	-1%	-100%	0%	5%
Manningham Rd	Between Bulleen Rd to Thompsons Rd	1,400–2,000	-12%	12%	-1%	1%	2%	8%	-1%	3%
Middleborough Rd	Between Whitehorse Rd to Eastern Fwy	2,400–3,100	-4%	6%	0%	0%	0%	-1%	0%	1%
North East Link	Eastern Fwy to Manningham Rd	18,900–20,900	-6%	6%	1%	0%	2%	1%	2%	1%
North East Link	Between Manningham Rd to Lower Plenty Rd	19,500–21,400	-6%	6%	0%	0%	2%	5%	0%	1%
North East Link	Lower Plenty Rd to Grimshaw St	19,900–22,000	-6%	6%	0%	-1%	3%	11%	0%	1%
Rosanna Rd	Between Brown St to Reid St	1,250–1,750	-8%	3%	-2%	2%	1%	4%	1%	2%
Templestowe Rd	Near Birrarrung Park	1,350–1,750	-9%	11%	0%	0%	2%	68%	0%	2%
Victoria Pde	Hoddle St to Lansdowne St	2,850–3,650	-8%	10%	0%	0%	0%	0%	0%	-1%
Watsonia Rd	Between Princes St to Bungay St	550–950	-3%	2%	-3%	3%	0%	-100%	1%	5%

12 Environmental performance requirements

Table 12-1 lists the recommended EPRs relevant to the traffic and transport assessment. Residual risks following implementation of these EPRs is contained in Appendix C – Risk assessment.

Table 12-1 – Environmental performance requirements

EPR ID	Environmental performance requirement
EPR T1	**Optimise design performance** Optimise the design of the works in consultation with appropriate road management authorities, public transport authorities, relevant land managers and local councils as part of the detailed design process to: • Minimise adverse impact on travel times for all transport modes, including walking and cycling • Maintain, and where practicable, enhance the existing traffic movements at interchanges • Design interchanges and intersections to meet relevant road and transport authority requirements • Maintain, and where practicable, enhance pedestrian movements, bicycle connectivity, and shared use paths • Work with relevant public transport authorities to minimise impacts on buses, trams and rail and, where practicable, enhance public transport facilities and services that cross or run parallel to the alignment of North East Link • Minimise loss of car parking in consultation with relevant local councils.
EPR T2	**Transport Management Plan(s) (TMP)** Prior to commencement of relevant works, develop and implement Transport Management Plan(s) (TMP) to minimise disruption to affected local land uses, traffic, car parking, public transport (rail, tram and bus), pedestrian and bicycle movements and existing public facilities during all stages of construction. The TMP must be informed and supported by an appropriate level of transport modelling and must include: • Requirements for maintaining transport capacity in the peak periods • Requirements for limiting the amount of construction haulage during the peak periods • A monitoring program to assess the effectiveness of the TMPs on all modes of transport • Where monitoring identifies adverse impacts, practicable mitigation measures • Consideration of construction activities for other relevant major projects occurring concurrently with construction activities for North East Link and potentially impacting modes of transport in the same area • Potential routes for construction haulage and construction vehicles travelling to and from the project construction site, recognising sensitive receptors and avoiding the use of local streets where practicable • Suitable measures, developed in consultation with emergency services, to ensure emergency service access is not inhibited as a result of project construction activities • Provision of alternative parking where practicable to replace public and commuter parking lost as a result of project construction activities • Requirements to minimise impacts on local streets, community and commercial facilities by providing parking for construction workers at construction compounds where practicable • Measures to ensure connectivity and safety for all transport network users during construction • Consultation with VicRoads and relevant transportation authorities. A TMP may be split into precincts where appropriate but must consider other precinct TMPs through the Transport Management Liaison Group as per EPR T3. TMPs must be submitted to the relevant authority for approval.

EPR ID	Environmental performance requirement
EPR T3	**Transport Management Liaison Group** A Transport Management Liaison Group (TMLG) must be established and convene prior to the commencement of any works that may impact on existing roads, paths or public transport infrastructure. The TMLG must include representatives from the State, VicRoads, emergency services, the project, relevant transportation authorities and relevant local councils. The TMLG will be a forum for exchange of information and discussion of issues associated with Transport Management Plans. This must include review of proposed haulage routes for construction sites south of the northern tunnel portal to minimise reliance on a single haulage route between Bell Street and the M80 Ring Road and facilitate different sites using different haulage routes. The TMLG must be provided with the Transport Management Plans, details as to timing of implementation, information about construction traffic monitoring conducted by the project, and other reports as relevant. The TMLG must meet at least monthly until the completion of construction.
EPR T4	**Road safety design** Undertake independent road safety audits after each stage of detailed design and after construction. The project design and operational activities must meet all relevant road and transport authority requirements with respect to transport network user safety
EPR T5	**Traffic monitoring** Undertake traffic monitoring on selected roads (arterial and non-arterial) identified in consultation with the relevant transportation authorities and local council pre-construction, at six monthly intervals during construction, and up to two years after construction is complete. As part of the selection process, consideration must be given to roads that carry public transport services. Implement local area traffic management works in consultation with the local relevant councils. Develop and implement traffic performance management to monitor conditions during construction. Real time traffic information must be provided to drivers.

13 Conclusion

The report has provided a traffic and transport impact assessment to inform preparation of the EES and EPBC Act assessments required for North East Link. A summary of the key assets, values or uses potential affected by the project, and the associated impacts assessment are summarised below.

Existing conditions

The existing conditions assessment found that Melbourne's north-east relies on a relatively sparse arterial road network, which is further constrained by the Yarra River. As there are only five river crossings in the north-east, the Yarra River forms a barrier for local, medium and longer cross-city trips throughout the region. This means the north-eastern arterial road network is generally congested in peak periods, and experiences extensive delays and travel time variability.

The assessment also found that limited options are available to facilitate truck demand through the north-east. The Greensborough Road and Fitzsimons Lane corridors carry the majority of this demand despite the primarily residential adjoining land uses and extensive curfews in operation.

An assessment of the Eastern Freeway found that it experiences heavy delays in peak periods for cars, trucks and buses that operate along the corridor. DART bus services operate along the freeway shoulders but are required to frequently merge and diverge at interchanges, which increases travel times for passengers.

While the north-east has an existing network of shared use paths, there are gaps in the network and barriers in the form of congested roadways. This creates conflict between active travel and traffic.

Impact assessment

The impact assessment identified a number of initial risks arising from the project, as well as EPRs to mitigate their effects. The majority of initial 'medium' and 'high' category risks related to potential impacts arising from the construction of the project. Examples of these potential impacts included impediments to the movement of traffic, public transport, cyclist and pedestrian movements as a result of construction activity, spoil haulage and traffic diversion. The EPRs developed to mitigate these effects include:

- EPR T2 – the development of Transport Management Plans for the project's construction
- EPR T3 – the establishment of a Transport Management Liaison Group to meet monthly over the course of the project's construction to review Transport Management Plans and discuss any issues which arise
- EPR T4 – road safety audits to be conducted at each stage of the project's detailed design to provide safe vehicle movements during and after construction
- EPR T5 – ongoing traffic monitoring during and after construction to identify adverse traffic impacts as they arise.

Medium and lower-order risks were also identified with respect to potential adverse traffic impacts for private vehicles, public transport services, pedestrians and cyclists. These risks related to potential changes in traffic behaviour and travel patterns as a result of the project. The EPR developed to mitigate these effects was:

- EPR T1 – optimisation of design performance through the application of relevant road and transport authority requirements as well as ongoing consultation with project stakeholders. The minimisation of adverse impacts across all transport modes – not just traffic – is also required.

14 References

Melbourne Market Authority 2016, *2015/16 Annual report,* <https://www.melbournemarkets.com.au/the-mma/annual-reports/>.

VicRoads 2013, *VicRoads Managed Freeways – Ramp Signals Handbook,* <https://www.vicroads.vic.gov.au/designstandards>.

VicRoads 2017, *Managed Motorway Framework* <https://www.vicroads.vic.gov.au/~/media/files/technical-documents-new/freeway-ramp-signals-handbook/managed-motorways-framework-march-2017.pdf>.

Victorian Planning Authority 2016, *Heidelberg West Business Monitor 2016*, <https://vpa.vic.gov.au/document/heidelberg-west-industrial-estate-business-monitor-results-banyule-business/>.

Appendices

Appendix A – Peer review report

North East Link (NEL)

Environment Effects Statement
Traffic & Transport Peer Review

Prepared by: GTA Consultants (VIC) Pty Ltd for North East Link Authority

on 13/02/19

Reference: V153790

GTAconsultants

North East Link (NEL)

Environment Effects Statement
Traffic & Transport Peer Review

Client: North East Link Project

on 13/02/19

Reference: V153790

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CONTENTS

Appendices

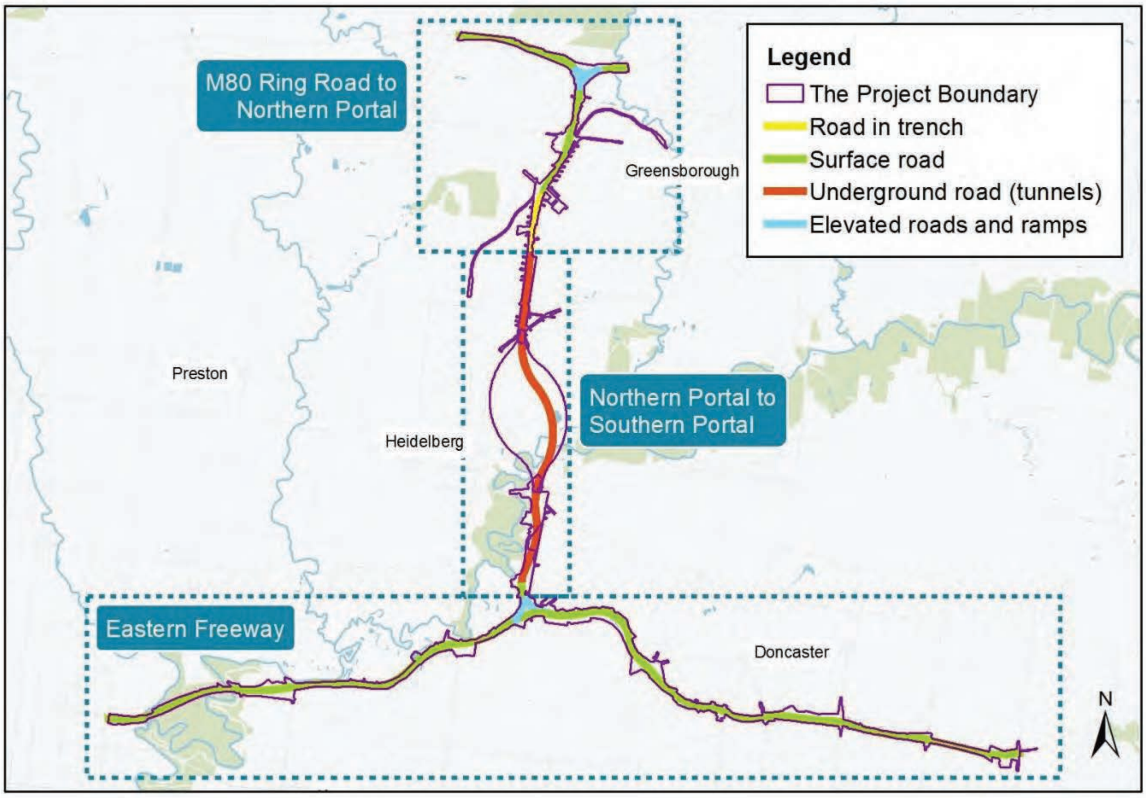
1. INTRODUCTION & PEER REVIEW CONTEXT

1.1. Introduction

The North East Link (NEL) is a proposed freeway linking the Eastern Freeway and the M80 Ring Road.

The project includes the widening and upgrade of the Eastern Freeway between Springvale Road and Chandler Highway, a new Doncaster Busway and a suite of shared use path upgrades along the project corridor. The conceptual project corridor is shown Figure 1.1.

Figure 1.1: North East Link Concept: Sections and Interchanges



In order to assess the impact of the project, an Environment Effects Statement (EES) is being prepared. As part of the EES process, the EES Scoping Requirements have been developed. These requirements provide detail on the specific matters to be investigated in the EES to enable effective assessment of potential effects of the Project. They outline evaluation objectives and specific requirements for assessment of potential effects.

Smedley Technical & Strategic (SmedTech) was engaged by North East Link Authority (NELA) to complete the technical investigation of the potential traffic and transport impacts of the North East Link and prepare a Traffic and Transport Impact Assessment (TTIA).

GTA Consultants (GTA) has been engaged by NELA to conduct an independent peer review of the TTIA completed by SmedTech. This report summarises the findings of GTA's peer review.

1.2. Purpose of the Peer Review

In undertaking this peer review, GTA has been guided by the North East Link Protocol for Peer Reviewers, which states that:

The purpose of the peer reviews is to assist NELA in ensuring that key technical studies and impact assessment reports prepared for the EES are prepared to a satisfactory standard and that there is appropriate consideration of key issues in the EES[1]*. Appropriate peer review of key or technically complex studies will also contribute toward an EES which suitably represents the impacts of the Project for the purposes of public exhibition and submission.*

The objective of each peer review is to ensure that the technical study or impact assessment report under review:

- *adequately addresses the relevant requirements of the EES Scoping Requirements and the "public works" declaration; and*
- *is suitable to represent the impacts of the Project.*[2]

The North East Link Protocol for Peer Reviewers also states that each peer review is to:

- *assess the process, methodology and assessment undertaken in preparation of the relevant impact assessment report including any assessment criteria applied or assumptions relied upon;*
- *identify any additional matters which should be considered in order to address the EES Scoping Requirements, 'public works' Order or to otherwise adequately assess the likely impacts of the Project;*
- *assess the adequacy of proposed Environmental Performance Requirements to manage potential adverse impacts arising from the Project.*[3]

The Peer Review also seeks to determine whether the Evaluation Objective for transport capacity, connectivity and traffic management has been addressed. The Evaluation Objective is reproduced below:

To increase transport capacity and improve connectivity to, from and through the northeast of Melbourne, particularly freight movement via the freeway network instead of local and arterial roads, while managing the effects of the project on the broader and local road, public transport, cycling and pedestrian transport networks.[4]

1.3. Approach and Structure of Peer Review

The North East Link is a one of the largest transport infrastructure projects that Victoria has ever embarked on. At its core is a tunnel, which together with a series of other road links connects the Eastern Freeway to the south and the M80 Ring Road to the north. As a peer reviewer, GTA has undertaken an assessment of a range of inputs relied upon to develop this complex project, including analytics, engineering and planning. Drawing on a transport team with a range of experience internationally GTA has sought to test critical aspects of the Traffic and Transport Impact Assessment (hereon referred to as TTIA).

In this peer review, GTA has focused on interrogating the process, methodology and assessment included within the TTIA to determine whether the scoping requirements have been adequately addressed in respect to issues such as

[1] See paragraph (viii) of the 'public works' declaration and section 3.2 of the EES Scoping Requirements
[2] (North East Link Protocol for Peer Reviewers, 2018)
[3] (North East Link Protocol for Peer Reviewers, 2018)
[4] (North East Link Protocol for Peer Reviewers, 2018)

transport capacity, connectivity and traffic management. A risk-based approach was adopted, with greater effort directed to investigating elements of the TTIA and project scope that pose relatively higher risk of adverse effects.

The process GTA followed is outlined below:

1. Map the relevant scoping requirements to each section of the TTIA to identify what each section should be seeking to address.
2. Identify an appropriate process and methodology for addressing the scoping requirement.
3. Determine the process and methodology that the TTIA has relied upon.
4. Consider whether the assessment set out in the TTIA adequately addresses the relevant scoping requirement and perform a peer review assessment of what is in the TTIA relative to what was expected. GTA performed the assessment both in terms of the expected process and methodologies undertaken and also in terms of the adequacy of the TTIA's assessment to address the relevant scoping requirements.
5. Identify, where required, an appropriate response to resolve any matters that require further assessment.

Responding to our Peer Review comments

GTA has reviewed iterative versions of the TTIA. Matters identified by GTA requiring further clarification or revision were provided to the project team co-ordinating and preparing the TTIA to enable these matters to be responded to or addressed. Upon receipt of additional information from the NEL project team, issues raised by GTA have either been resolved, or in the instance where they were not resolved, investigated independently to ensure that the potential impact of the matter was low. Any remaining items of concern have been captured as recommendations.

This report provides the findings of GTA's peer review of the TTIA. For clarity, and brevity, this report does not generally include commentary on items that have been resolved. In some cases, however, brief commentary is provided on items where a response was sought to provide visibility on more substantive matters raised as part of the peer review.

How to read this report

This report follows the structure and format as the TTIA, with an assessment made on the contents of each section, following the same structure as outlined below:

Relevant EES Scoping Requirements	
#	The Scoping Requirements that are relevant to the section of the TTIA will be listed here. Each requirement of Section 4.2 of the Scoping Requirements has been allocated a number from 1-33. This is to remind the reader of the Scoping Requirements that the section should be seeking to address.
Peer reviewer expectations	We will start each section by outlining what we expect the specific section of the TTIA to cover. We will focus on the process, methodology and overall assessment of the impacts.
TTIA approach	This is where we will outline what the TTIA covered. We seek to not replicate the contents of the TTIA, rather, provide the reader with a brief summary to provide the context for the peer review.
Summary of peer review findings	This is where we provide an overview of the findings of the peer review. If there is a discrepancy between what we expect to see, and what the TTIA included, we will discuss it in this section, and if required, elaborate below the table.

1.4. Scope and Limitations of Peer Review

In preparing this report, reference has been made to the following documents:

- North East Link Traffic and Transport Impact Assessment prepared for the EES.
- Issue 4, Revision U of the Reference Design. The assessment of the Reference Design was only performed to the extent that it was relied upon to understand, interpret and evaluate the assessment contained within the TTIA. The Reference Design, for the benefit of the review, represents one high level design response to the project brief set down by government. To that end, GTA has not prepared peer review findings on the Reference Design given that it represents one possible design response to the parameters established for the project.
- Eastern Freeway and M80 / project corridor operations models. GTA completed a peer review of the operations models. The report outlining GTA's findings is attached at Appendix A.
- Attachment III to the EES, the Risk Report.
- Stakeholder material. GTA was provided with preliminary stakeholder material produced by Councils whom have made submissions on the project. This material predominantly pre-dates the selection of the proposed alignment for NEL. GTA have completed a review of the material provided, but as the engagement with stakeholders has been completed by NELA at every stage of this project, the material reviewed by GTA is not exhaustive.

All other data that was used to inform this assessment was publicly available and has been referenced within the body of the report.

In preparing this report, GTA has relied on strategic travel demand estimates prepared by others, and as such, this peer review does not include any review or consideration of the adequacy and / or robustness of those forecasts.

GTA has undertaken its review based on the project material provided by the project team. The data and information contained within has only been checked or verified by GTA, as a part of GTA's review, to the extent that it was necessary for the purposes of undertaking this review. Specifically, no review of raw survey data has been completed by GTA for the purpose of this peer review. GTA does not accept any liability in connection with such unverified information, including errors and omissions in this report that may be a result of errors, omissions or subsequent updates in information provided by the project team.

2. PROJECT DESCRIPTION

Peer reviewer expectations	The EES Scoping Requirements require that the EES describe the project in sufficient detail to allow an understanding of all relevant components, processes and development stages to enable assessment of their likely potential effects[5]. The Scoping Requirements elaborate on the details that this project description should include. The primary project description appears as a section in the EES main report and was not reviewed as part of GTA's peer review. However, an abridged version was included within the TTIA.
TTIA approach	The TTIA provides an overview of the key elements of NEL, including the three main project components comprising the M80 to Northern portal section, Northern to Southern portal section and Eastern Freeway section. The project description goes on to outline construction activities and post-implementation operation and maintenance activities.
Summary of peer review findings	The project description informs the scope of the assessment for the TTIA. The contents of the project description are important in ensuring a holistic and sufficiently thorough review of the project's impacts is completed by the review team. While originally the peer review identified a number of project aspects warranting more detailed description, for example, commentary on the impacts of the project on the Doncaster Road Park and Ride Facilities or detail surrounding the proposed Bulleen Park and Ride facilities, these have now been satisfactorily addressed in the TTIA. This peer review finds the project description satisfactory and appropriate.

[5] (Scoping Requirements for North East Link Project Environment Effects Statement, June 2018, p. 8)

3. LEGISLATION, POLICY AND PLANS

3.1. Overview

The Scoping Requirements for the North East Link project EES dated June 2018 set out a requirement to consider a range of matters in association with the planning and delivery of the project. Included in those scoping requirements is a need to consider applicable legislation, policy and strategic plans. Guidance on this requirement is set out at Section 3.7 of the EES Scoping Requirements where it states:

"The EES will need to identify relevant State and local government legislation, policies, strategies, guidelines and standards, and assess the project's compliance or consistency with these documents….".

The section goes on to note a range of policy documents including, but not limited to, the Environment Effects Act 1978, Road Management Act 2004 and Transport Integration Act 2010. The relevant items in the scoping requirements, in this regard, are reproduced below.

Relevant EES Scoping Requirements		
	Priorities for characterising the existing environment	
	9	Describe relevant policies, strategies and plans for transport in the vicinity of the project.
	Assessment of likely effects	
	30	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to: consistency with transport and urban plans (e.g. VicRoads Movement and Place Framework, Victorian Cycling Strategy (2018-2028), Plan Melbourne (2017-2050)).
	Approach to manage performance	
	34	Describe the environmental performance requirements to set transport network outcomes that the project must achieve.

Peer reviewer expectations	Identifying and describing relevant policy, strategies and plans

Identifying and describing relevant policy, strategies and plans

The EES Scoping Requirements outline the requirement of the EES to identify relevant State and local government legislation, policies, strategies, guidelines and standards that pertain both to environmental performance requirements and the objectives of transport planning and associated plans and actions.

Consistency with transport and urban planning (in terms of project impacts)

The EES Scoping Requirements also require that the TTIA make an assessment of the project's compliance or consistency with both transport and urban planning. It can be inferred that this should include the documents identified in Scoping Requirement 30 and described in the TTIA.

On the above basis, it would be expected that the TTIA should include:

- A summary of the key policy objectives in each of the documents

	• A discussion as to whether, and to what extent, the NEL project aligns / does not align with the policy objectives as identified. It is expected that this strategic assessment would be included within the EES main report rather than within the technical appendix, with a description of the relevant policies, strategies and plans for transport in the vicinity of the project included within the technical appendix (i.e. the TTIA). To ensure that local policy is reflected in its entirety, one would expect to see an outline of Stakeholder Engagement within the TTIA and how this may have informed the Reference Design.
TTIA approach	**Identifying and describing relevant policy, strategies and plans** The TTIA states that while there is no Commonwealth documentation that it deems relevant to NEL, it does identify as relevant a range of state legislation, state policy and local government policy documents. For each of these documents the TTIA provides a general overview of its provisions and an assessment of the document's relevance to NEL. In section 5, the TTIA provides a table outlining the role of various bodies, including representatives from state and local government, in relation to ongoing design development as it pertains to traffic and transport. **Consistency with transport and urban planning (in terms of project impacts)** While, as noted above, there is discussion in Section 3 of the TTIA of the relevance of various policy and planning documents to NEL, it was initially identified that a more detailed discussion within the TTIA would benefit the review on how, or the degree to which, the impacts of NEL might or might not align with government plans, or the extent to which these documents provide a clear strategic rationale for NEL (based on expected policy outcomes of the project).
Summary of peer review findings	**Identifying and describing relevant policy, strategies and plans** Whilst it was initially identified that the legislation, policy and strategic plans review omitted a range of documents considered to contain relevance to the project, updates to the TTIA have addressed those concerns noting that updates now include, where appropriate, links between the individual policy or strategy with outcomes anticipated in association with delivery of NEL. This peer review finds the State and local government legislation, policies, strategies, guidelines and standards which have been identified to be consistent with peer review expectations.

4. METHODOLOGY

Section 4 of the TTIA outlines the methodology applied to assessing the potential impacts of NEL.

4.1. Overview

The EES Scoping Requirements and the Ministerial guidelines for assessment of the environmental effects under the Environment Effects Act 1978 outlines that a risk-based approach should be taken in preparing the EES, so that a greater level of effort is directed at investigating and addressing those matters that pose relatively higher risk of adverse effects.[6]

Peer reviewer expectations	**Overall methodology** It is expected that Section 4.1 of the TTIA should outline a methodology that takes a risk-based evaluation approach, as required by the EES Scoping Requirements. The methodology for the assessment of the potential impacts of NEL should have a mechanism to focus on 'larger' impacts (both beneficial and adverse) and those where there is uncertainty about the scale of the impact or benefit. Given the scale and complexity of the project, it is expected that as the assessment progressed and the risks and associated impacts became known, the project description, Reference Design and EPRs would be updated. It is expected that this process would include engagement with the community and stakeholders who are likely impacted by the project. **Risk assessment** It is also expected that the TTIA methodology would comply with AS/NZS ISO 31000:2009 Risk Management – Principles and guidelines (now revised to ISO 31000:2018), which outlines a risk management process flow and defines risk as the: "Effect of uncertainty on objectives"[7]. This definition provides a distinction which should be considered throughout the risk assessment methodology to ensure that the mitigations proposed recognise the degree of uncertainty inherent within a scheme governed by a Reference Design and EPRs.
TTIA approach	**Overall methodology** The TTIA includes a process flow (Figure 4-1[8]) that establishes a methodology with feedback loops informed by stakeholder engagement and risk and impact assessments and is consistent with what GTA would expect to see. **Risk assessment** In terms of the Risk Assessment, the TTIA outlines a process adopted that is consistent with AS/NZ ISO 310000:2009, which includes:

[6] (Section 3.1, Scoping Requirements for North East Link Project Environment Effects Statement, June 2018)
[7] (AS/NZS ISO 31000:2009 Risk management - Principles and guidelines, 2009)
[8] (Traffic and Transport Impact Assessment, p. 45)

	• The TTIA established the scope for the risk assessment. • The TTIA references that risks were identified; however, it does not specifically outline how this process was completed. The TTIA references the EES Attachment II Environmental Risk Report and states that additional material is contained within. • The Risk Analysis outlines the assessment of each risk pathway by a combination of likelihood and magnitude of impact (extent, severity and impact). • The TTIA highlights the iterative nature of the risk mitigation process and states that risks classified as medium or above are controlled through EPRs.
Summary of peer review findings	The TTIA adequately outlines the risk management methodology. The TTIA does not elaborate on the framework for classifying risks and therefore our peer review has not been able to comment in detail on this classification. More detail is provided on the classification of specific risks at Section 7.

4.2. Study Area

The Scoping Requirements relevant to Section 4.2 of the TTIA are outlined below.

Relevant EES Scoping Requirements		
	Key issues	
	3	Transport connectivity and capacity across the northeast of Melbourne, including network resilience and redundancy.
	4	Changes to local and arterial traffic distribution in the northeast of Melbourne.
	Priorities for characterising the existing environment	
	12	Undertake predictive modelling of regional and local transport network traffic flows in the absence of the project.
	Assessment of likely effects	
	20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.
	22	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to: redistribution of traffic, including trucks and placarded vehicles, on the regional and local road network;

Peer reviewer expectations	It is anticipated that a description and understanding of the extent of the study area should be included in the analysis of the project impacts. This section should also include reasoning and / or commentary on the breadth and scale of the of the selected study area extents.
TTIA approach	Section 4 of the TTIA outlines the extent of the project study area based on the application of a threshold of a 10 per cent increase in traffic volumes – i.e. the study area includes those areas around NEL that have been estimated to experience such an increase in traffic demand.

Summary of peer review findings	All areas expected to be addressed in Section 4 of the TTIA have been addressed as they have discussed the project area included in the analysis for both the strategic and microsimulation models.

The TTIA provides commentary on the selection of a 10 per cent increase in future traffic demand as a threshold for determining the extent of the study area as volume impacts less than 10 per cent are considered within the margin of error for transport models. More broadly, it is recognised that for land use planning purposes, industry generally accepts a need to evaluate transport impacts on networks where demands increase by values of 10 per cent or more.

With this forming part of the evaluation context, as well as feedback received during the community and stakeholder engagement process, a threshold of 10 per cent in traffic volume change is considered a reasonable basis to ascertain and establish the broad boundaries of the project's study area. In other circumstances, where a value change of less than 10 per cent is anticipated, professional judgement will be required to determine a need to extend the threshold estimated study area.

4.3. Existing Conditions

Peer reviewer expectations	It is expected that this section of the TTIA would provide explanation as to the methodology followed to establish a base line assessment of the current transport conditions across the identified study area.
TTIA approach	The assessment of the existing conditions for public transport, walking and cycling was undertaken through existing VicRoads, Transport for Victoria and Council data. The use of this data is addressed by our review in Section 6. A number of traffic surveys were undertaken between March 2017 and up to the time of finalising the TTIA (2018).
Summary of peer review findings	No raw survey data was provided as part of this peer review. GTA are therefore unable to comment on the validity and conformity of the data, so it is recommended that if it has not already been completed, an independent check be completed of the raw survey data to ensure it is deemed appropriate for use, or confirmation from the relevant agency (e.g. VicRoads) that the data relied upon meets their assessment requirements.

4.4. Risk Assessment

This sub section is discussed earlier in section 4.1.

4.5. Impact Assessment

The Scoping Requirements relevant to Section 4.5 of the TTIA are outlined below.

Relevant EES Scoping Requirements

Key issues	
1	Disruption to pedestrian movements, bicycle connectivity, public transport, motor vehicle and freight traffic during construction.
4	Changes to local and arterial traffic distribution in the northeast of Melbourne.
5	Effects of the redistribution of freight and heavy vehicle traffic including placarded and over-dimensional vehicles in the northeast of Melbourne and implications for residents, residential areas and businesses during construction and operation.
7	Predicting future travel behaviour and transport trends over time.
Assessment of likely effects	
20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.

Peer reviewer expectations

Given the specific reference to the need to undertake predictive modelling in the EES scoping requirements (7 and 21), we would expect to see a description of the transport assessment methodology (with a focus on the transport model) that was used to test the impact of the scheme on the transport network. As transport models have different applications (from the investigation of particular schemes, to detailed operational planning) we expect to see the use of a strategic transport model to estimate the broader network behaviours and implications and a microsimulation or operations model to assess the corridor and local impacts. Therefore, the methodology should present a summary of how a suite of transport models were used to assess the project study area and detailed local impacts.

Strategic transport modelling

GTA has relied on strategic travel demand estimates prepared by others, and as such, this peer review does not include review and consideration of the adequacy of those forecasts.

Spreadsheet modelling – capacity constraining

The simulation and analysis of peak spreading is a logical process that is common in infrastructure assessment. There is no industry standard for this process, but it is a common part of operational modelling. Based on this, we would expect to see a description of the process that was employed, and we would expect its implications to be captured in both the local study area and the corridor assessment.

Microsimulation modelling (operational modelling)

To address the EES scoping requirement, “undertake predictive modelling for the local and project transport network for future design scenarios without the project” (12), and following delivery of the project (20) we would expect to see consideration of:

- Study area and model extents
- Review of reported survey data
- Model inputs, parameters and any major exogenous changes to demands from the strategic model

	• Network coding • Details of calibration and validation • Traffic demand development (without reviewing the strategic model). **Assessment of walking and cycling** The EES Scoping Requirements specify that predictive modelling be completed of 'traffic flows'. GTA appreciate that this is distinct from a requirement to model 'transport flows', which would encapsulate walking and cycling flows along with vehicle traffic. Whilst it may not be a requirement to undertake predictive modelling of walking and cycling trips, the EES does require an assessment of walking and cycling connectivity (related to construction and 'with project'). Given this, it would be helpful if Section 4.5 of the TTIA outlined a methodology and/or framework which acknowledges a need to consider impacts on walking and cycling transport modes.
TTIA approach	The TTIA outlines the scenarios to be modelled and the modelling process used to assess these options and why each type of model was used. The TTIA includes discussion of the impacts identified in the traffic modelling process, with all the below topics discussed in relation to the modelling undertaken. **Strategic modelling** This is used to estimate traffic demands, public transport patronage and travel times across Melbourne for all scenarios. This is outside the scope of this review. **Spreadsheet Modelling** The section outlines the approach to complete a capacity-constrained traffic volume assessment within and outside the scope of the microsimulation model. The capacity constraining process was applied as the strategic model is only partially constrained and therefore generates demand which can sometimes exceed capacity in any finite time period. To overcome this phenomenon, the project team adjusted the demand volumes derived from the strategic model, using a spreadsheet model to manually shift vehicles travelling in the peak to the shoulders of the peak, to ensure modelled outcomes align with those likely to eventuate around demand profiling and vehicle arrival rates. The impact of the capacity constraining process on the 2036 'no project' and 2036 'with project' scenarios is presented in two charts that show the magnitude of manual adjustment across different bands. The range of adjustment is between 0% and greater than 20% reduction with the majority of constrained sites being constrained by between 0 and 5% as a result of the constraining process. **Microsimulation model** This section outlines the modelling package used and how the models have been calibrated and validated to existing conditions. It also provides a summary table of key statistics and an assessment against calibration and validation requirements. Discussion regarding the methodology for road safety has been discussed in the form of a crash assessment based on strategic model outputs and casualty accident rates.

Summary of peer review findings	Strategic modelling Not considered as a part of this review. Spreadsheet modelling The TTIA presents some analysis of the capacity constraining process. The reasoning and methodology used in determining peak spreading for future years is logical and common across industry. This issue is considered in further detail within Section 9.3 Project Corridor Assessment of this report. Microsimulation modelling GTA was engaged by NELA, as a separate but related part of this review, to undertake an independent peer review of the traffic microsimulation (operational) models of the road network surrounding the proposed NEL. GTA's peer review report is attached at Appendix A and contains an overview of the methodology GTA used to complete the peer review of the operational model, with a summary of both the resolved and outstanding recommended actions at the end of the report. The conclusion of the report is cited below: *Based on the analysis and discussions presented within this report, the modelling methodology is considered adequate for its intended purpose, bearing in mind both the range and intention of the recommendations outlined in Table 4.1 (NB: of the GTA modeling report). Where issues were identified, enquiries with SmedTech have revealed an acceptable approach was adopted.* To avoid duplication, the more detailed findings of the report are not repeated here. Assessment of walking and cycling The TTIA does not explicitly outline the methodology used to assess the likely positive or negative impacts of the project on walking and cycling connectivity. GTA do not interpret the Scoping Requirements to suggest that transport modelling of walking and cycling trips is required, however, we do consider there to be a need to develop and document a rationale and process for assessing the project's impacts on walking and cycling. Whilst the TTIA would benefit from a more explicit explanation of the methodology and process used to assess impacts and develop the design responses to adequately address Scoping Requirements relating to pedestrian and cycling connectivity, accessibility and safety, it is evident that Sections 6.5, 8.7, 9.1.4 and 9.7 of the TTIA set out a basis and findings on the performed evaluation. Further commentary on the adequacy and efficacy of that evaluation is provided within Section 9.7 of this report.

4.6. Justification, Limitations and Assumptions

The Scoping Requirements relevant to Section 4.6 of the TTIA are outlined below.

Relevant EES Scoping Requirements

Key issues	
2	Contribution to an integrated and sustainable transport system, including active transport.
7	Predicting future travel behaviour and transport trends over time
Design and mitigation measures	
16	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network, including any proposed solutions to accommodate placarded and over-dimensional vehicles.
Assessment of likely effects	
20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.
24	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to: traffic safety, given the predicted transport network traffic flows following implementation of the project

Peer reviewer expectations	**Limitations affecting project analysis** It is standard practice in the assessment of project impacts pursuant to EES processes that an account be made of any limitations in analysing those impacts and the reasons for those limitations. However, limitations such as those that relate to strategic modelling, as indicated in the TTIA (i.e. the inability in strategic modelling to represent results for local roads) is outside the scope of this review. **The application of assumptions** At a time when it is widely understood that our transport systems could undergo significant disruption with the next twenty or so years as a result, for example, of the increasing take-up and development of new transport technologies, it should be expected that major infrastructure projects take account of these prospective developments and consider them in the design process as well as during demand modelling.
TTIA approach	**The application of assumptions** The TTIA identifies various limitations and assumptions related to the methodology and approach outlined in previous sections, mostly in relation to transport modelling. It notes, for example, that where there are particular uncertainties and an absence of policy about conditions that might or might not pertain to 2036, such as in relation to road pricing or new transport technologies, current day assumptions have been applied. In other circumstances, the TTIA sets out a range of sensitivity tests including low population, high population, toll variation, other major project impacts, alternate interchange configurations and truck curfews.

Summary of peer review findings	**The application of assumptions** It is acknowledged that a range of sensitivity-tests have been conducted and it is further acknowledged that there are other emerging factors and trends, which could also potentially play a role in influencing actual traffic and transport outcomes for 2036 which should be considered throughout the project design process. For example, • international studies, such as by Bloomberg New Energy Finance and leading consultancy firms, indicate that a significant proportion of the private vehicle fleet in advanced economies could be electrically powered within twenty years, as the barriers to previous uptake of Electric Vehicles (EVs) (such as 'range-anxiety' and higher costs compared to traditional internal combustion engine vehicles) are overcome, and governments seek to address worsening pollution in cities. It has been argued that the lower per-km cost of operating EVs could result in a 'rebound' effect in terms of increased vehicle kilometres travelled on our road network. • it is also probable that by 2036, by which time NEL is expected to be operational, road vehicles will be operating with higher levels of automation, and particularly on motorways (where vehicle platooning, and 'fully driverless' operation may first be introduced). This could have implications not just for traffic volumes, but also for the design, maintenance and durability of infrastructure such as road surfaces and bridges, as indicated in the evidence released by Infrastructure Victoria in its recent advice to the Victorian government on Automated and Zero-emission vehicles. On this issue, where there is a policy guideline, statement or commitment by government or any of its subsidiary agencies on planning and / or design for any of these emerging management techniques or technologies occurring between now and finalisation of any project design, it is recommended that they be considered, where reasonable, for application to the project. This is especially relevant given the pace at which emerging technologies are developing coupled with the time likely to be associated with completing a final design for the project. It is appropriate that the EPRs are broad enough to monitor the applicability of future and emerging technology trends in the area of traffic and transport planning throughout the project design development process (following any EES endorsement). It is also the case that opportunities exist for government to mandate specific requirements within any project contract.

It is a requirement of the EES that consideration be given not just to present conditions under which the NEL might operate, but also to travel behaviour and transport trends that could alter the environment under which NEL might operate in the future. The TTIA identifies as possible trends or developments in the future as including road-pricing, the growth of ride-sharing and the introduction of emerging technologies such as autonomous vehicles (AVs), but does not factor these issues into either its demand modelling or crash assessment projections. It is recognised that these prospects reflect emerging technologies where a thorough understanding of implications is yet to be developed. With this the case, there are limitations on what can be reasonably contained or outlined in the TTIA.

This issue applies not just to issues around transport demand, but also for the safe and optimal operation of the asset post-construction. By way of example, the TTIA notes that its crash assessment projections are conservative as they do not factor in future advances in safety technology (e.g. related to AVs).

To overcome these issues, it is important that the EPRs take account of the implications of new and emerging technologies for project design, asset maintenance, safety and emergency response systems for NEL. As the formulation of standards in respect of the above technologies is still evolving, it is recommended specifically that the EPRs are sufficiently broad to ensure that planning and design for NEL has regard to developing government and industry advice.

By way of example, this could include Transurban's report on the Victorian connected and automated vehicle trials Phase One—Partially automated vehicles, the UK government report on Future Proofing Infrastructure for Connected and Automated Vehicles, and the reports generated as part of Infrastructure Victoria's advice to the Victorian Government on Automated and Zero-emissions Vehicles. Particular regard should be had to identifying any requirements for the safe and effective operation of Automated, Connected and Zero-emission vehicles in road tunnels and motorways.

It is also worth considering ongoing monitoring through the course of the design and construction of the development of any standards of information relevant to the engineering requirements to support the safe and effective operation of connected, automated and zero-emissions vehicles, and an ability to respond adequately to these developments in terms of *'future-proofing'* NEL.

GTA considers that the EPRs developed for the project are sufficiently broad to capture this requirement. It is also understood that, where appropriate, efforts could be made to require specific and emerging technologies to be considered as part of any project contract.

5. STAKEHOLDER ENGAGEMENT

5.1. Overview

Although the EES Scoping Requirements do not make direct reference to Stakeholder Engagement, the involvement of stakeholders in supporting the identification of potential project impacts and risks is entirely consistent with the pursuit of a risk-based approach as required by the Scoping Requirements, and in the iterative approach outlined in Section 4 of the TTIA. As such, it is appropriate for the TTIA to include a section outlining its stakeholder engagement strategy, and for this section to be within the scope of this peer review.

Peer reviewer expectations	It is expected this section would include an outline a discussion of the specific transport and traffic stakeholder engagement strategy and how it informs the final project description, the assessment of risks and (subsequently) the EPRs.
TTIA approach	The TTIA summarises the stakeholder engagement that was undertaken for traffic and transport. Discussion in the TTIA was initially limited, and the majority of matters discussed are summarised as: update on transport, impacts and redistributions and mitigating measures. Discussion of the outcome of stakeholder engagement was originally limited and was described minimally as informing the ‘ongoing design development’.
Summary of peer review findings	The TTIA has undergone revision, taking on board feedback from GTA as part of this peer review and provides a description of the issues raised and how they are proposed to be mitigated or resolved. To address the scoping requirements the TTIA has provided a list of key concerns and how they have been subsequently addressed by the review itself, changes to project scope or by changes to the EPRs. In preparing this peer review we undertook a strategic review of the key risks identified by stakeholders (based stakeholder material from NEL). This material was supplied at the start of our review and did not include subsequent comments made by stakeholders in response to the circulation of the draft TTIA. The key matters highlighted from our initial review of the consultation material is provided at Table 5.1. These have subsequently been acknowledged at Section 5.2 of the TTIA.

Based on the initial review performed by GTA Consultants, community feedback on the project was summarised and reproduced at Table 5.1. Additional commentary on whether the stakeholder concern is likely to be resolved through either the TTIA or the project is provided in later sections of this peer review report, as referenced in the final column of the Table. It is important to note that the issues raised at Table 5.1 and others have been subsequently acknowledged and addressed in the TTIA at Section 5.2 (Community Feedback).

Table 5.1: Key consultation themes / concerns

Council comment	TTIA adequately address comment?	GTA section reference
Work closely with local Councils to improve local access and safety.	The TTIA outlines some locations where local access is impacted by the project. Further discussion is included in Section 9.2.4 of the TTIA.	9.2
Work closely with local Councils to improve pedestrian and cycling connectivity.	Significant investment in pedestrian and cycling infrastructure provided through NEL. However, limited discussion on the rationale on how the treatments respond to likely walking and cycling access needs.	9.7
Enhance Thompsons Road in Bulleen to create a 'gateway boulevard', support a safer pedestrian environment and cater for public transport.	The TTIA outlines that the Thompsons Road / Bullen Road interchange improves slightly from a Level of Service C / D / E to C / D, reducing queuing and delays on the nearby arterial network. Whilst this does not directly address Council's comment, it may reduce the movement function on Thompsons Road allowing Council to dedicate additional road space to supporting the place function. Additional discussion on Movement and Place is included in Section 9.2 of this report.	9.2
Public transport upgrades be incorporated as part of the proposal.	A key design feature of NEL is the construction of the Doncaster Busway (a dedicated exclusive bus fairway) and two bus jump lanes.	9.6
To deliver a number of walking and cycling improvements including a new shared-path bridge across the Yarra River between Bulleen and Heidelberg and safer pedestrian crossings in various locations. Provide east-west, north south, bicycle network connectivity across and along NEL.	Significant investment in pedestrian and cycling infrastructure provided through NEL. However, limited discussion on the rationale on how the treatments respond to likely walking and cycling access needs.	9.7
Provide enhanced east-west road connectivity.	Section 9.4 of the TTIA outlines the travel time savings delivered by the project on several east-west roads.	9.4
Upgrade / downgrade the roads to reduce through traffic and improve pedestrian safety in Activity Centres.	The TTIA references TfV's Movement and Place framework when highlighting four streets which are likely to be downgraded following implementation of the project. The TTIA would benefit from additional commentary on how Movement and Place can support NEL to address the Scoping Requirements. This is discussed further in Section 9.3 of this report.	9.2

6. EXISTING CONDITIONS

6.1. Overview

The purpose of a TTIA is to assess the transport impacts of a major project in accordance with the EES Scoping Requirements. This customarily involves a comparison of the project case against both a present-day base case and a future-year, *'no-project'* base case. Such a comparison allows decision-makers to understand the potential risks and benefits, in terms of transport impacts, of proceeding with the project, compared to *'doing nothing'*. This analysis can also then be the basis upon which to evaluate environmental risks and formulate potential EPRs and mitigation measures.

Section 6 of the TTIA discusses the current (2016) transport network and operations to establish transport demand and travel patterns for the existing-year base conditions. The TTIA describes the elements of the current transport systems for each mode and identifies potential impacts from the existing transport operations.

As it is the comparison between the 2036 Project Case and the 2036 'no project' case that is germane to this peer review, this report does not make a separate detailed review of the 2016 base case.

7. RISK ASSESSMENT

7.1. Overview

As outlined in Section 4.4 of this report, the EES Scoping Requirements and the Ministerial guidelines for assessment of the environmental effects under the Environment Effects Act 1978 outline that a risk-based approach should be taken in preparing the EES so that a greater level of effort is directed at investigating and addressing those matters that pose relatively higher risk of adverse effects.[9]

Peer reviewer expectations	As the risk management methodology subsection (Section 4.4) outlined that all risks rated medium or higher will be subject to greater analysis and mitigation through EPRs, it is expected that the risk assessment section would include a risk matrix and adequate discussion for the reader to: 1. Ensure that all risks have been captured 2. Understand the rationale for risk ratings 3. Appreciate the link between the mitigation and the reduction in risk ratings. It is expected that the risk assessment process would be consistent with the AS/NZS ISO 31000:2009 Risk Management Process and referenced against the recently released equivalent 2018 Australian Standard (AS ISO 31000) noting, that the definition of risk within the Standard is the 'effect of uncertainty on objectives', rather than the probability of a loss. Whilst it is not an expectation of this specific section, GTA would expect to be satisfied that the assessment within Section 9: 2036 'With Project' Scenario focuses more heavily on assessing the risks identified as medium or above.
TTIA / Risk Report approach	The TTIA summarises the initial medium and high-risk pathways and the associated residual risk ratings for a series of environmental categories including amongst other things, transport, air quality, land use planning and human health. The complete risk assessment register is attached as Appendix C in the TTIA, and a comprehensive summary of the risk assessment approach is included as Attachment III to the EES. The methodology used to assess risk is consistent with ISO 31000 and extends to include an iterative risk analysis process which goes beyond an initial identification of a risk, including ongoing evaluation of that risk until it delivered an acceptable rating or managed through an appropriate EPR. In some cases, it was reported that the reference design was modified to deliver an acceptable level of risk.

[9] (Scoping Requirements for North East Link Project Environment Effects Statement, June 2018)

Summary of peer review findings	The TTIA details the evaluation bands that were used to categorise the magnitude of consequences relating to assessment of the risk (relating to extent, severity and duration). The TTIA refers to these elements as the "consequence criteria" and assigns values to specific factors to deliver an overall consequence rating. Value totals were then developed to rate risks as either negligible, minor, moderate, major or severe. These risks were then tested in a multi-disciplinary facilitated workshop. This has been referred to as a "calibration of risk assessment" process and is helpful to the extent that it helps provide consistency to the risk and impact assessment. Whilst the peer review does not explore the accuracy and or appropriateness of the identified potential threats and / or effect on the environment, the process and methodology set out in the risk assessment appears consistent with peer review expectations noting that further risk detailed risk assessments are expected to be prepared by contractors during both construction and operational phases of the project. It is expected that these assessments would be prepared in connection with advancement of the project design beyond that currently represented by the reference design.

8. ‘NO PROJECT’ SCENARIO

8.1. Overview

Section 8 of the TTIA considers the future-year (2036) ‘No Project’ scenario, including changes to network-wide performance across metropolitan Melbourne and the local study area, along the project corridor and in regard to impacts to travel time, accessibility, freight, public transport, walking and cycling. These results are then compared to the existing-year and future project scenarios.

As part of a risk-based approach taken for this peer review of the TTIA, we will not be performing a detailed review of the 2036 *‘no project’* base case. Rather, in Section 9 of this review, we will consider the comparison between the results of the 2016 and 2036 base cases and those for the 2036 ‘with project’ case.

9. 2036 'WITH PROJECT' SCENARIO

Overview

The TTIA is required by the EES to, amongst other things, take account of the potential future impacts of NEL, particularly in the north-east of Melbourne. In response, the TTIA provides, in Section 9, analysis and assessment of the type of project impacts specified in the EES Scoping Requirements, including the performance of the project corridor and the anticipated changes to travel behaviour and trip patterns across the study area, and including reference to freight movements, public transport and walking and cycling.

In this section of the peer review, we consider the TTIA's assessment of the 2036 'With Project' Scenario as it compares to the 2036 'No Project' scenario.

9.1. Project Overview

Section 9.1 of the TTIA provides an overview of the Project Case, including assessment of mode impacts, considered in relation to the 2036 'no project' Case.

Peer reviewer expectations	It is expected that Section 9.1 should include discussion on the key elements of the project to provide the reader with an overview before entering into greater discussion later within the section.
TTIA approach	The section included the following: • Key elements of the project scope • Project catchment and expected volumes • Tolling structures • Elements of managed motorway technologies.
Summary of peer review findings	The section provides an adequate overview of the project.

9.2. Local Study Area

It is expected that Section 9.2 of the TTIA, considering the local study area, would address the following items from the EES Scoping Requirements:

Relevant EES Scoping Requirements

Key issues	
2	Contribution to an integrated and sustainable transport system, including active transport.
3	Transport connectivity and capacity across the northeast of Melbourne, including network resilience and redundancy.
4	Changes to local and arterial traffic distribution in the northeast of Melbourne.
Design and mitigation measures	
16	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network, including any proposed solutions to accommodate placarded and over-dimensional vehicles.
18	Describe traffic calming or other management tools that could be used to modify travel behaviour on the project and local roads such as managed motorway systems, intelligent transport systems, tolls, clearways, truck curfews and bans.
Assessment of likely effects	
20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.
	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to:
21	○ predicted travel time and vehicle movement outcomes, including performance at the project's interchanges and key intersections adjacent to the proposed alignment;
22	○ redistribution of traffic, including trucks and placarded vehicles, on the regional and local road network;
23	○ effects of traffic management measures on local and arterial roads;
30	○ consistency with transport and urban plans (e.g. VicRoads Movement and Place Framework, Victorian Cycling Strategy (2018-2028), Plan Melbourne (2017-2050)); and
31	○ interactions, including possible cumulative impacts with other relevant projects, for example, the M80 and the Outer Metropolitan Ring Road/E6 developments.

Peer reviewer expectations

Localised trip redistribution and changes to movement patterns

In order to address the relevant EES Scoping Requirements, it is expected that the TTIA would determine the localised trip redistribution and changes to movement patterns brought about by the project.

Assessing the impacts of the project on the local study area

It is expected this would enable the assessment of three key elements:

1. The changes in traffic volumes on key streets within the study area
2. High level network performance within the study area
3. Intersection performance adjacent to the project corridor.

	Assessing the impacts of the project on local streets This peer review acknowledges that modelling the transport impacts of a scheme of this size is a complex task. Given the project's strategic role in the transport network (linking two existing freeways) and the extent of the project, the primary redistributions in traffic flows are likely to be regional in nature. The appropriate tool to enable this assessment is a strategic model. Therefore, both the TTIA and the peer review must be mindful of the granularity of the assessment made possible by a strategic model. The strategic model will not generally provide outputs that enable an assessment of the changes of traffic volumes on a local street. However, it is expected that conclusions be drawn based on a combination of the strategic and operational model outputs and transport engineering judgement, to determine the local precincts that are likely to be impacted by traffic accessing the project. This is key to addressing Scoping Requirement 23. **Design responses** As outlined in Section 4.4 and 7 of the TTIA, the Reference Design evolved in response to the findings of the analysis underpinning the TTIA. Rather than include a detailed account of the iterations of the design, it is expected that Section 9.2 of the TTIA would present the transport impacts of the final Reference Design. The TTIA should then state whether the transport impacts of the project on the local study area are acceptable, and where there is potential for adverse impacts, the TTIA should propose mitigations in the form of traffic calming measures (as required by Scoping Requirement 18) or list EPRs to ensure identified risks are satisfactorily managed. The mitigations proposed should be consistent and consider transport plans (or policy) such as Movement and Place to address Scoping Requirement 30.
TTIA approach	**Localised trip redistribution and changes to movement patterns** The TTIA draws conclusions on potential localised trip redistribution and movement patterns from strategic modelling outputs, drawing on select link origin-destination plots to demonstrate regional changes to distributions across the Yarra River screen line. **Assessing the impacts of the project on the local study area** • The TTIA presented plots showing total volume and changes in volume between 'no project' and 'with project' cases in 2036. The TTIA also included changes in volumes across the Yarra River screen line and changes in traffic volume by period for key streets. • The TTIA presents a series of network statistics and reports on the change between 2036 'no project' and 'with project' cases. • The TTIA presents a discussion on intersection performance under Section 9.3. **Assessing the impacts of the project on local streets** The TTIA presents percentage changes in daily traffic volume for local and arterial streets aggregated at the Council level, and throughout the section makes inferences around the general diversion of traffic activity onto key arterial roads and the project corridor.

	The TTIA highlights that Whittlesea City Council is likely to experience a 1 per cent increase in daily vehicle kilometres travelled and presents select link analysis results for the key arterial roads that experience increased volumes. **Design responses** The TTIA presents a subsection on local access changes that are proposed either to accommodate the project or mitigate the potential impacts of the project. The TTIA acknowledges that VicRoads may be required to re-phase intersections to allow for changes in traffic patterns and distributions. The TTIA relies on EPR T1 to optimise the design performance of the scheme and T5 to monitor selected streets and subsequently implement local area traffic management works.
Summary of peer review findings	**Assessing the impacts of the project on local streets** The TTIA broadly acknowledges that by virtue of this scheme being a road project that adds significant road capacity, it will change trip distribution patterns within Melbourne's north-east. A potential side-effect of this is localised increases and changes in trip patterns within the vicinity and around the project corridor. Upon review of the strategic and operational model outputs and applying professional engineering judgement, GTA consider there to be some streets within local precincts that should be observed and managed under the post implementation outcome as there is potential that they may be exposed to a level of change which in some cases could warrant some level of intervention or management. **Design responses** In some instances, it was initially observed that impacts brought about by changes to local access had not been clearly articulated. This has now been addressed through modifications to descriptions and or the Reference Design so as to avoid ambiguity around local access outcomes.

As referenced earlier, the project is likely to generate localised redistributions in traffic flows as traffic seeks to access the project. This outcome increases trips from within individual precincts which subsequently rely on the arterial road network which connects through to the Eastern Freeway.

As outlined earlier, the strategic model is not capable of estimating likely increases or decreases on most of the local street network contained in the study area for either the 'no project' or 'with project' outcomes despite Scoping Requirement 20 requiring predictive modelling be undertaken of regional, local and project transport network flows. In some cases, however, some strategic local streets have been specifically considered, these include Erskine Road and Watsonia Road. Traffic demands on these streets have been estimated and adequately documented in the TTIA and respond, to the extent possible, to Scoping Requirement 22 which requires an assessment of redistributed traffic on both the regional and local street network.

Scoping Requirement 18 and 23 require the TTIA to describe the traffic calming measures that could be used to modify travel behaviour on local roads and describe the effects of traffic management measures on local roads. The TTIA proposes several potential changes to local access to reduce 'rat running' and to facilitate improved performance on the approaches to the project. However, given the coarseness of the strategic model functionality, the TTIA stops short of outlining traffic calming mitigation measures on any specific local roads which may be required to mitigate project impacts.

Acknowledging the limitations of the strategic model, the approach outlined in the TTIA is considered acceptable. This acceptability however is dependent on ensuring that the project EPRs relating to mitigating local street impacts are sufficiently robust both during construction and under the post implementation phase of the project.

EPR T5 currently specifies that traffic monitoring in selected streets be completed pre-construction, during and post-implementation and that local area traffic management works be implemented in consultation with the local relevant Council.

This peer review deems that this EPR provides a satisfactory framework for managing risk on the local street network.

Design response – Local Access

There are several instances where local access is impacted to accommodate the project. The TTIA discusses the design responses, elaborates on the potential impact of local access changes and proposes mitigation measures.

Watsonia Station from Elder Street

An example of this is the change to local access to Watsonia Station from Elder Street shown at Figures 9.2 and 9.3, respectively. People accessing Watsonia Station from Elder Street will no longer have direct access and will be subject to an additional 900m journey when crossing Greensborough Bypass. A review of the Reference Design suggests that the left turn slip lane from Elder Street into Greensborough Highway is also being removed as part of the scheme, reducing opportunities for filtered movement from Elder Street onto Greensborough Road.

Figure 9.1: Watsonia Station access for existing road network, from Elder Street[10]

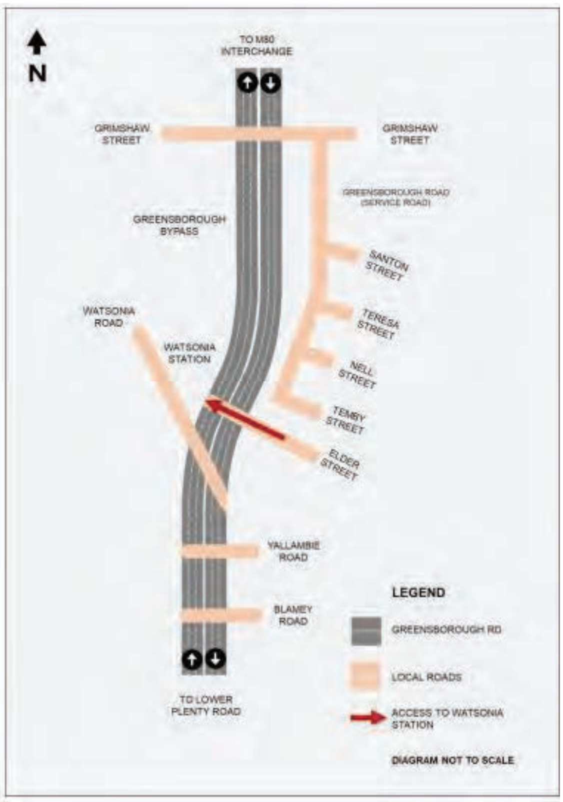
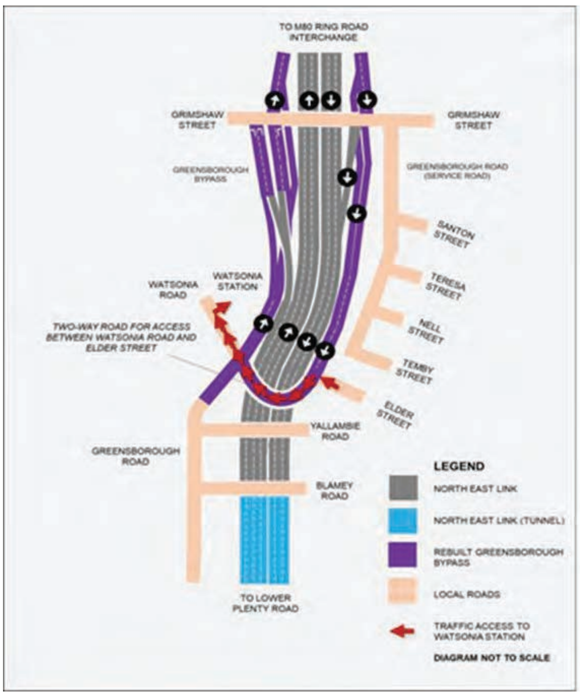


Figure 9.2: Watsonia Station access for the project scenario, from Elder Street[11]



[10] (Traffic and Transport Impact Assessment, p. 348)
[11] (Traffic and Transport Impact Assessment, p. 349)

The TTIA suggests that as the Greensborough Bypass and Greensborough Road are likely to have a reduction in traffic volumes, greater priority can be given to local access. On this, it is logical that reduced traffic demands will support a requirement to re-allocate green time to manage network changes which increase travel distance for local residents. This will however need to be considered more broadly in the context of local impacts identified on Watsonia Road where increases in travel demand are forecast under the 'with project' scenario under the link-based strategic model, as the mitigations proposed to respond to increased traffic demand on Watsonia Road could be undermined by this change.

It is noted that level of service outcomes for Elder Street improve under the 'With Project' outcome compared to the 'No Project' outcome even though the left turn slip lane is proposed to be removed. This assessment is important to ensure the impact on local access is maintained or preferably enhanced. In relation to Watsonia Road, it was acknowledged with the project team that the coarseness of the strategic model, which excluded allowance for localised parking and access in and around the Watsonia Activity Centre and Railway Station, did not allow for side friction and capacity impacts associated with these activities. In this regard, it is likely that the strategic model is over-estimating the attractiveness of Watsonia Road as a route between Grimshaw Street west and Greensborough Road. It was considered prudent to perform a strategic model sensitivity test which accounted more fully for the intersection constraints at either end of Watsonia Road and the effects of the Watsonia Activity Centre and Railway Station.

Recommendation #1: A sensitivity test for Watsonia Road be considered which reflects the attractiveness of this route between its intersection with Grimshaw Street and Greensborough Road.

Lower Plenty Road interchange

The Lower Plenty Road interchange will require local access to be reconfigured for several streets as outlined in Figure 9.3 and Figure 9.4, to limit 'rat running' and to support safer traffic flows onto the corridor. A northbound service lane will be built parallel to Greensborough Road between Edward Street and Sydney Street. The streets impacted are primarily residential, however, several businesses are impacted including a medical centre, a small shopping strip on Strathallan Road and to an extent, Macleod College. The TTIA includes an estimate of the increased travel time required by this change to local access, however, it does not provide an assessment of whether the local traffic redistribution can be accommodated on the network.

Figure 9.3: Lower Plenty Road, existing road network[12]

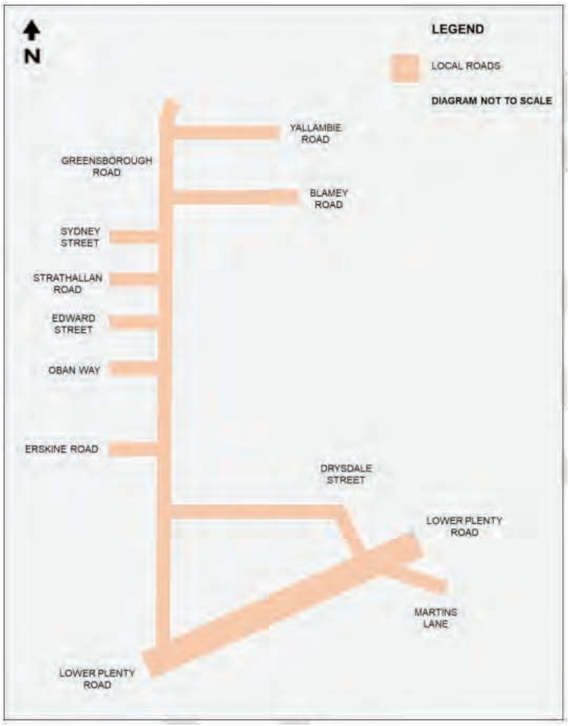
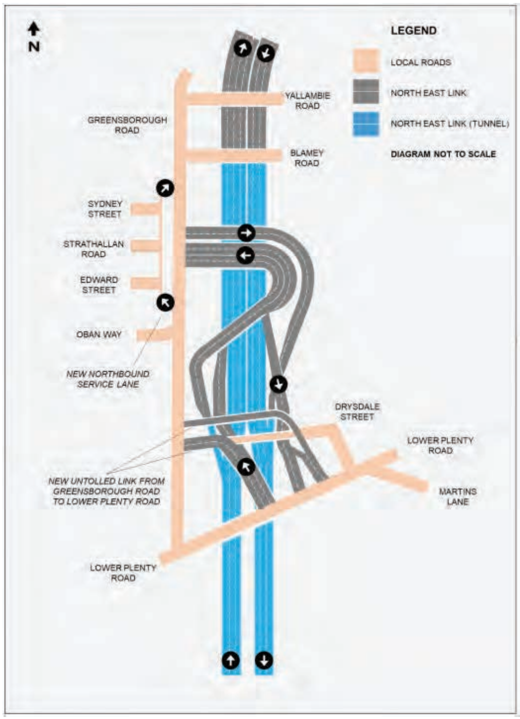


Figure 9.4: Lower Plenty Road access, project scenario[13]



The TTIA outlines that local traffic wanting to travel southbound on Greensborough Road will be required to divert to either Erskine Road or Torbay Street.

Torbay Street is currently governed by a left-in / left-out arrangement at Greensborough Road, with a median restricting right turns to travel southbound on Greensborough Road. The TTIA outlines that the median will be removed to facilitate right turns. Consideration should be given to including an auxiliary lane for right turn entry from Greensborough Road.

Erskine Road is projected to have an increase in traffic volumes following the implementation of the project. In response, the TTIA provides an assessment of the practical absorption capacity of Erskine Road to accommodate traffic accessing Erskine Road from the side streets. The assessment concludes that 120 vehicles per hour can turn right onto Erskine Road. This is likely to be enough to cater for increased demand from vehicles rerouted in response to the local access changes.

Increase in traffic volumes surrounding Lower Plenty Road Interchange

Erskine Road, Chapman Street, Carwarp Street and Ruthven Street are projected to experience an increase in traffic volumes following the implementation of the project. The resulting daily traffic volumes on these streets is approximately 9,000 – 13,000 vehicles per day, as shown at Table 9.1.

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[12] (Traffic and Transport Impact Assessment, p. 353)
[13] (Traffic and Transport Impact Assessment, p. 354)

Table 9.1: Erskine Road / Chapman Street / Carwarp Street / Ruthven Street average daily traffic volumes[14]

	Average daily traffic volumes	Change in traffic volumes from existing
Existing – 2017	7,000 – 9,000	
No Project	8,000 – 11,000	+1,600
With Project	9,000 – 13,000	+2,300

Demands shown in Table 9.1 indicate that the function and role of the select road system develops from a connector street classification to a higher support movement function more consistent with a sub-arterial road.

On this changing role, Erskine Road offers a geometric typology which can sustain such traffic load increases, however other links including Chapman, Carwarp and Ruthven Streets are narrower, with segments less than 8.0m wide and offering the ability for vehicles to be parked on-street kerbside. These geometric typologies are not suitably configured to cater for demands at the top end of the estimated daily traffic range and have the potential to adversely impact on residential uses located along those street sections.

In order to mitigate these potential impacts, it is recommended that the project consider applying traffic management measures which contribute to reducing predicted demands along the select route comprising Erksine Road – Carwarp – Chapman – Ruthven Streets between Greensborough Road and Kingsbury Drive. These measures should look to reduce demand along this route noting that measures which reduce truck or commercial traffic will have a more significant impact than measures which reduce general traffic given allowances for passenger car equivalents.

Notwithstanding the management measure adopted, as a general rule, it would be prudent to implement traffic management measures which deliver traffic demand levels more consistent with the current function of these streets or at least consistent with the forecast ‘no project’ case scenario.

On reviewing the proposed EPRs, EPR T5 provides a framework for ongoing measurement and management of demand levels identified along the Erksine Road – Carwarp – Chapman – Ruthven Streets between Greensborough Road and Kingsbury Drive.

Manningham Road Interchange

Avon Street Truncation

The TTIA outlines that Avon Street will need to be truncated to facilitate the on- and off-ramps from the Manningham Road / Bulleen Road interchange. The TTIA provides commentary on how residents of Avon Street can access Bulleen Road via Manningham Road, with access from York Street or via Austin Street. Both options increase travel distance measurably, noting that access at York Street onto Manningham Road is limited to left-in / left-out and access from Austin Street onto Bullen Road is limited to the same extent.

A review of plans prepared for the project indicate that there may be an opportunity for left-in / left-out access for Avon Street at Bulleen Road. It is recommended this option is explored before a complete truncation of Avon Street is adopted.

Acquired Land Around Manningham Road Interchange

Section 10 of the TTIA presents an indicative construction work zone over the industrial properties between Bulleen Road, Manningham Road and the on- and off-ramps. It is not clear from the TTIA what the likely ultimate land use will be for the acquired properties, therefore it is difficult to make an informed assessment of the likely local access impacts

[14] (Traffic and Transport Impact Assessment)

of the interchange on these sites. However, given the complexity of the interchange and the restriction in movements required to simplify the interchange, the accessibility of this land will need to be configured in a way which suitably respects the operational function of the project. At this stage, it would be premature to establish traffic access principles for this land parcel. In this regard, it would be more suitable to consider access arrangements once a land use has been identified.

Figure 9.5: Bulleen Road access for existing road network[15]

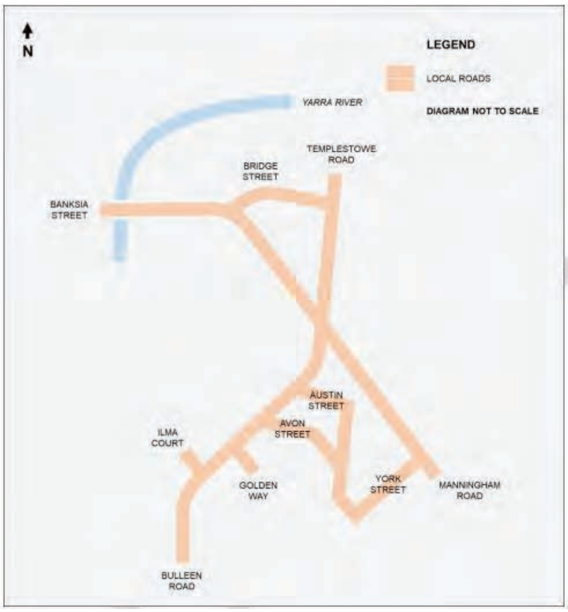
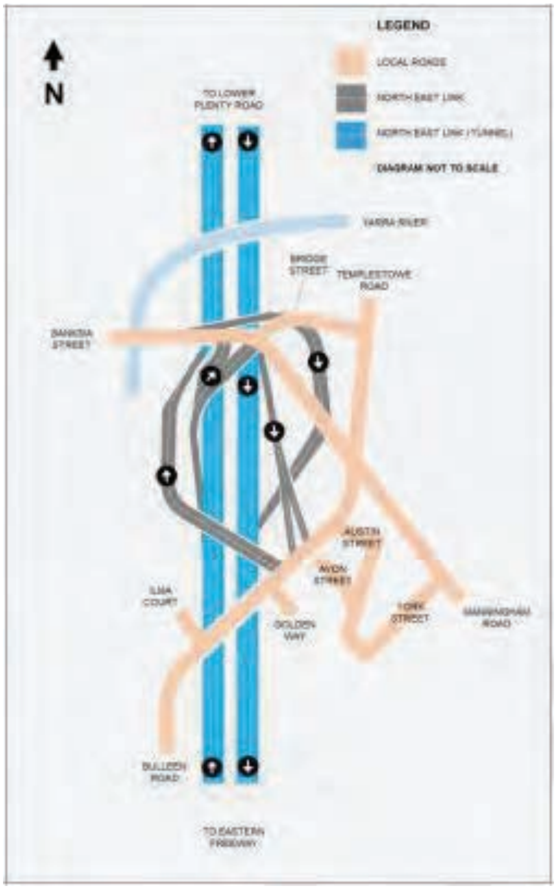


Figure 9.6: Bulleen Road access for the project scenario[16]



Recommendation #2: It is recommended the TTIA and Reference Design explore left-in / left-out arrangements to and from Avon Street at Bulleen Road.

Design Response – Movement & Place

Scoping Requirement 30 requires the TTIA assess the consistency with transport and urban plans including the VicRoads Movement and Place Framework. Movement and Place is an approach that recognises *"that a street can*

[15] (Traffic and Transport Impact Assessment, p. 351)
[16] (Traffic and Transport Impact Assessment, p. 352)

perform two functions: as a movement conduit and a place, a destination in its own right"[17]. It is intended to be used to establish the strategic role of a link, balancing the need for movement and accommodating its destination requirements. Road and street design should then reflect the strategic role of a link within the wider network[18].

Section 9.2.3 of the TTIA includes a table of four streets that are proposed to have their 'General Traffic' functions downgraded from streets with regionally significant traffic function to streets with moderate traffic function providing access to municipal level places.

The proposed outcome is supported by this peer review, including the downgrade of Greensborough Road noting however that any downgrading of Greensborough Road should consider (beforehand) a sensitivity test of likely traffic demands on Watsonia Road, allowing more specifically for present day operating patterns within the Activity Centre and access to public transport infrastructure. This requirement has been captured at Recommendation #1.

More broadly, it is important that any potential downgrade of Greensborough Road does not have an unintended consequence of amplifying the attractiveness of Watsonia Road as a *'through-route'* between Grimshaw Street and Greensborough Road.

9.2.1. Resilience and Redundancy

Section 9.2.5 of the TTIA relates to an assessment of network resilience and redundancy. The EES Scoping Requirements lists network resilience and redundancy as a key issue to be addressed through the project. Also, a key objective of Infrastructure Victoria's 30-year plan is to improve the resilience of critical infrastructure and more specifically to develop a multi-modal transport contingency plan, to maintain access on key transport corridors in the event of disruption. [19]

Peer reviewer expectations

It is expected that this subsection would present the results of an evaluation on redundancy and resilience of the network.

What does network resilience and redundancy mean?

The terms resilience and redundancy represent different characteristics of a transport system; however, they are often used either in conjunction or interchangeably. For the purpose of this peer review, definitions of these terms are taken from Austroads and VicRoads guidance.

Redundancy	The AustRoads Glossary of Terms defines redundancy as the existence of more than one means for accomplishing a given function within a system. Each means of accomplishment of the function need not necessarily be identical.[20]
Resilience	The VicRoads Managed Freeways, Freeway Ramp Signals Handbook defines resilience as the ability to perform under stress and absorb a 'shock' as well as the ability to recover in the event of failure. It also states that the degree of resilience also relates to the rate at which the system returns to a steady state following the cause of a disturbance.[21]

Redundancy can be evaluated by both a qualitative assessment of the road network, and quantitatively by using a screen line assessment at the *'weakest points'* of the network. In the

[17] VicRoads https://www.vicroads.vic.gov.au/traffic-and-road-use/traffic-management/smartroads.
[18] (Movement and Place - Overview, 2018)
[19] (Victoria's 30-year Infrastructure Strategy, 2016, p. 208)
[20] (Austroads Glossary of Terms, 2015, p. 120)
[21] (Managed Freeways, Freeway Ramp Signals Handbook, 2013, p. 31)

	north east arterial network, capacity is most constrained along the Yarra River screen line. A comparison of 'with project' and 'no project' traffic volumes along the Yarra River screen line will provide an understanding of whether the network has theoretical capacity to provide alternatives for travellers and continue to function during events such as disasters, shut-downs or crashes. Network resilience should be assessed by modelling the network's response to a *'shock'*. An example of this approach is to simulate the closure of one lane in the NEL project corridor, maintaining peak demands, and assess the network's response.
TTIA approach	The TTIA does not provide a definition for network resilience and redundancy. It assesses the concept in terms of capacity across the Yarra River screen line, and by reviewing the capacity in the network during a night time closure of the NEL. It also assesses resilience and redundancy by determining the impacts of a southbound lane closure on Rosanna Road between the 'with project' and 'no project' scenarios. The TTIA states that overall reliance on the north eastern arterial network is anticipated to reduce with the construction of the NEL. Network Resilience The TTIA states that the Eastern Freeway and the NEL will both be operated as fully-managed motorways with features including ramp metering, lane use management signs (LUMS), incident detection, variable message signs (VMS), closed-circuit television (CCTV) coverage and pavement detection studs. This will enable NEL to be more responsive to shocks such as flow breakdown, heavy congestion or incidents. This increased responsiveness results in a more resilient freeway network, as the freeway is more likely to be able to perform under stress.
Summary of peer review findings	The TTIA does not set out a specific methodology for assessing network resilience but provides a range of examples as they relate to both the 'with project' and 'no project' outcomes. These examples are helpful and demonstrate that the delivery of the project will assist with delivering network resilience and redundancy.

9.2.2. Interactions with Other Projects

Section 9.2.6 of the TTIA relates to understanding the NEL's interactions with other projects.

Peer reviewer expectations	It is expected that this subsection would specify any interactions with key projects that are likely to impact travel behaviours or land uses in the project study area. The appropriate methodology to capture and assess this impact is through the project's inclusion in the strategic model.
TTIA approach	The TTIA presents a table of six projects that are likely to interact with NEL, and outlines whether they are included in the 'no project' and 'with project' cases. Where the project has not been included in the model, it has been included as a sensitivity test. Section 8.1.2 of the TTIA also lists key projects in the 2036 network models.
Summary of peer review findings	The projects nominated within the TTIA at Table 9-12 of the TTIA are consistent with those the peer review would expect to see. Other projects including the grade separation of level crossings within the north-east study area would be worth modelling. Examples which could be considered include the Grange Road, Alphington and Lower Plenty Road, Rosanna. Both these projects would improve the 'no project' and 'with project' Scenarios and improve overall network performance. Given the coarseness of the strategic model however, changes in network trip patterns are likely to be small. As a consequence, allowances for these network changes are unlikely to be substantive.

9.2.3. Crash Assessment

The findings of the peer review on crash assessment within the local study area will be discussed at Section 9.8 of this report.

9.3. Project Corridor Assessment

Section 9.3 of the TTIA assesses the peak period traffic volumes for the 2036 'with project' case. The EES Scoping Requirements establish the need to provide transport connectivity across the northeast of Melbourne and to integrate the project with the existing or modified transport network transport. The relevant scoping requirements that this section of the TTIA ought to address in this regard are outlined below:

Relevant EES Scoping Requirements

Key issues	
3	Transport connectivity and capacity across the northeast of Melbourne, including network resilience and redundancy.
Design and mitigation measures	
16	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network, including any proposed solutions to accommodate placarded and over-dimensional vehicles.
Assessment of likely effects	
20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.
21	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to predicted travel time and vehicle movement outcomes, including performance at the project's interchanges and key intersections adjacent to the proposed alignment

Peer reviewer expectations

Performance criteria

In optimising the design of the corridor within the network, it is expected that the TTIA would present an assessment on what performance metrics are used to determine whether performance is acceptable.

Results of predictive modelling – corridor performance

To address Scoping Requirement 20, it is expected that the TTIA would outline the results of the predictive modelling for the project corridor, including details of the predicted travel time metrics, performance metrics (Speeds, Level of Service, Queue Lengths) at the key interchanges and intersections.

It is expected the results would be used to demonstrate the transport capacity and redundancy provided by the project to address Scoping Requirement 3.

Traffic demands

The TTIA should also outline, to the extent practicable, the traffic demands used to assess the performance of the freeway sections, interchanges and intersections.

Design and mitigation measures

To address Scoping Requirement 16, it is expected that the TTIA would include a description of the proposed transport network design features at each of the existing interchanges and intersections required to accommodate the projected traffic demands.

TTIA approach	**Performance measures** Section 8.3 of the TTIA outlines that both freeways and intersections are designed to operate at a Level of Service D or better in peak periods. It uses density-based Level of Service (LoS) outputs for the freeway road segments based on the Highway Capacity Manual 2010 (HCM2010), for segments with a posted speed limit of 100km/h or above, with vehicle speeds being used as a measure for all other segments. Delay-based LoS classifications are used for interchanges and arterial road intersections, again from HCM2010. **Results of predictive modelling – corridor performance** The TTIA focuses on both the freeway sections and the interchanges along the corridor. Two separate models have been prepared representing the Eastern Freeway and the NEL corridor, so the results are presented for both corridors separately. The TTIA presents outputs for the freeway sections, using LoS and average speed outputs and the intersection performance using LoS metrics. Peak Period Traffic Volumes: The sectional volumes on the freeway sections were provided. These were provided as a range for the various midblock sections, on ramps and off ramps. Approach volumes were also provided in Appendix D of the report at each of the assessed intersections. Peak Period Traffic Speeds: The average travel speeds have been provided with a comparison on the Eastern Freeway and M80 connection for both the 'with project' case and 'no project' case. These have been provided for freeway sections only. Peak Period LoS: The peak period LoS has also been provided for both the freeway sections, the interchanges and intersections. The freeway sections were calculated using densities and the intersection LoS was calculated by the approach delay. Appendix D: More detailed outputs for the freeway and intersection performance were provided in Appendix D which included the delay value (in seconds) and the 95th percentile queue length (in metres). **Traffic demands and design and mitigation measures** The TTIA includes schematic diagrams outlining the proposed corridor including the projected traffic demands on each link within both peak periods. The Reference Design provides additional detail on the design features of the project.
Summary of peer review findings	**Performance measures** Whilst density-based and delay-based LoS metrics are common practice within transportation engineering, the use of vehicle speed as a measure of performance is less common. However, comparing modelled speed to sign-posted speeds still provides an indication of traffic flow performance and enables an adequate assessment of performance.

	Results of predictive modelling – corridor performance The TTIA demonstrates that the project achieves LoS D or better in both peak periods, and on balance, the network achieves higher LoS results in the 2036 'with project' case when compared to the 'no project' case. It was also identified that the LoS in some locations improves between the 'no project' and 'with project' cases, even though increases in traffic volumes are experienced and mitigating works are not discussed within the TTIA. Comment on the rationale and reasons for these observations is provided below in the expanded findings discussion. **Peak Period Traffic Volumes** Peak period traffic volumes have been provided for the freeway sections and ramps within the body of the report, whilst approach flows have been provided at Appendix D. A breakdown of the heavy vehicles versus light vehicles for the intersections is not provided in detail within this section, although it is noted that this can be ascertained elsewhere in the report. **Traffic demands - capacity constraining** Section 4 of the TTIA discusses the capacity constraining process and how this was applied. A summary is also provided on the number of links contained in the model which were modified to account for this change and the degree or magnitude of change. It can be observed from that summary that most of the links in the model did not undergo any capacity constraining modification. In some cases where changes are at the higher end of the scale (in relative terms) GTA sought clarity on which links were affected and the rationale for the applied constraint on these links. Commentary is provided on the peer review findings in the expanded section below. **Design and mitigation measures** Further clarity is recommended around the Reference Design and assumptions used in analysis, particularly around signal changes.

A further discussion on the peer review findings is outlined below.

Performance measures

Initially, the methodology for extracting and calculating performance measures from the model was not adequately explained within the TTIA report. However, the methodology is outlined in Section 8.3.1 of the TTIA. GTA considers that this has now been addressed noting two initial examples which were cited include:

- Microsimulation models are not able to report on the 95th **percentile queue lengths**. GTA's review of the model suggests that the queue has been recorded for every minute of the simulation and the queue has been calculated outside of the model. This methodology was not originally documented in the TTIA but has subsequently been incorporated and clarified.
- The **Level of Service** is based on the approach delay to an intersection, which is consistent with industry practice. GTA's review of the model indicates that this has been undertaken using stop line counters rather than intersection nodes under alternate industry practice. The peer review is satisfied that the alternate approach is acceptable.

Results of predictive modelling – corridor performance

As outlined earlier, the LoS in some locations improves between the 'no project' and 'with project' cases, even though increases in traffic volumes are experienced and mitigating works are not outlined within the TTIA. To explore the validity of these outcomes, GTA performed a review of a sample of these intersections.

This assessment was completed by reviewing the approach volumes and LoS results located in Appendix D of the TTIA. It is important to note when reviewing these results that the intersection statistics have been obtained from a microsimulation model, rather than intersection modelling software such as SIDRA. Microsimulation modelling does not model intersections in isolation but rather the network as a whole. This, however, means that when reviewing intersection results in isolation there is a level of interpretation that is required by the reviewing practitioner, as one intersection can be impacted by other interactions within the wider network.

GTA's review found that, of the sample of intersections assessed, the results were consistent and logical with those reported. There were primarily four reasons which explain the observed results:

1. Additional lanes provided more capacity on individual intersection approaches.
2. Increased capacity of opposing movements or grade separation for opposing movements at intersection allows for a reallocation of green time to the approach in question, thereby increasing capacity.
3. Queue spill back in the 'no project' case due to limited capacity downstream on the network.
4. Change in origin-destination patterns due to the introduction of NEL:
   - The shift in demands result in lower demands upstream, in turn eliminating queue spill back which affects upstream intersections. This, for example, is evident at the Burke Road off ramp which has more demand northbound on Burke Road. This results in queueing from MacArthur Road and affects the operation of the interchange.
   - It has also been identified that lane utilisation may change due to a change in route choice which occurs with the introduction of NEL.

Traffic demands – capacity constraining

Section 4 of the report discusses the capacity constraining process and how this was applied. A summary is also provided on the number of links contained in the model which were modified to account for this change and the degree or magnitude of change. It can be observed from that summary that most of the links in the model did not undergo any capacity constraining modification.

Notwithstanding, GTA sought clarification on those links where the greatest changes were made. A list of road links was provided to GTA with commentary confirming that on most links, predicted demands exceed practical lane capacities as well as up-stream and downstream constraints which will metre demand on the network. From the summary it was observed that less than 5% of links were constrained in the largest category amount in the AM peak and PM peak. The rationale for these adjustments on review is considered reasonable allowing for the scale of the modelled network.

Design and mitigation measures

Scoping Requirement 16 requires the TTIA describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network. The Reference Design demonstrates how the project may integrate into the wider transport network. The TTIA also references that traffic signals will require re-phasing. Enquiries made with the project team (SmedTech) indicate that the project corridor assessment included traffic signal re-phasing where emphasis was placed on network optimisation, coupled with recognition of the function and role of links on the broader road network. The proposed methodology is considered satisfactory.

9.4. Travel Time and Accessibility Changes

Section 6.2.4 of the TTIA outlines six key routes in the north east for a travel time assessment. These routes were surveyed in 2017 to establish a baseline travel time for comparison against future scenarios. In Section 9.4 the TTIA continues the assessment by presenting the modelled travel times under future scenarios in 2036 and provides discussion around the changes resulting from NEL.

The relevant scoping requirements that this section ought to address are outlined below:

Relevant EES Scoping Requirements		
	Key issues	
	4	Changes to local and arterial traffic distribution in the northeast of Melbourne.
	Priorities for characterising the existing environment	
	11	Describe the elements of the road-based transport system including road, public transport, pedestrian and bicycle movements in areas affected by the project.
	Assessment of likely effects	
	20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.
	27	Accessibility and safety for pedestrians at road junctions and community facilities.
	28	Connectivity, accessibility, function, experience and safety for cyclists and pedestrians including use of existing and new shared paths, bridges and on-road bike paths.

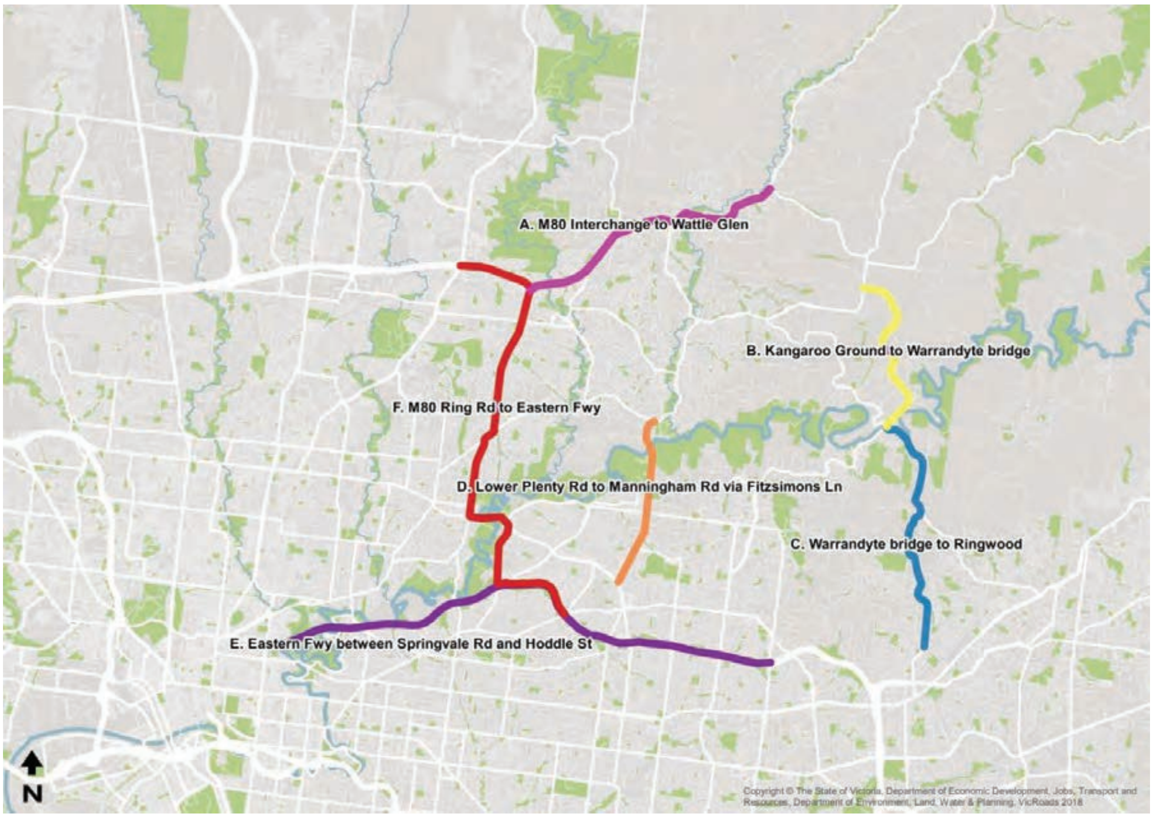
Peer reviewer expectations	**Travel Time Changes** Given that an earlier section (6.2.4) of the TTIA outlines current travel times, it is expected that Section 9 of the TTIA would present a summary of modelled travel times under future scenarios, both under the 'no project' and 'with project' scenarios. It is also expected that the TTIA would provide discussion around changes in travel time on key links and between key origins and destinations for each individual transport mode, supported by discussion outlining the positive and negative impacts of the project. **Accessibility Changes** It is expected that this section should discuss the accessibility impacts of the project at a strategic scale (i.e. across metropolitan Melbourne), corridor scale (i.e. along the project's alignment) and local scale (i.e. on key road links, interchanges and intersections adjacent to the proposed alignment), supported by the travel time analysis.
TTIA approach	**Travel Time Changes** The TTIA outlines the road-vehicle-based travel times under current conditions and under both the 'no project' and 'with project' scenarios along the project corridor via North East Link and along the 'parallel corridor' Greensborough Road – Rosanna Road – Bulleen Road arterial road link. The TTIA also outlines some travel time impacts on other key links (as identified in section 6.2.4) and provides a comparison of travel times between existing conditions and the two future scenarios. The TTIA outlines a delay-based approach to Level of Service (LoS).

	Accessibility Changes The TTIA provides an overview of car-based accessibility from three locations in Melbourne's north / north-east, showing contour plots of average travel times in both the morning and evening peaks for both the 2036 'with project' and 'no project' scenarios. This allows a strategic-level comparison of overall accessibility across the network from a range of locations in north-east Melbourne. The TTIA also presents contour plots showing the proportion of Melbourne's total employment within 45-minute car or public transport trip in the morning peak hour. It is noted that accessibility is also covered briefly in section 9.7.2 of the TTIA, with respect to local accessibility for pedestrians and cyclists.
Summary of peer review findings	**Travel Time Changes** • There is limited discussion on the impact of the project on walking, cycling or public transport travel times, particularly in local areas and routes in the vicinity of the project corridor and between key trip origins and destinations. • There is limited discussion on the impact of the project on travel times along other road links, including key local roads. • There is limited discussion on the changes in travel times at key intersections and interchanges in the vicinity of the project corridor. **Accessibility** • There is limited discussion on the impact of the project on road, walking, cycling or public transport accessibility, particularly in local areas and routes (noting some discussion is provided in other sections).

Travel Time Changes & Accessibility

The section provides a high-level travel time assessment along a number of key routes for car-based travel. These routes are outlined in Figure 6-26 and have been reproduced below.

Figure 9.7: Key travel time routes analysed in the TTIA (reproduced from Figure 6-26)[22]



As shown, these routes are focussed on key north-south arterial road segments in the north-east of Melbourne, except for the Eastern Freeway and M80 / Greensborough Bypass.

For the six routes outlined above, the TTIA provides an adequate assessment of the expected changes in travel time between current conditions and the 2036 'No Project' scenario, as well as the changes between the 2036 'No Project' and 'With Project' scenarios. Discussion is provided to support the findings of the analysis.

Notwithstanding this, assessment of changes in travel time for other key east-west routes is not provided. This makes it difficult to understand the impacts of the project on the road network at locations other than those outlined, including key local and arterial roads both in the vicinity of the project corridor (local), and more broadly (corridor or strategic).

A quantitative assessment of changes in accessibility and connectivity is also not provided for other modes of transport, other than some high-level metrics on mode share between the *'With Project'* and *'No Project'* cases. For example, no discussion is provided about likely improvements or otherwise of the project on walking and cycling, such as through new links or re-routing. Likewise, there could be a better understanding of how public transport services might be impacted by the project, particularly with consideration to proposed priority measures. This makes it difficult to understand the impacts of the project on other transport modes.

With this being said,

1. There are limitations with the analytic software on mapping direct impacts for active travel and public transport services such as buses. Public transport routes currently on the network have not been specifically assessed and in many cases, routes enter and exit the selected study area making it difficult to do so.

[22] (Traffic and Transport Impact Assessment, p. 117)

2. The project delivers significant improvements to the road-based network's through-put which will improve operation for modes sharing that trafficable road space such as buses.
3. The project delivers an appreciable improvement to connecting and expanding strategic active travel links around the project corridor. In other cases, the project will create barriers for movement and access such as in and around Watsonia Station.
4. Accessibility at locations such as road junctions for pedestrians and cyclists is a detailed design matter and not something the TTIA needs to specifically consider in its commentary at this stage of the planning process. It is a matter that must be considered as part of developing the project design, before construction and in consultation with key stakeholders and agencies.

Given the foregoing, it will be important that adequate consideration is made on the impact of the project on both public transport and active travel including walking and cycling as detailed design plans are developed for the project. The peer review is satisfied that these impacts can be satisfactorily addressed as part of select EPRs. A review of those requirements reveals that each of these matters can be satisfactorily addressed via EPRs T1 and T2. In relation to EPR T1 it can be specifically observed that in relation to walking and cycling that the project under the operation phase:

- *"Maintain, and where practicable, enhance pedestrian movements, bicycle connectivity, and shared use paths"*

On this criterion, the peer review is satisfied that the proposed design will be satisfactorily optimised noting that the preamble to this requirement sets out a need to consult with the relevant agencies and stakeholders. This consultation will be important to ensuring the EPR is met and an appropriate and balanced outcome is achieved.

By way of extension, EPR T1 also requires the project delivery team to:

- *"Develop a strategy with Public Transport Victoria to minimise impacts on buses, trams and rail and, where practicable, enhance public transport facilities and services that cross or run parallel to the alignment of the North East Link"*

Accordingly, the peer review is satisfied that travel times and accessibility requirements contemplated by the Scoping Requirements for public transport and active travel can be met satisfactorily.

9.5. Freight

Section 9.5 of the TTIA relates to an assessment of freight impacts. The relevant scoping requirements that this section ought to address are outlined below:

Relevant EES Scoping Requirements		
	Key issues	
	5	Effects of the redistribution of freight and heavy vehicle traffic including placarded and over-dimensional vehicles in the northeast of Melbourne and implications for residents, residential areas and businesses during construction and operation.
	Design and mitigation measures	
	16	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network, including any proposed solutions to accommodate placarded and over-dimensional vehicles.
	Assessment of likely effects	
	22	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to (as bullet point): the redistribution of traffic, including trucks and placarded vehicles, on the regional and local road network.

Peer reviewer expectations	**Freight redistribution** It is expected this section would include discussion on the redistribution of freight due to the project, including changes to freight volumes to address Scoping Requirements 5 and 22, which specifically refers to implications for residents, residential areas and businesses during construction and operations of NEL. **Accommodate placarded and over-dimensional vehicles** It is expected a freight network plan would be included, demonstrating how the project integrates with the wider freight network, including HPFV and placarded and over-dimensional vehicle networks to address Scoping Requirements 5 and 16. **Integrate design into existing freight network** It is expected there would be discussion on design features that demonstrate the project has been optimised to accommodate freight to address Scoping Requirements 16.
TTIA approach	**Freight redistribution** The TTIA has used results from the strategic model to show changes to freight volumes and vehicle kilometres travelled on freeway and non-freeway components in metropolitan Melbourne and the north-east between *'No Project'* and *'With Project'* cases. **Accommodate placarded and over-dimensional vehicles** There is discussion on HPFV access, arrangements for over-height and placarded vehicles, and specific impacts on the Rosanna Road corridor.

	Integrate design into existing freight network The TTIA did not explicitly discuss how the project has been optimised to accommodate freight. However, it outlined that NEL will be designed to SM1600 standard and the Eastern Freeway to 75% of SM1600 standard, and that the project generally will be designed to accommodate A-double trucks.
Summary of peer review findings	**Freight redistribution** The TTIA highlights positive impacts of freight redistribution from the arterial to freeway networks. The TTIA also includes an assessment of the impact to some local streets, where they have been included in the strategic model, but does not outline how the impacts may be mitigated. **Integrate design into existing freight network** The TTIA highlights NEL's positioning within the freight network, however, an approved network map is not available at this time.

Freight Redistribution – Local Impacts

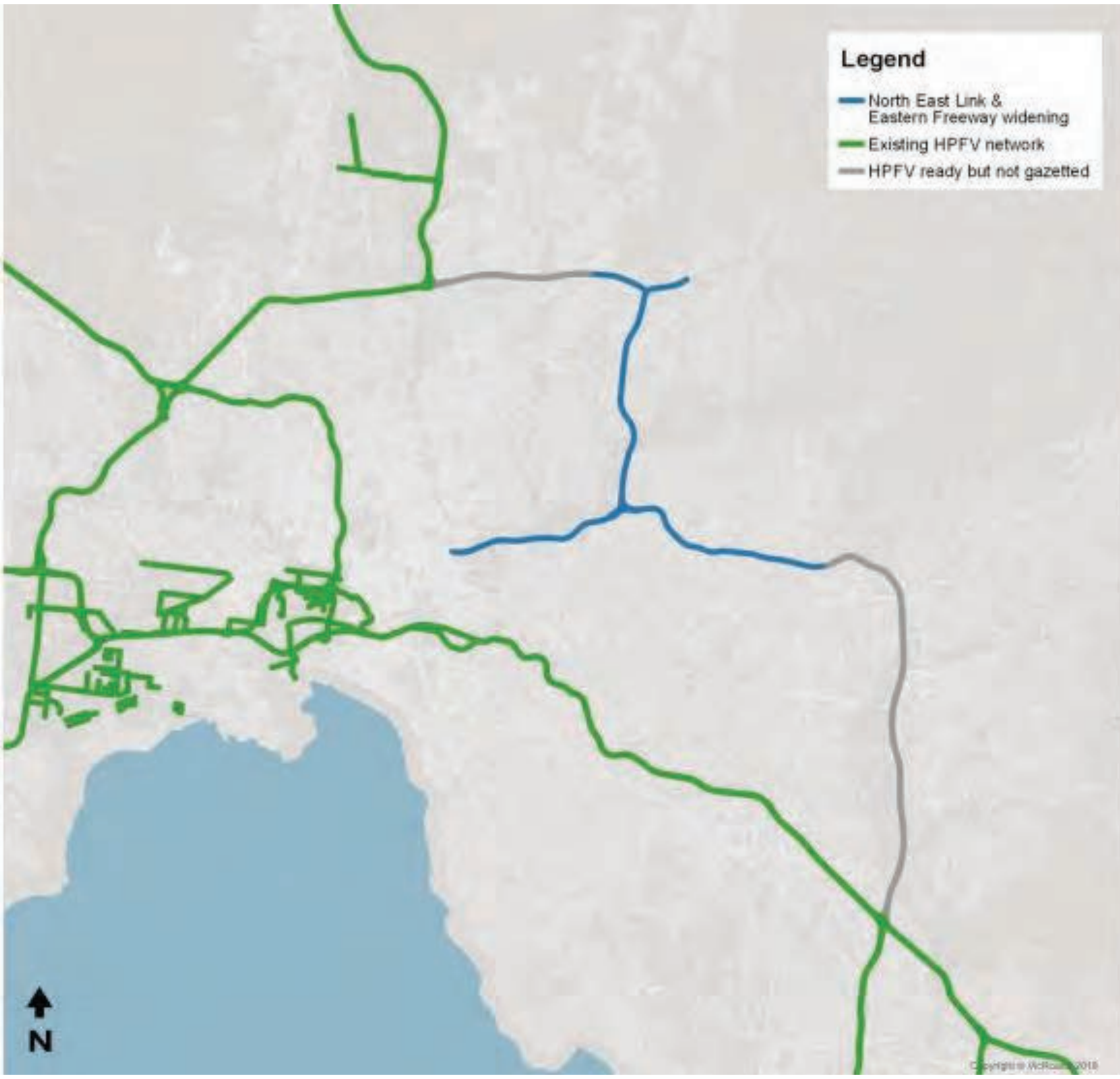
GTA recognises that the TTIA demonstrates the positive impact NEL will have in redistributing freight trips from the local and arterial network onto freeways. However, there are several locations within the local and arterial networks where freight volumes are predicted to increase. The TTIA does not provide an assessment as to whether these changes in volumes are acceptable. The TTIA highlights Erskine Road, which is predicted to experience an increase of 300 trucks per day. The TTIA suggests that as it is a residential street, the impacts for Erskine Road could be mitigated by a VicRoads approved truck ban. Whilst it is not the TTIA's role to mandate specific mitigating treatments, the EPRs need to be robust enough to achieve certain transport outcomes. A review of the drafted EPRs indicates that this issue can be satisfactorily captured at EPR T1 and EPR T5 if predicted demands eventuate.

Integrate Design into Existing Freight Network

The TTIA outlines that NEL is designed to SM1600 standard to allow for use by HPFVs. The TTIA also states that part of the Eastern Freeway will be upgraded to accommodate HPFVs. The TTIA did not initially include a future freight network map, which made it unclear as to how NEL proposes to integrate into the existing freight network.

The TTIA now includes Figure 9-103 (reproduced as Figure 9.8 below) revealing opportunities to complete an orbital, metropolitan HPFV network through delivery of the project. A separate process would be expected to inform the adoption and selection of any modified and updated HPFV network opportunity shown at that figure.

Figure 9.8: Extent of North East Link and Eastern Freeway widening, with existing HPFV network[23]



[23] (Traffic and Transport Impact Assessment, p. 425)

9.6. Public Transport

Section 9.6 of the TTIA contains an assessment of public transport impacts under the 'with project' scenario. The TTIA does not include a specific definition of public transport, only making reference to rail, tram and bus. For the purpose of this peer review report, public transport is defined as rail, tram and bus. Other modes which may typically be considered as public transport, including taxi, car share, bike share will not be discussed.

The EES Scoping Requirements establish the need to contribute to an integrated and sustainable transport system as a key issue to be addressed by NEL. Public transport is a key part of an integrated sustainable transport network. The relevant scoping requirements that this section ought to address in this regard are outlined below.

Relevant EES Scoping Requirements

Key issues		
2	Contribution to an integrated and sustainable transport system, including active transport.	
3	Transport connectivity and capacity across the northeast of Melbourne, including network resilience and redundancy.	
Design and mitigation measures		
16	Describe any potential public transport priority treatments, such as signal priority and tram/bus lanes, to enhance public transport access and uptake and minimise any adverse impacts on traffic and other public transport users' journeys including travel to stops and stations during construction.	
17	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing or modified transport network, including any proposed solutions to accommodate placarded and over-dimensional vehicles	
Assessment of likely effects		
20	Undertake predictive modelling of regional, local and project transport network traffic flows following implementation of the project.	
	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to:	
21	○	predicted travel time and vehicle movement outcomes, including performance at the project's interchanges and key intersections adjacent to the proposed alignment;
27	○	effects on tram, bus and train movements and access to stops and stations;

Peer reviewer expectations

Future public transport network

In order to appreciate the impacts of the project on public transport in 2036, a description of the future public transport network should be presented, which includes broad commentary on:

- Public transport prioritisation
- Interchange and bus stop locations where major change is planned
- Bus route alignments where any change is proposed
- Service frequency increases or decreases
- New or modified park-and-ride facilities
- Changes (if any) to the train or tram network

	Key performance indicators The section should also include an assessment of future public transport performance and include outputs and commentary on: • Appropriate performance metrics and results • Likely reliability improvements or otherwise **Methodology - model outputs** We expect to see an assessment of the model outputs to determine how the project responds to Scoping Requirement 16, which may include an assessment as to: • whether any modelling methodology including traffic signal optimisation has prioritised public transport • whether bus priority measures are included or required to manage impacts of the project. **Access to stations** We expect to see a discussion on the project's impacts to station access, as required by EES Scoping Requirement 27. At a minimum, the following stations / interchanges should be considered: • Watsonia Station • Doncaster Park and Ride
TTIA approach	**Future public transport network** Section 6.6 of the TTIA provides an outline of the existing condition as it relates to public transport provision and accessibility. A route description is provided at Figure 6-77 which provides details of train, tram and bus routes within the study area. Section 9.6.1 of the TTIA provides a broad description of a future public transport network with a focus on the new busway system proposed along the Eastern Freeway (Doncaster Area Rapid Transit (DART) services). This section also provides an outline of the service frequency changes expected as a result of the project. **Key performance indicators** The TTIA provides assessment of future public transport network performance based on: • Public transport speeds • Total service hours • Travel time changes. The TTIA also provides a focused assessment of the DART bus service along the Eastern Freeway corridor. Projected public transport patronage changes were included in this assessment.

	Methodology - model outputs The TTIA does not utilise outputs from the operations models but rather provides outputs from the strategic model. It provided three instances of public transport priority measures which seek to enhance public transport access and uptake. **Access to stations** The project's impact on station access was not initially discussed but has been subsequently updated to include a discussion on access to Doncaster Park and Ride and Watsonia Railway Station.
Summary of peer review findings	**Future public transport network** Based on requirements set out under Scoping Item 16 and 17 this section was, on initial review, considered to require further detail on the proposed provision of bus jump lanes at identified select locations and comment on the project's potential impact or otherwise on the future deliverability of projects within the same study area, such as Doncaster Rail. **Key performance indicators** 1. The section broadly sets out performance impacts on bus services between the 'no project' and 'with project' cases. The outputs rely on the strategic model and it is unclear to what extent intersection performance along bus routes is considered in developing a design solution. 2. There was initially no discussion on impacts to public transport travel time reliability, despite it being a key performance indicator for public transport. This has now been amended in the TTIA. 3. The discussion on mode share and mode shift is broad and a product of limitations associated with the reliance on strategic modelling software for outputs. **Access to stations** 1. The TTIA did not initially discuss impacts to the Doncaster Park and Ride facility shown in the Reference Design. 2. There was initially no assessment or comment of NEL's impact on public transport interchanges and stops where a major change can be expected.

A further discussion on the peer review findings is outlined below. Estimates of future demand for public transport are not considered within this report.

Future Public Transport Network

Section 9.6 of the TTIA sets out the broad public transport prioritisation parameters for the proposed Eastern Freeway busway between the existing Doncaster Park and Ride and Hoddle Street. The section also outlines the provision of queue jumps lanes at the Doncaster Road and Grimshaw Street intersections with the project. It was initially considered helpful that the rationale for the priority bus jump lanes was to be provided in the TTIA. This, amongst other details, have subsequently been addressed at Section 9.6.1 and 9.6.8 of the TTIA.

No specific detail was originally provided on interchange and bus stop provisions where major change can be expected such as Watsonia Station and no comment was provided on whether any bus route, tram or train timetabling changes are planned. This has subsequently been addressed at Section 9.6.8 of the TTIA.

Key Performance Indicators

The assessment of public transport impacts has been completed using the strategic model. The strategic model results show that bus travel times across the study area are projected to decrease.

Given the scale of the network and number of services within the study area, including services which enter and exit the modelled network, this is generally acceptable.

With that being said, it is important that operational modelling prepared for the project consider the impacts of selecting particular public transportation prioritisation measures and where these measures are located. This review would include consideration of output results from the operations model, where intersection delays and other metrics are reported.

By way of example, GTA has completed a review of the Level of Service (LoS) plots for the AM and PM peaks (from the operational model) and found there are several locations along bus routes where buses are likely to experience delays as the LoS on the approach to an intersection is poor (LoS E or F) or decreasing from that available under the 'no project' scenario. These sites are listed at Table 9.2.

Table 9.2: Poor LoS or LoS changes on bus routes between 2036 'with project' and 'no project' cases[24].

Impacted street (approach)	Intersecting street	2036 'No Project' LoS	2036 'With Project' LoS	Impacted bus routes
Ringwood Street (northbound)	Ringwood Bypass	E (PM peak)	E (PM peak)	370, 380, 364, 271
Ringwood Street (southbound)	Ringwood Bypass	D (PM peak)	E (PM peak)	370
Mitcham Road (eastbound)	Springvale Road	F (PM peak)	E (PM peak)	902, 907, 273, 309
Grosvenor Street (westbound)	Surrey Road	F (PM peak)	F (PM peak)	270, 279, 303
Greythorn Road (northbound)	Doncaster Road	D (AM peak)	E (AM peak)	284, 207, 285
Bulleen Road (northbound)	Eastern Freeway	D (PM peak)	E (PM peak)	200
Yarra Boulevard (eastbound)	Chandler Highway	D (PM peak)	E (PM peak)	609

In order to satisfy Scoping Requirement 16, which seeks to ensure that adverse impacts to public transport are minimised, comment has been provided in the TTIA on the acceptability of the project performance at those approaches where a poor LoS (LoS E or F) or deteriorating LoS has been identified between the *'No Project'* and *'With Project'* scenario (refer Section 9.6.4 of the TTIA).

Travel time reliability is a key performance indicator for public transport operation. It is likely that the construction of the Doncaster Busway could result in an increase in travel time reliability, as trips are no longer impacted by entry/exit ramps and incidents on the Eastern Freeway. The final TTIA includes commentary on this issue at Section 9.6.8.

Impact on DART Buses

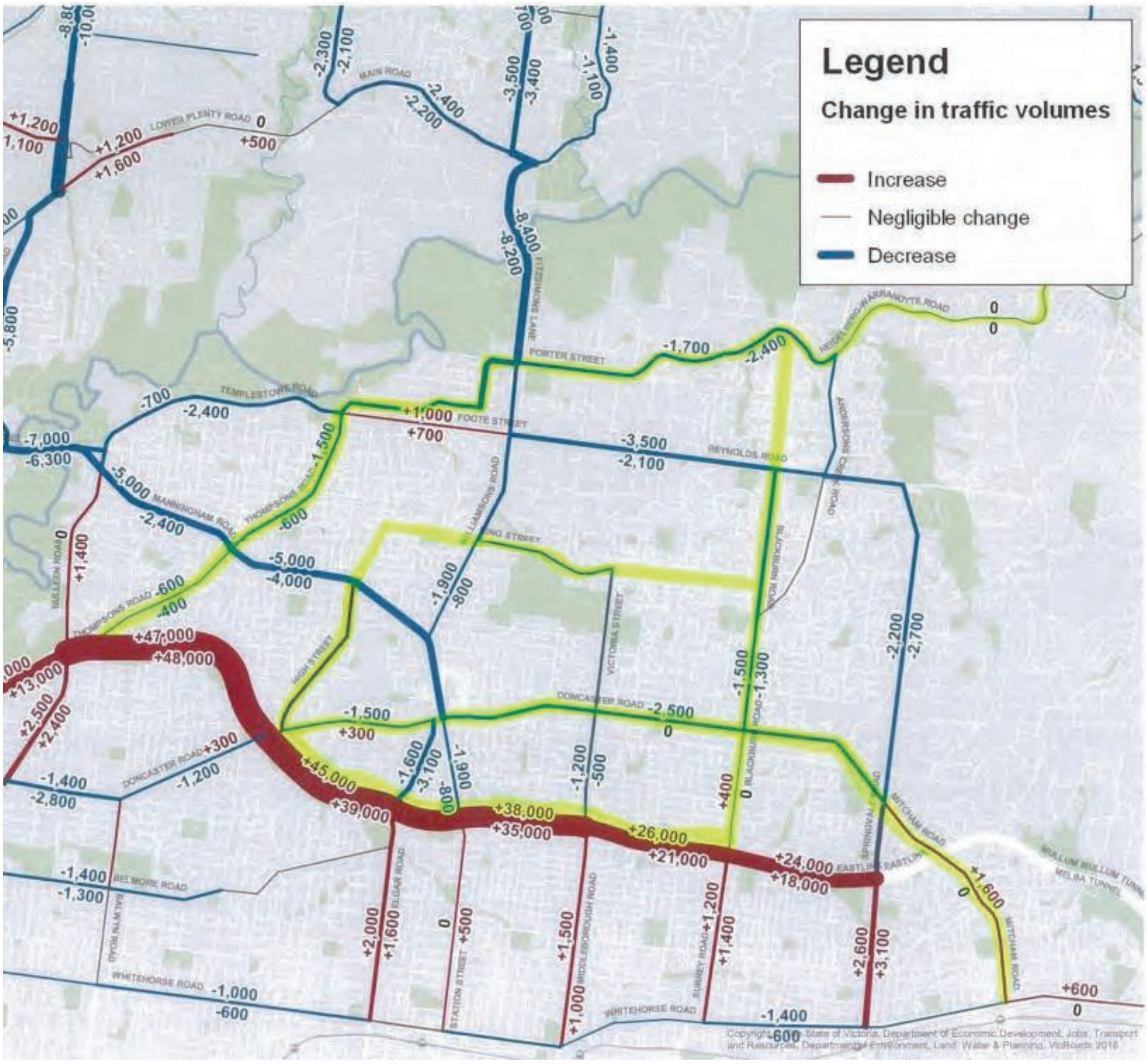
In the TTIA, travel times on the Doncaster Busway are predicted to be approximately 15 to 30 per cent faster in the *'With Project'* scenario. The results are displayed for both the Eastern Freeway segment and the Non-Eastern Freeway

[24] (Traffic and Transport Impact Assessment)

segments. The Non-Eastern Freeway segments include DART services within the inner city and the eastern suburbs, which are predicted to experience travel time savings of up to 15 per cent.

Section 6.3.5 of the TTIA outlines that the greatest delays experienced are due to congestion along Hoddle Street and Victoria Parade. Given traffic volumes are projected to increase on Hoddle Street (by approximately 2%), and at several points on the bus network in the eastern suburbs (as shown in Figure 9.9), it is recommended that bus travel times are monitored following implementation of the project to minimise the potential for delay increases at this part of the network. This requirement can be satisfactorily met by EPR T5 which was revised from a *"Traffic Monitoring"* EPR to a broader *"Monitoring"* EPR which accommodates a wider range of transport modes.

Figure 9.9: Predicted changes in traffic volumes along DART bus routes



Public Transport Interchanges and Stops

The TTIA provides select commentary on impacts at specific bus stops effected by the project in and around planned interchanges. The TTIA was however absent of commentary on the effect of the project at major change areas such as Watsonia Station. Subsequent changes to the TTIA now include relevant commentary at Section 9.6.8 on this issue.

Doncaster and Bulleen Park and Ride Facilities

The TTIA also did not initially address the proposed changes to the Doncaster Park and Ride facility, with no discussion on changes to car parking access or the likely quantum of car parking being provided. Updates to the TTIA now include specific commentary on proposed outcomes on the Doncaster Park and Ride facility at Section 9.6.8, including stating that the number of car parking spaces will be maintained or increased, and that a new access point will be provided on Doncaster Road, west of Hender Street.

Figure 9.10: Doncaster Park and Ride, 2018 'No Project'[25]

Figure 9.11: Doncaster Park and Ride, 2036 'With Project'[26]

The Reference Design includes a new Park and Ride facility at Bulleen. However, the TTIA does not include commentary on how this site integrates with the project or the wider network.

Recommendation #3: Commentary is provided on the proposed Bulleen Road Park and Ride facility including estimated number of car parking bays, general facilities and proposed access arrangements for general traffic and bus traffic.

[25] (Google Maps, 2018)
[26] (Reference project horizontal alignment plans Specialists Issue 3, 2018)

9.7. Walking and Cycling

Section 9.7 of the TTIA provides an outline of the proposed walking and cycling facilities provided as part of NEL, which generally consists of providing a continuous shared path network along the associated corridors and crossing facilities as an extension in support of identified local connections. The TTIA considers walking and cycling as a collective and focuses on the general provision and integration of a 3.0m wide shared path network.

The EES Scoping Requirements establishes the need to contribute to an integrated and sustainable transport system as a key issue to be addressed by NEL. More specifically to walking and cycling, a connected, integrated and optimised network is being sought.

The relevant scoping requirements that this section aims to address are outlined below:

Relevant EES Scoping Requirements

Key issues		
2	Contribution to an integrated and sustainable transport system, including active transport.	
3	Transport connectivity and capacity across the northeast of Melbourne, including network resilience and redundancy.	
5	Effects of the redistribution of freight and heavy vehicle traffic including placarded and over-dimensional vehicles in the northeast of Melbourne and implications for residents, residential areas and businesses during construction and operation.	
6	Connectivity of pedestrian and cycling networks across the northeast of Melbourne and opportunities for future linkages.	
Design and mitigation measures		
17	Describe the proposed transport network design features and approach to optimise and integrate the project with the existing pedestrian and bicycle network, including any proposed solutions to enhance pedestrian and bicycle access in the vicinity of the project.	
Assessment of likely effects		
	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to:	
25	○	local access of the community to residential areas, schools, retail centres, activity centres, community facilities and open spaces;
27	○	accessibility and safety for pedestrians at road junctions and community facilities;
28	○	connectivity, accessibility, function, experience and safety for cyclists and pedestrians including use of existing and new shared use paths, bridges and on-road bike paths;
30	○	consistency with transport and urban plans (e.g. VicRoads Movement and Place Framework, Victorian Cycling Strategy (2018-2028), Plan Melbourne (2017-2050));

Peer reviewer expectations

Future walking and cycling network

It is expected this section would provide a description of the proposed changes to the existing walking and cycling transport network, and how they help achieve an integrated and sustainable transport system, to enable Scoping Requirement 2 and 6 to be addressed.

	Local connection optimisation It is expected there would be commentary on changes proposed at key locations where significant changes to the existing conditions are proposed and the provision of new links will help achieve a connected, integrated and optimised walking and cycling network. It is expected this section would provide commentary on current and future potential user types (e.g. commuters versus recreational cyclists), major trip generators / attractors, transport interchanges and key proximate movement patterns to address Scoping Requirements 25, 27 and 28. **Traffic redistribution impacts** Consideration broadly of the effects of the redistribution of traffic on the resulting walking and cycling network should also be made within this section. This would support the assessment of Scoping Requirement 27.
TTIA approach	**Future walking and cycling network** The TTIA provides an overview of the proposed walking and cycling network improvements (paths, crossings and on-road bicycle lanes) to existing facilities. The proposed facilities generally consist of 3.0m wide shared paths and where practicable, walking and cycling facilities separated. Detail is provided on the proposed new path network for the Greensborough Road corridor, Bulleen Road corridor and Eastern Freeway corridor and how that new path network will connect with the existing path system. **Local connection optimisation** There are various local connections proposed along and across NEL, which will help provide a connected network. The TTIA presents the location of facilities, as well as provides specific references on where linkages exist with other existing trails (refer Figure 9-113). **Traffic redistribution impacts** The TTIA identifies that there can be expected to be some road safety improvements through the redistribution of traffic from local streets (4 per cent reduction with project expected). It also notes the additional shared path facilities increases opportunity for cyclists to avoid sections of roads all together.
Summary of peer review findings	**Future walking and cycling network** As the potential 2036 walking and cycling network has not been established in detail within the TTIA, it is difficult to assess how well the project responds adequately to Scoping Requirement 6. Having said that, the TTIA sets out commentary at Section 9.7 on the *'core'* and *'complimentary'* walking and cycling upgrades proposed as part of the project and how the proposed additions will deliver completed north-south and east-west walking and cycling facilities. Section 9.7.3 also assists with an explanation of how the project responds to strategic connectivity considerations. **Local connection optimisation** Section 9.7.2 of the TTIA sets out a range of observations on local connectivity. The TTIA does not however provide any specific solutions which aim to enhance pedestrian and bicycle access in the vicinity of the project.

	Traffic redistribution impacts The TTIA does not consider the impacts of localised traffic redistribution on pedestrians or cyclists. The TTIA states that intersections adjacent to the corridor are likely to be re-phased to accommodate the increases in vehicles wanting to access the corridor, but it does not consider the specific impact that this may have on pedestrians.

In some cases, the level of detail required to be developed to fully respond to identified Scoping Requirements is outside the material usually developed as part of the EES planning process.

In these cases, a determination must be made on whether proposed EPRs will satisfactorily address and capture design detail such as traffic signal re-phasing and the like.

Future Walking and Cycling Network

It is expected as the design evolves, further consideration is given on understanding how the walking and cycling facilities proposed by the project are integrated with proposed strategic walking and cycling routes in conjunction with government and the community.

The proposed walking and cycling facilities outlined in the TTIA generally consist of 3.0m wide shared paths. The safety and operational issues associated with shared use paths is broadly acknowledged within the transport industry. Both Victoria Walks and VicRoads have produced material on the safety and amenity issues associated with shared use paths and express a desire for implementing separated facilities for pedestrians and cyclists wherever possible [27] [28]. The TTIA recognises the need to consider the delivery of separated facilities on the network. The peer review recognises the importance of this pursuit in and around major destinations and attractors where demand volumes may warrant such an approach.

Local Connection Optimisation

The walkability of a network is a function, in part, of its permeability[29]. Freeways are by their nature barriers to permeability, as they can only be crossed by pedestrians and cyclists where facilities are provided. Therefore, the spacing of the connections across the freeway, and the existing networks they link into, are important when seeking to reduce severance impacts of a freeway. As such, it is recommended that catchment assessments be prepared prior to completing any detailed design, to determine the optimal locations for pedestrian and cyclist bridges unless other planning disciplines (i.e. urban design peer reviewers) have satisfactorily addressed this in their reports. The peer review is satisfied that this requirement can be resolved and addressed under EPR T1 where sub-point four requires an optimised design to:

- *"Maintain, and where practicable, enhance pedestrian movements, bicycle connectivity, and shared use paths."*

Traffic Redistribution Impacts

Section 9.3.3 of the TTIA outlines a LoS assessment along the project corridor, including at freeway interchanges and signalised arterial road intersections. The TTIA notes that at signalised intersections, traffic signal times have been "*kept constant between 'no project' and 'with project' scenarios, however the phase times may have been altered to allow for changes in traffic distribution*"[30].

The report subsequently provides an indication of LoS based on delay, reflecting time spent by vehicles at signals. However, the TTIA does not provide an assessment of the impacts on pedestrian and cyclists as a result of rephasing for vehicle traffic distribution. This means it is difficult to understand how pedestrians and cyclists may be affected by traffic signals changes to accommodate vehicle movements, and whether they are acceptable.

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[27] (Section 5.1.2 - Design Guidance for strategically important cycling corridors, 2016)
[28] (Shared paths - the issues, 2015)
[29] (Permeability and interface catchment: measuring and mapping, 2017)
[30] (Traffic and Transport Impact Assessment)

By way of example, the signalised intersection of Bulleen Road and Thompsons Road is shown to function with a LoS of 'E' or worse on at least one of the approaches during three of the four modelled peak hours (two morning and one evening peak hours) in the 2036 *'With Project'* scenario (refer Figures 9-72, 9-74 and 9-78 of the TTIA). Given the Level of Service is delay-based, vehicles at the approaches with poor levels of service are expected to experience reasonably long waiting times at signals in the peak hours. This may also impact pedestrians (and cyclists) seeking to cross adjacent to the approaches, particularly given the location is in close proximity to key pedestrian attractors including a new park and ride facility, local shops, a school and residential pockets.

Similar impacts might be found at other intersections with poor LoS approaches and close proximity to key attractors (such as the local shops at Woodhouse Grove at Station Street and Mitcham Road at Springvale Road) or on key walking and cycling trails (such as M80 eastbound off-ramp at Plenty Road and Eastern Freeway westbound off-ramp at Bulleen Road).

Further analysis and consideration should be given to the impacts of re-phasing network signals on pedestrians and cyclists. It would be possible for this analysis to be completed as part of detailed design.

We are satisfied that this requirement can be satisfactorily resolved and addressed under EPR T1 where sub-point four requires an optimised design to:

- *"Maintain, and where practicable, enhance pedestrian movements, bicycle connectivity, and shared use paths."*

9.8. Road Safety

The TTIA addresses road safety impacts of the *'With Project'* case across several sections of the report (Section 9.2.7 and 9.7.4). This peer review has consolidated those sections and will present its findings below. The relevant Scoping Requirements that this section aims to address are outlined below:

Relevant EES Scoping Requirements

Key issues		
5		Effects of the redistribution of freight and heavy vehicle traffic including placarded and over-dimensional vehicles in the northeast of Melbourne and implications for residents, residential areas and businesses during construction and operation.
Design and mitigation measures		
18		Describe traffic calming or other management tools that could be used to modify travel behaviour on the project and local roads such as managed motorway systems, intelligent transport systems, tolls, clearways, truck curfews and bans
Assessment of likely effects		
		Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to:
24	○	traffic safety, given the predicted transport network traffic flows following implementation of the project;
27	○	accessibility and safety for pedestrians at road junctions and community facilities;
28	○	connectivity, accessibility, function, experience and safety for cyclists and pedestrians including use of existing and new shared use paths, bridges and on-road bike paths;

Peer reviewer expectations

In order to address the relevant Scoping Requirements, it is expected that the TTIA would cover the following:

Road safety assessment

A methodology for estimating the potential traffic safety outcomes in the *'With Project'* scenario.

Safe Systems approach

Discussion around how the project aligns with the *"Safe System Approach"* and achieves safe roads and roadsides, safe speeds, safe vehicles and safe road use by all people using the road.

Road safety treatments

Identification of the treatments and management tools that will be adopted as part of the project to achieve a suitable level of safety for all users.

TTIA approach

Road safety assessment

Section 9.2.7 of the TTIA presents the findings of a crash assessment which considers the broad level safety improvements that are projected to be achieved by shifting local traffic movements onto a fully managed freeway network.

The methodology used to estimate the road safety outcomes of the project, whereby a crash factor is applied to the increase in vehicle kilometres travelled, is standard industry practice. It

	is also standard industry practice to apply a crash reduction factor when evaluating specific treatments that are likely to reduce the crash risk posed by existing infrastructure. The crash reduction factor for NEL was sought from the VicRoads Managed Motorways Framework, which provides numerous local and international examples of improvements in road safety outcomes achieved through implementation of managed motorway facilities. The case studies provide a range in the degree of benefits, and the 30 per cent crash reduction sits squarely within that range. Safe Systems approach The Towards Zero Road Safety Strategy, of which the Safe Systems approach is a key tenet, is referenced at the outset of the TTIA. However, the body of the TTIA does not seek to identify alignments between the treatments proposed and the objectives of Towards Zero. Road safety treatments The TTIA methodology suggests that the key road safety benefits of the project are achieved through implementing fully management motorway facilities along NEL and the Eastern Freeway upgrades. This is estimated to achieve a 30 per cent crash reduction, as referenced through the VicRoads Managed Motorways Framework, March 2017[31]. The TTIA also discusses road safety improvements for cyclists in Section 9.7.4 resulting from the provision of additional shared path facilities which will help reduce the need for cyclists to travel on-road and mix with traffic.
Summary of peer review findings	Safe Systems approach The TTIA outlines the road safety benefits that can be achieved through the project, however, the TTIA would benefit from providing a clearer link between the potential outcomes and the framework for achieving the road safety outcomes, but recognise that if an alternate policy position is established post any project approval and prior to detailed design, that new policy is applied to the project. Based on known and available policy, GTA recommend that the Safe Systems approach be relied upon by the project team preparing the project design to ensure that safety outcomes are satisfactorily considered. Road safety treatments The TTIA provides a discussion on the managed motorway facilities proposed for the project, but it does not provide a discussion on road safety treatments and management tools beyond the freeway network. This potential gap can be resolved through applying a Safe Systems approach or potentially any other developed policy which supersedes current practice.

Safe Systems Approach

A network-level approach to road safety improvements, including safety impacts on surrounding local road networks, is expected to be undertaken in the TTIA due to project scale and scope. This network-level approach to road safety improvement should employ the Safe Systems approach, the aim of this approach being to achieve safe roads and roadsides, safe speeds, safe vehicles and safe road use by all people using the road.

31 (Managed Freeways, Freeway Ramp Signals Handbook, 2013)

The key to providing a safer transport network is understanding at what impact speed vehicle types can cause fatal or serious injuries when collisions occur and developing treatments and management tools to ideally eliminate, but at least minimise the potential of collisions occurring.

While the TTIA does not itself provide detail on indicative treatments proposed across the network and how the proposal seeks to achieve the Towards Zero strategy, these treatments can be developed during the concept and detail design stages in consultation with the community using the Safe Systems Approach methodology.

The peer review is satisfied that the use, adoption and application of this commonly accepted best practice document (at present) is satisfactorily captured within EPR T1.

10. CONSTRUCTION IMPACTS

10.1. Overview

Overview of the Peer Review

Section 10 assesses the potential construction impacts of the project on the road network. It is appreciated that this assessment is predicated on the Reference Design and a range of assumptions (including in methodology and timeline) made at the time of writing. The contractor may propose an alternate methodology which alters some of the impacts associated with the construction of the project.

As such, GTA would expect to see within the TTIA an overview of the likely construction methodology and an assessment with sufficient breadth and depth to satisfy that the project's potential risks and impacts on the community have been identified (and mitigation options considered). The findings within the TTIA should inform EPRs which address how the project can manage and mitigate these risks in later stages of planning, for example, during the preparation and implementation of traffic management plans. It is important that sufficient time is provided to both plan and then implement the identified mitigations, otherwise the impacts could be more significant than estimated.

Relevant EES Scoping Requirements

In assessing the construction impacts of the project, the following EES Scoping Requirements are considered relevant:

Relevant EES Scoping Requirements		
	Key issues	
	1	Disruption to pedestrian movements, bicycle connectivity, public transport, motor vehicle and freight traffic during construction.
	5	Effects of the redistribution of freight and heavy vehicle traffic including placarded and over-dimensional vehicles in the northeast of Melbourne and implications for residents, residential areas and businesses during construction and operation.
	Priorities for characterising the existing environment	
	11	Describe the elements of the road-based transport system including road, public transport, freight, cycling and pedestrian transport networks that might be affected by the project, during the construction and operational phases of the project.
	Design and mitigation measures	
	13	Describe the proposed approach to managing transport network conditions during the project's construction such as any staging proposed to maintain transport system function and the proposed nature and duration of diversions including for pedestrian and cycle links.
	14	Describe the potential routing of spoil transport from tunnelling works and other construction-related transport movements to minimise traffic and amenity impacts.
	15	Describe any potential public transport priority treatments, such as signal priority and tram/bus lanes, to enhance public transport access and uptake and minimise any adverse impacts on traffic and other public transport users' journeys including travel to stops and stations during construction.
	Assessment of likely effects	
	19	Characterise the extent, duration and types of disruptions during the construction phase.
	21	Assess the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to: ○ predicted travel time and vehicle movement outcomes, including performance at the project's interchanges and key intersections adjacent to the proposed alignment;

22	○	redistribution of traffic, including trucks and placarded vehicles, on the regional and local road network;
23	○	effects of traffic management measures on local and arterial roads;
24	○	traffic safety, given the predicted transport network traffic flows following implementation of the project;
25	○	local access of the community to residential areas, schools, retail centres, activity centres, community facilities and open spaces;
26	○	effects on tram, bus and train movements and access to stops and stations;
27	○	accessibility and safety for pedestrians at road junctions and community facilities;
28	○	connectivity, accessibility, function, experience and safety for cyclists and pedestrians including use of existing and new shared use paths, bridges and on-road bike paths;
29	○	the overall geographic distribution and magnitude of changes to travel times and accessibility for road users;
30	○	consistency with transport and urban plans (e.g. VicRoads Movement and Place Framework, Victorian Cycling Strategy (2018-2028), Plan Melbourne (2017-2050)); and
31	○	interactions, including possible cumulative impacts with other relevant projects, for example, the M80 and the Outer Metropolitan Ring Road/E6 developments.

Preamble

Section 10.1 of the TTIA broadly outlines an overview of key construction site segments generating haulage vehicle movements to the road network, while Section 10.2 outlines an overview of proposed haulage routes between the key construction site segments.

Sections 10.3 to 10.5 present a high-level quantification and appraisal of some of the potential impacts of construction activity, within the bounds of the Reference Design and various assumptions (including methodology and timeline).

The various sub-sections of this Section within the TTIA are closely interrelated. For simplicity, GTA's review of this section has been consolidated below into a single summary matrix for Section 10, followed by some supporting discussion.

<table>
<tr><td>Peer reviewer expectations</td><td>
Overview & Section 10.1
It is expected that the TTIA would develop a preliminary understanding of the key construction sites, their likely extents and how they could be reasonably assumed to function with respect to haulage.
This overview should set the tone for the likely order of magnitude of construction activity and potential impacts of the project within the extents of the construction sites and immediate surrounds. This includes the following:

A definition of ‘key construction sites’ and their assumed spatial extents to inform the balance of the section.
An outline of the proposed activity, operation (in terms of hours per day), duration (in terms of timeline) and haulage traffic generation at each of the construction sites, including an indication of the types of vehicles.
An outline of the location and extents of construction sites relative to movement networks, including public transport, walking, cycling, road and freight routes.

</td></tr>
</table>

Section 10.2

It is expected that the TTIA develop a preliminary understanding of the proposed haulage routes and how they could be reasonably assumed to function. This overview should set the tone for the likely order of magnitude of construction activity and potential impacts of the project along the proposed haulage routes, between the construction site bounds and the assumed spoil sites. This includes:

- Identification of potential haulage routes from each of the construction sites to the assumed spoil sites, per EES Scoping Requirement 14.
- Identification of the characteristics, capacity, constraints, abutting land uses and suitability (for freight vehicles) of each of the roads on the routes to inform the balance of the section.
- Alignment of routes with wider polices and strategies (per EES Scoping Requirement 30).

Sections 10.3 – 10.5 - Assessment of impacts

ased on the context provided in Sections 10.1 and 10.2, we also expect to see a broad assessment of the proposed arrangements against the ‘key construction considerations’ outlined below, based on the EES Scoping Requirements.

This includes a definition of what impacts are considered ‘acceptable’, a suitable assessment quantifying the broad impacts of the construction sites (and surrounding areas), haulage routes (and surrounding networks), staging areas, potential closures/diversions and other construction impacts (such as access points), as well as discussion outlining the acceptability of these impacts on:

- Local and arterial roads, including redistribution of cars and trucks on the regional and local road networks (per EES Scoping Requirements 22, 23 & 29)
- Other movement networks, including pedestrian, bicycle, public transport, motor vehicle and freight traffic networks (per EES Scoping Requirements 1 & 11).
- Travel times and vehicle movement outcomes, including at key intersections (EES Scoping Requirements 21 & 29)
- Traffic safety (per EES Scoping Requirement 24)
- Local access to key locations, including residential areas, schools, retail centres, activity centres, community facilities and open spaces (per EES Scoping Requirement 25).
- Public transport movements and access to stations/stops (per EES Scoping Requirement 26).
- Accessibility and safety for pedestrians (per EES Scoping Requirement 27).
- Connectivity, accessibility, function, experience and safety for cyclists and pedestrians (per EES Scoping Requirement 28).

Where impacts have been identified, it is expected that the TTIA contain discussion around the extent, duration and types of disruptions caused by the construction sites to these networks, consistent with EES Scoping Requirement 19.

	This assessment should consider alignment with relevant transport and urban plans and possible cumulative impacts with other projects (per EES Scoping Requirements 30 & 31). Mitigation of impacts Where impacts are deemed to be unacceptable, we expect to see a broad outline of the proposed approach to manage these impacts, consistent with EES Scoping Requirement 13. This includes: • Discussion around the proposed mitigation measures (including traffic management), their proposed staging, duration and interaction with other mitigation measures. • Discussion around the how the proposed mitigation measures satisfy the above 'key construction considerations'. The findings of this process should be reaffirmed in the project's EPRs.
TTIA approach	The TTIA outlines: Overview & Section 10.1: • Assumptions regarding the general location of site segments, two possible tunnel launch site scenarios, broad distribution of haulage vehicles across the network and types of vehicles likely to be hauling spoil. • Estimates of the construction duration and daily construction vehicle trips (in peak quarter) for each site segment under each tunnel launch site scenario. • Estimates of total truck trips across all site segments for each month over the predicted six-year construction period. Section 10.2: • Assumptions regarding broad distribution of haulage vehicles across the network, proportion of contaminated spoil material and potential haulage routes. • Anticipated haulage routes, including general characteristics for some routes and key reasons to exclude various routes. • An estimate of peak haulage volumes along each segment of each route as a daily average (overall and project peak month) for both the northern and southern tunnel launch scenarios. • General discussion around the potential access arrangements for oversize or over-mass vehicles. Section 10.3 – Site-specific construction vehicle impacts • High-level estimate of additional construction traffic impacts on various key roads and broad comparison against capacity on these roads in various periods across the day, including sensitivity testing around the additional construction vehicle trips across an 8-hour spoil haulage period compared to a 20-hour spoil haulage period. • Broad discussion on the ability of these links to accommodate the additional truck movements in capacity terms. • Discussion around potential site access arrangements at various locations. • Broad discussion around potential network upgrades required at various locations.

	Section 10.4 – Location of site compounds Identification of potential site compound locations along the North East Link and Eastern Freeway corridors and their potential access arrangements. A high-level estimate of the number of additional truck movements generated by each site compound and general discussion regarding the ability of the immediate road network to absorb these additional movements. **Section 10.5 – Closures and diversions** Identification of potential short-term and long-term closures for construction activity at specific locations, including the duration and closure type. General discussion around some of the challenges of specific closures, with varying levels of detail in discussion and analysis of traffic impacts and potential mitigating treatments.
Summary of peer review findings	The TTIA could more substantially take account of the: • Impact of construction activity on walking, cycling and public transport networks • Impact of construction activity on traffic, walking and cycling safety • Impact of construction activity on amenity • Impact of construction activity on access to local attractors • Impact of construction activity on travel times • Cumulative construction impacts • Suitability of freight routes • Clear articulation of what is considered an ‘acceptable’ level of impact. • If impacts are found, proposed mitigation measures and whether the impacts are acceptable and if not, how these impacts could be mitigated. Further discussion with respect to these findings is outlined below.

Delivering a project of this scale and scope will have impacts; it is unavoidable. The key to a manageable outcome is in understanding these impacts and implementing appropriate mitigation measures to minimise those impacts and manage the associated risk.

The construction assessment at this early stage of planning requires a range of assumptions, including those surrounding methodology and timeframes. By the time a detailed design is developed, and contractors seek to mobilise, the preferred tender or contractor may well propose an alternate methodology which alters the impacts associated with the construction of the project, including that resulting from design changes, inefficiencies or opportunities for innovation. Notwithstanding this and in our experience, many aspects of construction often remain relatively consistent with information available at the EES stage, with only refinements rather than wholesale changes adopted. For this reason, it is important that the TTIA review implications as thoroughly as practically possible and establish or recommend a clear process in which a framework can be developed to ensure those charged with undertaking a review of the detailed design(s) do so in a manner which aligns with best practice and is consistent with the requirements of the EES process.

At this stage of planning, the role of the TTIA is to provide general indications of likely construction activity, proposals and their associated impacts, based on current information. Construction planning is complex, and the TTIA needs to simplify and distil this complexity and present the key issues of concern and appropriate mitigation measures in a cohesive and comprehensible manner. The TTIA should also be consistent with contemporary traffic management protocols and procedures.

Generally speaking, the key issues in reviewing the impacts of construction activity relate to:

- Routes for construction traffic - both haulage vehicles, general site traffic and workers
- Worksite arrangements, including size and scale and access points and other associated activities (e.g. worker parking)
- Extent of closures of roads, lanes, paths and removal of parking.

These elements can impact on safety, congestion and traffic delay, noise and air quality, as well as create general inconvenience and disruption. To address these impacts and manage project risks, suitable mitigation measures will be required which:

- Address safety issues
- Consider all modes of transport
- Ensure co-ordination between works
- Do not unreasonably impact on transport networks
- Can be delivered.

Failure to do the above can result not only in potential safety issues, congestion and disruption, but also introduce reputational risk and poor project perception amongst the community.

This section provides a headline response to the key issues identified within the construction section of the TTIA, with discussion beneath.

Construction Impact on Walking and Cycling Networks

Whilst there is some degree of detail and comfort in the methodology adopted for road-based impacts, there is limited discussion around the impacts of construction activity on other modes of travel. Various EES Scoping Requirements articulate the importance of due consideration for the impacts of the project on walking, cycling and public transport (in addition to traffic and freight), including during construction and on the transport 'experience'.

Within the TTIA, the appreciation of construction impacts on walking and cycling are generally limited to envisaged closures and potential diversions, including their location and duration. Some high-level discussion around the potential journey time impacts and mitigating treatments with respect to these closures and diversions is also provided. The TTIA notes that *'pedestrian bridges not listed in this section are not currently proposed to be closed during construction'*. This material is important and useful as a basis of informing the preparation of management plans in support of delivering the project during detailed design.

Not-with-standing, in some cases it was initially established that the TTIA could provide more detail relating to the adequacy and acceptability of closures and diversions for walking and cycling. As an example, the TTIA initially identified the closure of the Macorna Street Pedestrian Bridge for 26 weeks (six months) resulting in a *"long diversion route"* but did not provide an understanding of the magnitude of impact or acceptability of alternative detour routes as a suitable mitigation option.

The TTIA proposes a detour route via Plenty Road which extends the walking distance by 4.2 kilometres (or 52 minutes)[32] or a marginally shorter route via the Yando Street underpass. The TTIA did not contemplate alternate

[32] (Google Maps, 2018)

mitigation arrangements and their suitability, nor did it consider the safety or amenity of the selected detour routes. On face value, the prospect of the proposed change for the time required is expected to deliver a significant impact to those reliant on the existing bridge structure.

The TTIA has since been updated to incorporate a review of the relative impact of such changes on the proportion and / or volume of users that will be inconvenienced by the diversion. Section 10.5.2 of the TTIA provides specific commentary on the volume of pedestrians and cyclists effected. Whilst not ideal, this section of the report indicates that the number of users effected by this temporary diversion will be low.

Construction Impact on Walking and Cycling Safety

EES Scoping Requirement 28 requires an assessment of the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation, including in relation to connectivity, accessibility, function, experience and safety for cyclists and pedestrians (including use of existing and new shared use paths, bridges and on-road bike paths).

There are also issues around the safety of pedestrians and cyclists both in proximity to construction sites and also on the identified haulage routes. This has been a concern on other major projects and is not addressed in any detail in the TTIA.

To outline one potential response, Rail Projects Victoria, along with other stakeholders, is developing the 'CAPS' (Construction and Public Safety Project) approach, which applies a Safe Systems approach to different aspects of safety associated with vulnerable road users. Under CAPS, there are four key aspects (shown in Figure 10.1) which seek to address and improve safety. This includes improved guidance for traffic management for cyclists and pedestrians, a tool to assist in haulage route selection (Human Impact Route Assessment, HIRA), safer vehicle specifications, driver training and other behavioural work.

Figure 10.1: Overview of the Construction and Public Safety Program

NELA is a member of the CAPS working group and is understood to be incorporating aspects of CAPS into the contracts. The use of these reference guides is encouraged, and their application will be useful in developing a framework which will help manage safety implications associated with pedestrians and cyclists.

It is expected that these guides will be relied upon in the course of preparing the detailed management plans required under EPR T2.

Construction Impact on Public Transport Networks

The TTIA would benefit from a more detailed assessment of the direct and indirect impacts of construction on public transport networks.

The TTIA does not provide an assessment of the potential impacts to public transport operation during construction. Given that the TTIA listed impacts of construction on public transport as a 'high' risk, it is expected that transport modelling would underpin an assessment of potential impacts. Whilst it would helpful if this assessment were presented within the TTIA, EPR T2 requires that an appropriate level of transport modelling be completed prior to developing TMPs. Requirements to perform this work within the framework of the EPRs is reasonable given that the construction impact outlined in the TTIA is an estimate based on an assumed construction methodology. This assumed methodology may or may not be adopted by the successful contractor. Given this possible variability, it would be expected that a more granular review of public transport impacts will be prepared at that time with input from the Transport Management Liaison Group (TMLG) as required under EPR T3.

It was also initially identified that the TTIA would benefit from additional analysis on the impacts to public transport interchanges and stops. By way of example, the TTIA identifies Doncaster Park and Ride as a potential site compound for the storage of materials before they are required on-site.[33] Doncaster Park and Ride is the City of Manningham's third busiest bus interchange, with bus services operating on average every six minutes in peak periods.[34] The TTIA identifies that at present, car parking at the facility is often at capacity by 7:00am, resulting in patrons parking up to one kilometre from the interchange.[35]

Closing the Park and Ride facility in either part or total would necessarily require displacement of car parking spaces to other areas, as well as relocation of bus boarding and alighting arrangements and pedestrian and cyclist access to the interchange.

The TTIA did not initially provide any commentary on the extent, duration or timing of the potential use of the Park and Ride as a staging area, nor does it consider the implication or potential solutions for alternate car parking, bus platforms, shelters or facilities during construction works. After identifying this issue, the TTIA has since been updated with commentary provided at Section 10.5.16 which satisfactorily resolves an absence of information on this issue.

Individual Site Haulage impact on Road Network

EES Scoping Requirements 1 and 11 require identification of disruption to pedestrian movements, bicycle connectivity, public transport, motor vehicle and freight traffic during construction and a description of the elements of the road-based transport system (including road, public transport, freight, cycling and pedestrian transport networks) that might be affected by the project, including during construction.

Overall, the appraisal of construction activity and its impacts is particularly focussed on haulage vehicle movements and their effect on the road network. The TTIA outlines a *'best estimate'* at the number, type and general movement patterns of construction vehicles both in peak periods and across the lifespan of the project, consistent with what could be expected at this stage of planning. The assessment includes a sensitivity test assessing the potential implications of both tunnel launch scenarios, as well as an understanding of how the impact may change in a shorter spoil haulage window compared to a longer window.

GTA is generally comfortable with the overall approach and methodology of the assessment in identifying haulage routes, appreciating the limitations imposed by project uncertainties and assumptions. Of note, the assessment is predicated on a number of key assumptions to which changes may materially change the outcomes, namely (but not limited to):

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[33] (Traffic and Transport Impact Assessment, p. 480)
[34] (City of Manningham Bus Network Review 2017, p. 15)
[35] (Traffic and Transport Impact Assessment, p. 142)

- Forecast truck volumes, site workforce and proposed construction program
- Broad location of proposed spoil haulage sites & broad identification of haulage routes consistent with the transport impact assessment (such as spread of haulage task)
- Assumptions regarding the number of lanes and periods of road closure (i.e. outside of peak periods)
- Location of access points, construction sites and staging areas
- Movement of haulage vehicles (outside of peak periods).

The assessment provides a useful understanding of the relative impacts of various potential scenarios, as well as potential construction movements in totality over the lifespan of the project. The review also demonstrates consideration of available network capacity and envisaged impact of construction haulage vehicles on the road networks for individual sites, as well as a good understanding of the potential locations of staging areas, closures and their anticipated duration.

It is noted that while the assessment has provided detail on haulage numbers and capacity impacts, it is limited in its coverage of the impact on delay and travel time caused by the vehicle numbers. This makes it difficult at this stage to understand the magnitude of any impact of haulage movements on other users across the network and the cumulative impact of multiple construction locations operating simultaneously, noting that this is primarily an issue for a construction scenario limited to an 8hour rather than 20hour day.

Given the current planning phase of the project, we are generally comfortable with the approach. However, this is subject to additional analysis and assessment being completed as the certainty of the project scope and construction methodology progresses as the project transitions from a planning to delivery phase.

GTA consider that suitable provision has been made to manage risks with delay and travel time and cumulative impacts under EPR T2 (Construction) which requires Traffic Management Plans (TMP's) be supported by *"an appropriate level of transport modelling and must include"* (but not limited to):

• Maintaining transport capacity in the peak periods

• Consideration of construction activities for other relevant major projects occurring concurrently with construction activities for North East Link and potentially impacting modes of transport in the same area.

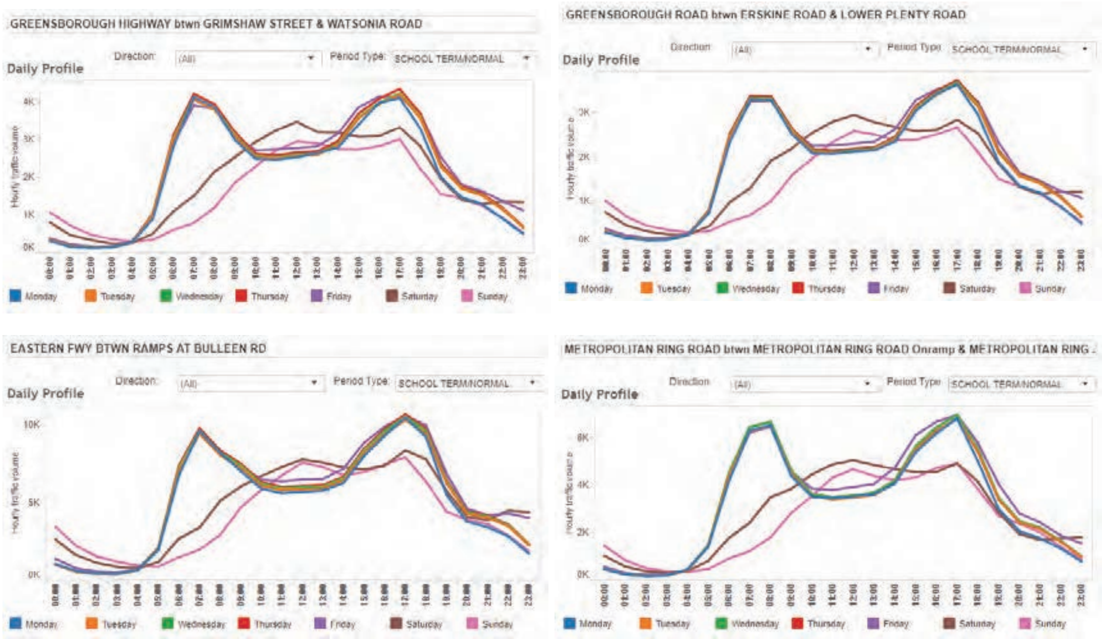
Construction Vehicle impact on Road Network

EES Scoping Requirement 11 requires a description of the elements of the road-based transport system including road, public transport, pedestrian and bicycle movements in areas affected by the proposal.

Section 10.4.1 of the TTIA outlines predictions of workforce numbers across the various project site segments, noting their distribution across multiple locations within each site segment. The assessment also notes that the "majority of work zones" will operate for nine hours a day, with the workforce typically arriving at 7:00am and departing at 5:30pm. On 24-hour sites, workers may arrive at 7:00am (day-shift) or 7:00pm (night-shift) and depart at 4:00pm (office-based day shift), 7:00pm (site worker day shift) or 7:00am (site worker night shift). The TTIA notes that this means the workforce "arrives prior to the morning peak and exiting during/after the afternoon peak".

GTA has reviewed VicRoads Traffic Profiles to determine peak periods for various segments of key roads in the vicinity of North East Link construction sites. The review identified a morning peak occurring at 7:00am, and wider evening peak occurring at approximately 5:00pm.

Figure 10.2: Current Daily Traffic Profiles in the vicinity of the NEL Project Corridor[36]



On this review, construction traffic is anticipated to arrive at or immediately before the peak of the morning peak period and depart near the evening peak hour. This observed overlap may be problematic depending on specific network location operations and the scale of workforce required at each sub-project site.

Closing this gap would require reassessing the anticipated additional demand across the various site access routes against available capacity in the road network during the morning and evening peak hours. Demand to and from sites needs to consider all traffic associated with the site haulage vehicles, general construction vehicles and staff, only then can an accurate assessment be made.

Suitable mitigation measures (such as a plan to encourage access to site by other modes) could also be considered and would be consistent with the approach taken on other major infrastructure projects such as Melbourne Metro. An alternate approach may involve the adoption of modified shift start and end times to avoid an exacerbation of existing congestion levels.

A review of drafted EPRs indicates that suitable provision has been made to manage risks with delay and travel time and cumulative impacts under EPR T2 (Construction) which requires Traffic Management Plans (TMP's) to be supported by *"an appropriate level of transport modelling and must include"* (but not limited to):

- *"Maintaining transport capacity in the peak periods"*

The EPR requirement should satisfactorily manage overlapping activities noting that the TTIA recognises a need for the workforce to be on-site and ready to start at 7.00am.

Curfew Haulage on Amenity

EES Scoping Requirement 13 requires a description of the potential routing of spoil transport from tunnelling works and other construction-related transport movements to minimise traffic and amenity impacts.

Section 10.3 of the TTIA outlines the specific construction impacts of vehicles at key sites, including a sensitivity assessment to understand the difference in traffic impact between a concentrated 8hour daily spoil haulage period and

[36] (VicRoads Traffic Profile)

longer 20hour spoil haulage period. The TTIA recognises that the longer haulage period reflects an exemption to truck curfew periods which are currently in place, particularly along the NEL corridor segments.

Although the longer operation period significantly reduces the hourly traffic volume on haulage routes, the traffic benefits must be balanced against the potential implications on amenity. This includes consideration of noise and vibration impact on residential areas, given that the 20hour period necessarily includes much of the night. This also includes consideration of other factors, such as air quality, pollution, soil spillage, light spillage and visual amenity. These elements are not explored within the TTIA but may be considered by other peer reviewers to help estimate or appreciate the trade-offs between these elements and preferred outcomes.

On this issue, the TTIA sets out at Table 1-2 references to other technical documents which address these issues.

Suitability of Freight Routes

The basis for determining the suitability of freight routes is not set out in any substantive detail within the TTIA, however it is evident that efforts have been made to retain this activity on higher order arterial roads. Section 10.2 of the TTIA provides some general discussion around various factors which may impact upon the choice of suitable freight routes.

For most roads, routes are determined without any specific rationale, save for various routes which have been excluded due to freight restrictions or high levels of congestion throughout the day. The three routes from Bell Street to the northern haulage site (via Sydney Road, High Street or Plenty Road) provide additional discussion around the existing traffic and freight volumes, number of lanes, abutting land uses and presence of car parking. These are all factors which the peer review expects will be considered when finalising route choice as part of preparing required TMP's noting that the TTIA found the *'best solution'* may be to spread the construction traffic load across the three routes to distribute the impact.

On route selection, the peer review would expect that the group charged with determining the appropriate haulage routes will have regard to tools available at the time, including possibly CAPS and HIRA as outlined earlier.

The peer reviewer is satisfied that EPR T2 sets a sufficient framework for the selection of these routes coupled with EPR T3 which involves input to those plans for all key agencies and stakeholders.

Construction Impact on Access to Local Attractors

EES Scoping Requirement 25 requires an assessment of the project's positive and negative effects on the existing transport network during construction (including spoil transport) and operation including in relation to local access for the community to residential areas, schools, retail centres, activity centres, community facilities and open spaces. The TTIA refers to these uses as sensitive receptors.

Section 10.5 provides general discussion around the potential impacts of closures, including potential detour routes. However, there is limited reflection on the location of these closures and detours relative to sensitive receptors, particularly where the closure would significantly impact pedestrian and cyclist accessibility (such as a bridge).

As an example, the TTIA outlines that the Koonung Creek Wetlands Pedestrian Bridge is proposed to be closed for a period of 12 weeks (3 months) while a new bridge is constructed, with no discussion of the implications for local access during that time. Further investigations undertaken by GTA have found that the school zone for Birralee Primary School in Doncaster extends to the south of the Eastern Freeway.[37] These areas (in Mont Albert North) are connected to the school by this bridge. The closest alternative crossing of the Eastern Freeway is at Elgar Road, a detour of 1.4km (or 17minute walk).

Given these observations, it is recommended that further investigation is completed on the volume and cross-section of users likely to be impacted by the temporary unavailability of this asset both during school term and out of school term

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[37] (Melbourne School Zones)

periods. It may well be appropriate that these bridge works are timed to coincide with school holidays to minimise interruptions. Whilst it is preferred that these investigations are completed earlier, it is possible that they can occur once the preferred tenderer has been appointed under the framework of the EPRs. Indeed, at that time, a 12week construction period can be reviewed and confirmed as a reasonable and appropriate estimate.

More broadly, similar analysis is likely to be required for other sensitive receptors where construction activity may impact on local access for extended periods of time.

Cumulative Impact of Construction Impacts

EES Scoping Requirement 13 requires a description of the proposed approach to managing transport network conditions during the project's construction, such as any staging proposed to maintain transport system function, as well as the proposed nature and duration of diversions.

Section 10.5 provides a summary of closures and diversions at key construction site segments, including their location and duration. However, the TTIA does not specifically describe which or if any closures will occur concurrently.

The extent to which this might be an issue can be appreciated when, for example, you combine activities associated with more than one high level of construction activity site. Broadly, the southern or northern launch sites (Table 10-4) show haulage volumes of between 100 to 200 movements per hour, which represents more than one vehicle per minute. Under this level of demand, signalisation will likely be necessary for various sites to manage volume and safety. The alternative would be that the contractor uses traffic controllers, which may not be practical for extended periods and could have greater impact on managing demand on the broader road network.

Overall, further assessment will be required on site access and a more robust assessment of the impacts associated with the vehicle movements and mitigations required to ensure safe access and minimise network impact. This assessment would combine the cumulative impacts of all construction-related vehicles (including spoil haulage, materials haulage and workforce movements to, from and between sites) in addition to broader traffic diversions and closures across the network, and the likely impact on network performance at various stages of project construction.

While there is some discussion on independent site impacts, supported by analytics (for example, each of Greensborough Bypass and Grimshaw Street), the combined impacts of these projects are not clear. Where analytics have been provided, impacts have been outlined in terms of capacity and throughput, rather than say travel time in accordance with Scoping Requirement 21. The exception to this is the assessment of the Greensborough Bypass, Grimshaw Street and Manningham Road works where either the strategic or operational models are used to assess impacts to travel time.

Consideration should also be given to traffic management arrangements associated with worksites and lane closures or reductions in capacity, particularly with respect to speed limits. For example, works on the Eastern Freeway that lead to lane width reductions would involve maximum limits of 80 km/h or less, as has occurred during the CityLink Tulla Widening project. Works on arterial roads may result in reductions to 40 km/h for worker safety. These changes will have an impact on capacity and throughput.

The TTIA has also referenced changes to traffic signal operations, and new signal facilities on the premise of managing vehicle demand. This is consistent with management techniques adopted on managing other large construction projects in Melbourne and has been used successfully as a Travel Demand Management technique to assist in redistributing trips to other modes, re-timing of trips and other behavioural change initiatives. Importantly, this approach must be supplemented by techniques built to manage other modes of travel in effected locations.

On these issues, the peer review acknowledges that decided outcomes will depend largely on the proposed methodology and timeline proposed by the preferred tenderer or contractor(s) and that considerations around the volume and location of closures can be adequately considered within the framework of the proposed EPRs.

11. SENSITIVITY TESTING

11.1. Discussion

It is noted that the sensitivity testing set out in the TTIA originates from strategic modelling prepared by others, which is not subject to this peer review. Notwithstanding, the implications of the sensitivity analysis are relevant to GTA's appraisal of the TTIA. A high-level review is provided below.

Key issues	
32	Undertake sensitivity analysis to test assumptions and inputs of transport model, if required.

Peer reviewer expectations	In this section it is expected that the TTIA would present: • The results of suitable sensitivity tests • Discussion around the implications of the sensitivity testing.
TTIA approach	The TTIA outlines: • An outline of eight additional scenarios undertaken as sensitivity testing. • A summary of percentage change results at a range of locations along the project corridor and surrounds, compared to the 2036 'with project' case. • Discussion around the key findings and implications of the sensitivity testing.
Summary of peer review findings	Section 9.2 of this assessment recommends the completion of a further sensitivity analysis using the strategic model which more accurately represents the traffic capacity constraints generated by the Watsonia Activity Centre along Watsonia Road and its intersection with Grimshaw Street and Greensborough Road.

This peer review has found that the Watsonia Road link is subject to high levels of kerbside car parking, pedestrian activity and public transport activity which involves a level of side friction which would from a practical viewpoint reduce the relative attractiveness of this route between Grimshaw Street and Greensborough Road. In this regard, the strategic model estimates may be over-estimating the level of likely traffic demand along this route in the With Project case scenario. A sensitivity test which more accurately reflects practical link-capacities on this part of the network is recommended.

Setting aside the recommendation for Watsonia Road, GTA is generally satisfied with the presentation of results and discussion of the implications and findings. In conjunction with other recommendations outlined in earlier sections of this report and the EPRs, GTA is satisfied that no major concerns were observed in the TTIA's approach to sensitivity testing.

12. ENVIRONMENTAL PERFORMANCE REQUIREMENTS

12.1. Overview

The purpose of establishing Environmental Performance Requirements (EPRs) is to set the transport network outcomes that the project must achieve. The EPRs are the mechanism used to manage project impacts.

In reviewing the EPRs consideration should be given to the material provided in the TTIA, the risk assessment provided in Appendix C and the EES Scoping Requirements. This section considers the extent to which the EPRs adequately establish transport network outcomes, mitigate potential impacts and provide suitably flexibility in the development of the appropriate design and construction solution.

It is accepted that aspects of the design and therefore construction may change from the Reference Design assessed by the TTIA and what is ultimately built by the Project. For this reason, the uncertainty inherent in the project should be managed through a suite of EPRs which demonstrate that potential adverse impacts are appropriately identified, mitigated and / or managed.

The relevant EES Scoping Requirement that this section seeks to address is outlined below.

Approach to manage performance	
34	Describe the environmental performance requirements to set transport network outcomes that the project must achieve.

Peer reviewer expectations	It is expected that this section of the TTIA would include a description of the EPRs, and that the EPRs would suitably manage both the performance of the network (in accordance with the intent of the Scoping Requirements) and mitigate the impacts of risks that are rated medium or above. The EPRs should cover both the project's construction and operation. Given this project follows a number of other major projects including Melbourne Metro, Westgate Tunnel, City Tulla Widening and Level Crossing Removals, it would be expected that lessons are applied from these previous projects to achieve industry consistency, reduce risk and improve outcomes for the State and the broader community.
TTIA approach	The TTIA described five EPRs that cover both the project's construction and operation. The EPRs are broad in scope and include the formation of a Traffic Management Liaison Group (TMLG) and Traffic Management Plans (TMPs) to mitigate the potential impacts of the project during construction.
Summary of peer review findings	The TTIA adequately addresses Scoping Requirement 34 by describing the EPRs, in some cases GTA held discussions with the project team (SmedTech) around the level of prescriptively contained in the EPRs as well as terminology that was more traffic rather than transport focussed. Following those discussions, variations were made to the EPRs. The adequacy of the EPRs has subsequently been assessed throughout the body of this peer review and whilst in some circumstances more detail would have been preferred, it has been

	determined that this detail can be satisfactorily captured by the EPRs once a contractor has been appointed and there is greater clarity around the proposed detailed design, as well as certainty around construction methodologies and construction timing including adopted haulage timing.

A. MICROSIMULATION MODEL PEER REVIEW REPORT

A

North East Link
Microsimulation Model Peer Review

Client //	North East Link Authority
Office //	VIC
Reference //	V153790
Date //	08/10/18

Confidential for the purpose of TRG

North East Link

Microsimulation Model Peer Review

Issue: B 08/10/18

Client: North East Link Authority
Reference: V153790
GTA Consultants Office: VIC

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
B	8/10/18	Final	Matt Petherick and Phoebe Hollins	Rob Dus and Will Fooks	John Kiriakidis	

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1. Introduction

1.1 Project Background

The North East Link (NEL) is a proposed 11-kilometre freeway linking the Eastern Freeway and the M80 Ring Road. NEL will include two twin tunnels between Lower Plenty Road and Manningham Road.

The project also includes widening and upgrade of the Eastern Freeway between Springvale Road and Chandler Highway, a new Doncaster Busway and a suite of shared use path upgrades along the project corridor.

In order to assess the impact of the project, an Environmental Effects Statement (EES) is being prepared. As part of the EES process, the EES Scoping Requirements establish a need to complete technical investigations and analysis of potential effects of the project and outlines the evaluation objectives and specific requirements for the assessment of those potential effects.

Smedley Technical & Strategic (SmedTech) was engaged by North East Link Authority (NELA) to complete the technical investigation of the potential traffic and transport impacts of the North East Link and prepare a Traffic and Transport Impact Assessment (TIA).

A number of traffic microsimulation models were developed to understand the potential impacts that these new links and upgrades have on the surrounding road network (surface network only) for a 2036 design year. An Eastern Freeway model and M80 model (that includes the NEL corridor) were created for base, No Project and With Project cases.

1.2 Report Purpose

GTA have been engaged by NELA to conduct an independent peer review of the traffic **microsimulation (operations) models** of the road network surrounding the proposed North East Link. There is currently no industry recognised Australian guidelines for undertaking a transport modelling peer review. Therefore, in approaching this peer review, consideration was given to the purpose, function and use of the operational models.

The EES Scoping Requirements include a requirement to undertake predictive modelling of regional, local and project transport network traffic flows in the absence of and following implementation of the project. The Scoping Requirements also include a range of other items for analysis that rely on outputs from predictive models. The Scoping Requirements do not provide guidance on the methodology, extent or type of modelling required, so professional judgment is required during all aspects of the model development, application of outputs, and peer review to ensure that the modelling is '*fit for purpose*'.

At a high level, related to the NEL project, a '*fit for purpose'* model means that the modelling can, at a minimum, provide outputs to enable assessment of the following:

- Operational performance of the network (i.e. Level of Service, travel speeds)
- Operational performance at interchanges and key intersections adjacent to the proposed alignment
- Changes to travel time
- Impacts to travel time reliability
- Redistribution of traffic
- Impacts to public transport operation

With the purpose of the model in mind, GTA have undertaken a review of the operational modelling process, inputs and assumptions to ensure the models have been built to adequately assess the impacts of the project.

As GTA identified matters that required further clarification or revision, they were provided to SmedTech to enable the matters to be responded to or addressed. Upon receipt of additional information from SmedTech, any issues raised by GTA have either been resolved or recommendations originally made, updated. For visibility purposes, this report includes both the original and updated recommendations, with a brief discussion about both the original issue and SmedTech's response. Where a recommendation has been updated, it has been labelled with a version number (e.g. V1 and V2). In addition, a memo provided by SmedTech on 24 September 2018 outlining a range of responses to GTA's original recommendations has been included in Appendix C. The outcome of receiving this memo is addressed in the body of the report.

1.3 Scope of Review and Limitations

This report documents the findings of GTA's peer review of the Eastern Freeway AM and PM peak base model, future No Project models, and future With Project models and a review of supporting documents informing the preparation of those models. A complete list of the material reviewed is included in Section 2.1.

The peer review included consideration of:

- Study area and model extents
- Review of reported survey data (no review of raw survey data completed)
- Model inputs and parameters
- Network coding
- Review of model calibration and validation reports
- Traffic demand development (without reviewing the strategic model)

For avoidance of doubt, GTA's peer review is not an *'audit'* but rather an assessment of build methodology, process review and sample checking of inputs and assumptions relied upon to prepare a scaled representation of the effected transport network. In undertaking this peer review, GTA has adopted a risk-based approach and focused more closely on the components of the model that are most likely to influence the operation model outputs.

In preparing this report, GTA has relied on strategic travel demand estimates prepared by others, and as such, this peer review does not extend to review and consider the adequacy of those forecasts.

GTA has undertaken its review based on the NEL project related material provided by SmedTech. The data and information contained within has not been checked or verified by GTA as a part of GTA's review, beyond that which is necessary for the purposes of undertaking this review. GTA does not accept any liability in connection with such unverified information, including errors and omissions in this report that may be a result of errors, omissions or subsequent updates in information provided by SmedTech.

1.4 Structure of this Report

This report is intended for a technical audience, with a good understanding of operational transport modelling, and therefore we have assumed a level of knowledge when reporting findings.

The report starts with an overview of the methodology GTA used to complete the peer review, then documents the peer review findings, with a summary of both the resolved and outstanding recommended actions at the end of the report.

2. Peer Review Methodology

2.1 Overview

The following components of the models and associated documentation were reviewed during the review process:

- Model calibration and validation reports
- Model inputs and parameters
- Network coding

In preparing this report, reference has been made to the following files as provided by SmedTech:

- Reports
  - North East Link Traffic and Transport Impact Assessment (Version B) dated 27 June 2018
  - M80 Plenty Road to Greensborough Highway Traffic Modelling Local Model Validation Report dated May 2012
  - Eastern Freeway Calibration and Validation Report (filename: "Eastern Freeway Section_LMVR_v2.pdf")
  - Memo "Link Types and Driver Behaviour - NEL" from SmedTech to GTA dated 19 September 2018
  - Memo "Micromodel peer review response" from SmedTech to GTA dated 24 September 2018
- Vissim simulation model files:
  - Eastern Freeway 2017 AM base model ("NEL_2017_AM_Base.inpx" and associated files)
  - Eastern Freeway 2017 PM base model ("NEL_2017_PM_Base.inpx" and associated files)
  - Eastern Freeway 2036 AM No Project model ("EF_2036_AM_NoProject.inpx" and associated files)
  - Eastern Freeway 2036 PM No Project model ("EF_2036_PM_NoProject.inpx" and associated files)
  - Eastern Freeway 2036 AM With Project model ("EF_2036_AM_Project.inpx" and associated files)
  - Eastern Freeway 2036 PM With Project model ("EF_2036_PM_Project.inpx" and associated files)
  - M80 2036 AM No Project model ("2036_NoProject_AM.inpx" and associated files)
  - M80 2036 PM No Project model ("2036_NoProject_PM.inpx" and associated files)
  - M80 2036 AM With Project model ("2036_Project_AM.inpx" and associated files)
  - M80 2036 PM With Project model ("2036_Project_PM.inpx" and associated files)
- Excel spreadsheet files:
  - Eastern Freeway Cal and Val Report Spreadsheets
    - "AM Cal_Val Outputs.xlsx"
    - "PM Cal_Val Outputs.xlsx"

The review excludes the following items which have not been provided:

- M80 Base Vissim model
- M80 calibration and validation outputs
- Raw survey data
- Spreadsheet models
- Demand models

GTA has been advised by SmedTech that the material that is not being provided to GTA has been reviewed by VicRoads to their satisfaction. On that basis, as VicRoads is the authority charged with the management the road system within the framework of a range of Acts and legislation including the Road Management Act 2004, we defer the adequacy of those elements to VicRoads. Further discussion on the M80 calibration and validation report is included in Section 3.2.2.

2.2 Model Review Software Declaration

The base and future models for the Eastern Freeway and future models for the M80 were all reviewed in Vissim 9.00-13. It is noted that this does not correlate to the version outlined in the calibration and validation reports for either model. The Eastern Freeway base model was calibrated and validated in version 9.00-07 while the M80 2012 base model was calibrated in version 5.40-01. Version 9.00-13 was used for this peer review as the Vissim input files indicated that the models had been saved in this version. Clarification should be provided on the version of Vissim being used.

2.3 Review Structure

This review has adopted the following ranking system to identify the importance of any recommended changes or items requiring clarification:

- **"Major"** – items that may have significant impact on the performance and validity of the model and should be investigated.
- **"Medium"** – items that may have an impact on the performance and validity of the model and may need to be investigated, unless reasonably justified otherwise.
- **"Minor"** – items that are not likely to significantly impact the validity of the model and may not require correction, but are worth being aware of.

The presence of any "Major" items are recommended to be investigated and modified in an updated model to ensure that the models are fit for purpose and provide a sufficiently robust base from which scenario testing can be undertaken. "Medium" items may need to be addressed unless reasonably justified otherwise.

The ranking of recommendations is outlined in Table 4.1. As the recommendations were resolved and subsequently updated, the ranking typically has been downgraded.

3. Model Results Review & Consideration

3

3.1 Study Area and Model Extents

The project study area covers the north eastern suburbs of Melbourne spanning from Merri Creek in the west to the metropolitan boundary of Melbourne in the east, the Eastern Freeway in the south and the M80 Ring Road in the north and is outlined in Figure 3.1. Figure 3.2 shows the extents of the Eastern Freeway 2036 models while Figure 3.3 shows the extents of the M80 2036 models.

Figure 3.1: Study Area and Surroundings

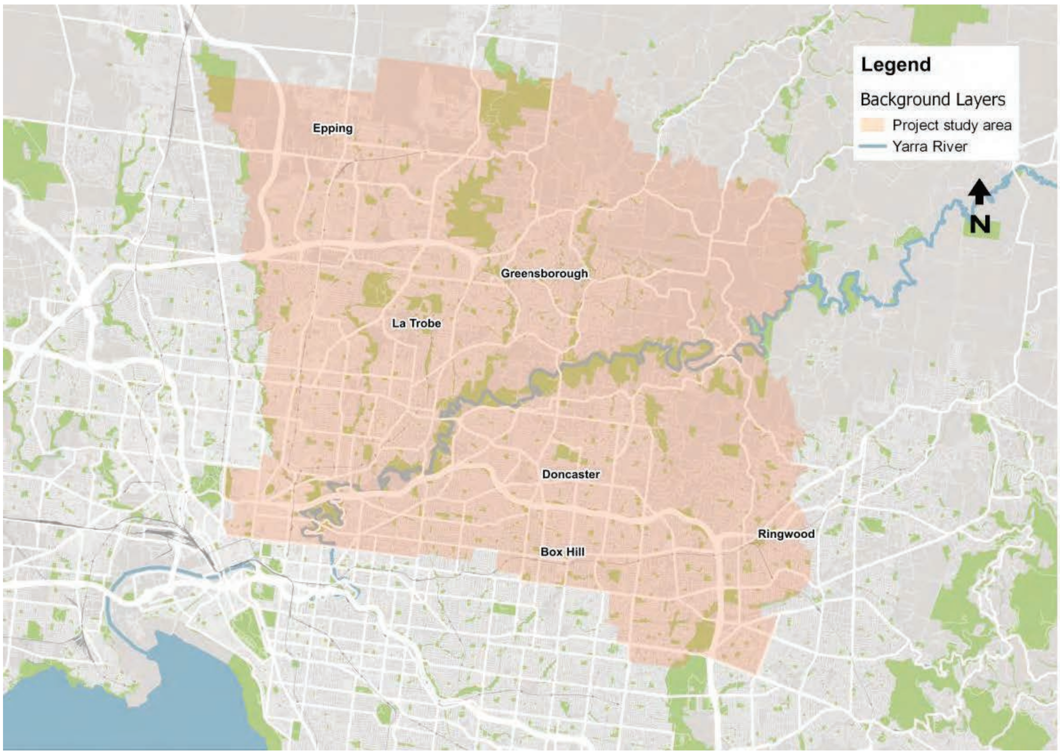


Figure 3.2: Vissim Model Extents (Eastern Freeway 2036 models)

Figure 3.3: Vissim Model Extents (M80 2036 models)

When defining the extents of a microsimulation model, ideally all known congested areas that are likely to directly impact the project are contained within the modelling extent. However, in some instances complex congested junctions are excluded from larger operational models where they are not within the project scope. Where this is the case, additional analysis should be undertaken to adapt the model to replicate the congestion.

By way of example, the Eastern Freeway simulation models exclude the Hoddle Street interchange at the western end of the corridor. The Hoddle Street interchange is a known congestion bottleneck that regularly impacts on the Eastern Freeway performance, particularly during the morning peak hours. Any future increase in demand is expected to exacerbate those impacts.

Recommendation One V1: Further investigation should be undertaken to understand the impacts the restrictions in capacity at the western end of the network would have on the project. The operational effects of these restrictions should be replicated sufficiently in the prepared models.

Enquires with SmedTech regarding operational performance at the junction of the Eastern Freeway and Hoddle Street indicates that the model is being reviewed and modified to replicate present day conditions and interactions at this network location. Recommendation one has been updated as this work is still in progress at the time of issuing this report.

Updated Recommendation

Recommendation One V2: Replicate the operational effects associated with the Hoddle Street and Eastern Freeway junction to ensure those characteristic elements are appropriately considered on the operation of the broader corridor.

3.2 Survey Data Review

No raw survey data was provided as part of this peer review. The extent of review is limited to an assessment of the survey data as described in the calibration and validation reports. GTA are therefore unable to comment on the validity and conformity of the data, so it is recommended that if it has not already been completed, an independent check be completed of the validity and conformity of the raw survey data to ensure it is deemed appropriate to use.

Recommendation Two V1: If it has not already been completed, an independent check be completed on the validity and conformity of the raw survey data to ensure it is deemed appropriate to use.

In raising this issue with SmedTech, GTA has been advised that VicRoads have reviewed the data relied upon and utilised during the preparation of the base models and are satisfied with the veracity and robustness of the applicable data set.

To the extent possible, the following section provides commentary on the adequacy of the survey data as outlined in the respective calibration and validation reports.

3.2.1 Eastern Freeway Survey Data

The calibration and validation report for the Eastern Freeway 2017 base model outlines the types of survey data collected and the survey dates.

Demand Surveys

The report indicates that most of the data collection was undertaken on 24 May 2017. The only exception to this was speed data obtained from VicRoads, which was provided for the entire month of May 2017. The peer review found that it was not clear if any analysis of the survey data was undertaken to ensure it was representative of an average day, so the following recommendation was made.

Recommendation Three V1: Further analysis and investigation be undertaken to ensure traffic survey data is representative of average conditions.

Information provided by SmedTech in response to this recommendation reveals that the survey day sits within the range reasonably expected across an annual period of data. This review and confirmation ensures that scaling for 2036 demand flows does not exacerbate any anomaly where a count sits beneath an average value.

Queuing & Travel Time Surveys.

The absence of queue length surveys, and the extent of travel time surveys is an issue warranting consideration. A review of material indicates that travel time surveys were undertaken for the length of the Eastern Freeway, however, there has been no travel time or queue surveys undertaken at interchanges or arterial roads. The exclusion of this data may result in the true demand trying to enter the freeway being underestimated.

Whilst it is important to ensure that all demand for the network is captured, it is likely to have a minor impact on the operation of the freeway. Not-with-standing, advice from SmedTech revealed field observations have been completed to ensure model outputs satisfactorily represent network performance.

At the time of issuing this report, GTA had not been provided with documentation outlining VicRoads' satisfaction with the methodology. As such, recommendations two and three have been updated to reflect the need for SmedTech to produce on request, documentation to that effect.

Updated Recommendations

Recommendation Two V2: Ensure suitable documentation is available on file (and accessible) which demonstrates the validity and conformity of the raw survey data in the event that a request is made to demonstrate adequacy and confirm VicRoads were consulted and were satisfied with the adopted survey data.

Recommendation Three V2: Ensure suitable documentation is available on file (and accessible) which demonstrates existing traffic performance has been adequately documented including queuing and general vehicle delay observations out in the field.

3.2.2 M80 Survey Data

The base model for the M80 was calibrated and validated using 2012 traffic data. SmedTech have outlined and applied a methodology which includes factoring 2017 traffic data to estimate 2036 traffic volumes. The M80 base model uses 2012 traffic data, and the peer review found it initially to be unclear whether any checks have been completed to determine whether there is significant uplift in traffic volumes between 2012 and 2017, and whether this impacts the suitability of the data and the resulting base model.

As the M80 base model was not provided to GTA, and the calibration and validation report for the M80 base model was written in 2012 (and not specifically updated to reflect the update undertaken for the 2017 base model), GTA requested clarification on the process SmedTech followed to validate the extension of the M80 base model to include the NEL corridor. The original recommendations are shown below.

Recommendation Four: Complete a comparison between the 2012 and 2017 data to ensure the suitability of the data.

Recommendation Five V1: Update the M80 calibration and validation report to include details of the extension of the model to include the NEL corridor.

Advice provided by SmedTech in response to recommendation four indicates that SVO data, SCATS data and ATC surveys in 2017 were used to update the M80 model. This approach is considered acceptable coupled with field surveys confirming that the updated base model is adequately replicating observed 2017 network conditions. GTA considers recommendation four to have been adequately addressed.

On making enquiries with SmedTech regarding the availability of an M80 calibration and validation report for the 2017 base model, SmedTech advised that a report has not been prepared based on the following rationale:

1. In consultation with VicRoads, the 2017 base model was validated through a range of techniques including stakeholder and community feedback, TRG feedback and numerous site visits checking field operations. An iterative process involving the modification of parameters in the model was applied until SmedTech was satisfied that the 2017 base model performance was satisfactorily reproducing observed operational behaviours.
2. It was not possible to collect new turning movement count data due to works on the M80 Ring Road and rail closures which impacted traffic conditions within the area.
3. SmedTech believe the 2017 models are not being directly used as part of the EES assessment, so their performance and alignment with the observed traffic counts was considered acceptable.

GTA appreciates there are practical challenges associated with updating models and subsequently preparing the typical calibration documentation, so the approach involving validation based on site observations is acceptable as a part of the validation process. It is however recommended that a report be prepared is completed which sets out the details of the validation process, including the issues raised by the community and stakeholders, the dates and time ranges of visits completed; observations recorded on those sites visits and changes made to the base model to satisfactorily replicate observed network performance. As such, recommendation five has been updated as follows.

Updated Recommendation

Recommendation Five V2: Provide written documentation which outlines and summarises the issues raised by the community and stakeholders, the dates and time ranges of visits completed; observations recorded on those sites visits and changes made to the base model to satisfactorily replicate observed network performance. This documentation should also demonstrate that the adjustments made to the M80 model (2012 data) are sufficiently robust and thorough. This summary paper should subsequently confirm outputs such as queuing on key parts of the network are consistent with field observations relied upon to calibrate the existing (2017) base condition.

Simulation Period

The simulation periods for the models relative to the reported periods is shown in Table 3.1.

Table 3.1: Simulation periods

Model	Simulation period	Reported period
Eastern Freeway AM peak	5:30am to 8:30am	7:00am to 9:00am
Eastern Freeway PM peak	3:00pm to 6:00pm	4:00pm to 6:00pm
M80 AM peak	6:00am to 9:00am	7:00am to 9:00am
M80 PM peak	3:00pm to 6:00pm	4:00pm to 6:00pm

On review of Table 3.1, it can be observed that there is a misalignment between the simulation period and the reporting period for the Eastern Freeway AM peak model, and inconsistency in the simulation between models.

The Eastern Freeway AM peak model finishes at 8:30am. An analysis of SCATS data completed by GTA found that the peak hour commences as early as 6:00am towards the eastern end of the model extent, which provides an explanation as to why the simulation period commences at 5:30am. However, high volumes are still being experienced beyond 9:00am particularly towards the western end of the model extent.

Recommendation Six V1: Additional clarification is required to support the model simulation period ending at 8:30am, and the reported period in the TIA should be updated to reflect the simulation period.

Information provided by SmedTech in response to recommendation six revealed that traffic volumes peak on the Eastern Freeway at or around 6.30am after which demands oscillate downwards and then upwards before steadily declining[1]. SmedTech has also advised that the reported modelling period was defined in consultation with VicRoads. As such, recommendation six has been updated as follows.

Updated Recommendation

Recommendation Six V2: Ensure the reported period in the TIA reflects the adopted simulation period.

Seeds

Seeds are used in a microsimulation model to create small variations within the model to ensure the model is stable. The peer review found there to be inconsistencies between the reported and modelled seeds and different numbers of model runs between the Eastern Freeway and M80 models for the base and No Project and With Project 2036 models.

Further to this, no analysis of the stability of different seed runs had been undertaken to ensure consistency in the models.

Recommendation Seven: Consider updating seeds to be consistent between models and undertake stability checks.

In response, SmedTech completed stability checks and reran the models with updated seed numbers. In doing this, GTA consider this recommendation to be adequately addressed.

3.3 Network Coding

Desired speeds and Speed Distributions

Desired speeds have been coded in the models according to posted speed signs and have been coded appropriately in both the Eastern Freeway and M80 models. Speed distributions are used to create a variation in the desired speed of vehicles travelling on the network. A summary of the speed distributions used in the models is provided in Table 3.2

1 Data captured for the Yarra River screen-line location.

Table 3.2: Speed Distributions Used

Speed	Eastern Freeway [1]			M80	
	2017 Base AM and PM	2031 No Project AM and PM	2031 Project AM and PM	2031 No Project AM and PM	2031 Project AM and PM
40km/hr	40-45km/hr			38-42km/hr	
50km/hr	Not used			47-53km/hr	
60km/hr	55-65km/hr			57-63km/hr	
70km/hr	65-75km/hr			66-74km/hr	
80km/hr	75-110km/hr			76-84km/hr	
90km/hr	Not used			85-95km/hr	
100km/hr	88-110km/hr			95-105km/hr	

[1] the speeds shown in this table have subsequently been updated

Table 3.2 shows that the speed distributions used for the M80 models are within 5% of the posted speed. The speed distributions used for the Eastern Freeway had no discernible pattern or consistency and tended to favour faster travel.

Recommendation Eight: Consider adjusting the speed distributions of the Eastern Freeway to form a more consistent approach as is used in the M80 models.

SmedTech modified and reran all Eastern Freeway models to be consistent with the distributions used in the M80 models. GTA consider this recommendation to have been adequately addressed.

Vehicle Types Compositions

Vehicle type compositions are used to create a distribution of vehicle types throughout the model. They are generally calculated from existing traffic counts or in the case of future demands, can be influenced by strategic model inputs.

The Eastern Freeway base model shows that only two vehicle compositions have been used, that correspond to two vehicle types, Car and Heavy Goods Vehicle (HGV). The 2036 No Project model introduced a new vehicle composition which corresponds to Light Commercial Vehicle (LCV) vehicle type. All other vehicle compositions, vehicle types and 2D/3D model distribution elements remain the same as per the base models. The same settings have been carried through to the Eastern Freeway With Project scenario.

The M80 models have consistent traffic compositions and 2D/3D model distributions across the No Project and With Project scenarios.

Recommendation Nine V1: It is suggested the vehicle types and compositions should be more thoroughly addressed in the reports, however GTA notes that the decreased proportion in the Eastern Freeway models and the LCV's modelled with HGV model distributions in the M80 models, will create more conservative project case models.

SmedTech have updated the vehicle types in response to recommendation nine. SmedTech also outlined that the change in proportions was to reflect the splitting out of LCVs to be a new user class in the 2036 models and was based upon ATC data from the study area. GTA consider this recommendation to have been adequately addressed but recommend that this information be included in the TIA, as such, recommendation nine has been updated as follows.

Updated Recommendation

Recommendation Nine V2: Vehicle types and compositions be more thoroughly explained in the reports to ensure audience appreciation of the applied methodology.

Public Transport

The peer review found there were minor discrepancies between the bus stop dwell times between the Eastern Freeway and M80 models and the values reported in the calibration and validation reports.

Recommendation Ten: Update the dwell times reported in the M80 calibration and validation report or provide clarification as to why there is a discrepancy between the reported and modelled dwell times.

SmedTech adjusted the models to reflect a 10 second dwell time for all public transport lines across all models to maintain consistency. GTA consider this recommendation to have been adequately addressed.

Link Behaviour Types

The capacity of a road network depends on a range of elements including road geometry, lane width and vehicle types. Perhaps the most difficult element to predict which effects the capacity of a network is human behaviour. It is understood that local effects can result in drivers behaving differently due to the influence of the surrounding environment. Familiarity, road geometry and congestion levels are only a few of the elements which may affect people's driving behaviour. An example of this is that drivers may become more aggressive in a merging area of a freeway when compared to a midblock section.

Using appropriate behaviour settings in a microsimulation model is important as it can have a meaningful effect on the capacity of a network. Within a microsimulation model, numerous settings can be adjusted to assist in simulating peoples driving behaviour on a road network. Typically, these driver behaviour settings are calibrated and validated to local conditions in the base model to ensure fundamental traffic theory (vehicle throughput at certain speeds) can be replicated. The settings are often carried forward into option testing so that a like for like comparison can be made.

In the case of NEL, a number of new road links are proposed for the With Project case so it is not possible to calibrate and validate the behaviours of these links. To overcome this issue, a methodical and consistent approach has been proposed when making changes to the behaviour types for future models. This approach proposes adjustments depending on the type of freeway sector the link is (e.g. midblock sector or merge / weave sector) and details of the sectors (e.g. 2 lane entry versus single lane entry).

Several link behaviour types have been used to code each of the models. Appendix A shows the behaviour types used in the models as well as the key differences between each behaviour type while Table 3.3 shows the total number of each link type originally used in each model. Noting, the link types have subsequently been updated based on GTA's recommendations.

Table 3.3: Total number of link types used in each model [1]

Behaviour Type	Comments	Eastern Freeway 2017 Base	Eastern Freeway 2036 No Project	Eastern Freeway With Project Case	M80 2036 No Project	M80 2036 With Project Case
10 – Urban Default	Default link types used according to subsequent correspondence	1143	1158	1495	726	992
20 – Freeway Basic		347	345	569	18	227
1 – Urban (motorized)	No reference to these link types made in correspondence				98	
6 – Urban (merge)					3	
3 – Freeway (free lane selection)					29	
7 – Freeway (merge)					9	
21 – Freeway Constrained120	Typically decrease capacity compared to default settings	8	8			
23 – Freeway Constrained130		3	3			
27 – Freeway Basic Queue		19	19			
11 – Urban Merge	Typically increase capacity compared to default settings	28	31	87	11	45
28 – Freeway Merge (mild)		24	26	59	1	62
29 – Freeway Merge (aggressive)		13	13	12	2	13

[1] The values shown in this table have subsequently been updated

Eastern Freeway Behaviour Types

Behaviour types for the Eastern Freeway model are generally consistent with the approach outlined by SmedTech in correspondence dated 19 September 2018. However, three link types used in the base and No Project models used to replicate extended queueing have not been used in the With Project case. Excluding these link types from the future model may overestimate the capacity of the network. Further clarification has been sought as to why these link types are required in the base model so that they can be applied appropriately in the With Project case scenario if required.

On this issue, SmedTech have advised that changes have been made to parts of the network in the With Project case where capacity constraints are being removed through delivery of the project. The extent to which capacity changes have been applied has been subject to experience in driver behaviour change gained from developing the previously prepared Westgate Tunnel With Project operations model in collaboration with VicRoads. These experiences have subsequently been applied to NEL and should be broadly documented within the NEL TIA to ensure an adequate level of transparency and visibility on the adjustments applied.

M80

Three link types have been used in the M80 No Project scenario which have different behaviour types from those used in any other models. Details of those parameters have not been outlined within the documentation provided by SmedTech:

1 – Urban (motorised)

6 – Urban (merge)

3 – Freeway (free lane selection)

For reasons outlined earlier in comments on the Eastern Freeway model, it is important that the methodology used to define behaviour types is broadly consistent. It is recommended (if not already completed) that the No Project model is adjusted to ensure the same vehicle behaviour is established on both the No Project and With Project models where similar traffic environments occur. In the event that capacity increasing changes have been applied to the With Project model using expertise developed as part of the Westgate Tunnel project, details of these changes should be reported in the NEL TIA to ensure an adequate level of transparency and visibility on adjustments applied.

Eastern Freeway and M80 Overlap

A review of the models indicates that there is a section of the M80 model which overlaps the Eastern Freeway model. The driver behaviour types in this area of the network were overlayed and checked against each other for consistency. In undertaking this comparison, some minor differences were found. In subsequent advice it has been noted that the M80 model will be used for reporting in this area of the network.

The original recommendations made by GTA are shown below.

Recommendation Eleven V1: Provide further detail to clarify the purpose for the difference in link types in the Eastern Freeway base model.

Recommendation Twelve V1: Adjust the M80 No Project model to ensure the same vehicle behaviour is established on both the No Project and Project models where similar traffic environments occur, unless suitable reasoning can be provided.

Summary of Review on Link Behaviour Application

On enquiry of the applied link behaviour methodology, GTA have been provided with a memo from SmedTech (dated 19 September 2018) setting out the basis upon which behaviour patterns have been established and applied to the 2017 and 2036 network models. This memo (attached at Appendix B) discusses parameter development and sets out the rationale for adjustments on the network at the following locations along the Eastern Freeway:

- Springvale Road to Blackburn Road,
- Doncaster Road Bend to Elgar Road,
- Mid-block rolling queues, and
- General merge and weave sector applications.

A review of that technical note indicates the basis upon which adjustments were made to the 2017 models to replicate existing conditions and the decision in some circumstances where network upgrades were proposed (improving efficiency) to relax applied 2017 capacity constraints on specific parts of the 2036 modelled network. On this basis, it is considered an acceptable methodology has been applied to determine appropriate link behaviours in the adopted models. GTA consider recommendations eleven and twelve to have been adequately addressed subject to more detailed information being outlined in the TIA, as such, the recommendations have been updated as follows.

Updated Recommendations

Recommendation Eleven V2: Provide within the NEL TIA suitable and sufficient detail on driver behaviour adjustments made to the prepared Eastern Freeway models where an inconsistency or deviation from the base model exists.

Recommendation Twelve V2: Adjust the M80 No Project model to ensure the same vehicle behaviour is established on both the No Project and With Project models where similar traffic environments occur. Where deviations from this approach have occurred provide suitable and sufficient detail in the NEL TIA.

3.4 Model Calibration and Validation

A microsimulation model is typically calibrated against observed traffic data with the GEH statistics typically used to compare *'goodness of fit'* between observed and modelled counts. It is common practice for travel times, queue lengths and vehicle speeds to be used as a secondary source of data to validate traffic models. Industry accepted guidelines have typically been used for the calibration and validation of the base models.

Eastern Freeway

Turn count data for all interchanges along the Eastern Freeway, adjacent arterial sites and the EastLink and Eastern Freeway mainlines have been used in conjunction with ATC data for all ramps. For the Freeway Entry and Exit links a more stringent calibration criteria have been adopted based on the *'core'* calibration criteria in the Roads and Maritime Services (RMS) Traffic Modelling Guidelines. Turn counts on sections repressing arterial roads have been calibrated to the standard RMS calibration criteria. This approach is considered reasonable with results meeting the criteria.

Travel times on the Eastern Freeway have been used to validate the model. The results in the calibration and validation report show that the model meets all the adopted criteria but also points out that there are several individual travel time sectors (between interchanges) where the criteria has not been met. Also, the heat map results show that the model spatial distribution of congestion along the corridor correlates well with the observed data. It is noted that the travel times along the corridor are generally lower than the average observed travel times however still within the specified criteria and considered acceptable.

M80

As referenced earlier in this report, GTA were provided with the calibration and validation report for the M80 2012 base model. A calibration and validation report for the 2017 base model has not been prepared. As such, this review is limited to the detail contained within the M80 2012 base model calibration and validation report.

Turning counts have been used to calibrate the 2012 base model. The criteria used to calibrate the turning counts included 85% of turning movements having a GEH <5 with an R2 value between 0.9 and 1 for a flow plot of observed versus modelled turn volumes. All periods in the AM and PM peak are reported to satisfy this criterion, with no discernible outliers and the calibration for the 2012 base model is therefore considered satisfactory.

Travel times and queue lengths were used to validate the model, noting that travel time validation excluded the M80 mainline. Travel times were only recorded on Plenty Road during both the AM and PM peak period with the modelled travel times within 15% of those observed which is considered acceptable.

To supplement the travel time data, queue lengths were analysed at the following locations:

- Metropolitan Ring Road eastbound off-ramp at Plenty Road
- Metropolitan Ring Road westbound off-ramp at Plenty Road
- Metropolitan Ring Road eastbound approach at Greensborough Highway
- Greensborough Highway southbound approach to Metropolitan Ring Road (northern ramps
- Greensborough Highway northbound approach to Metropolitan Ring Road (southern ramps)

Results from the comparison of observed and modelled travel times and queue lengths show an acceptable degree of correlation.

3.5 Traffic Demand Development

3.5.1 Base Demand

Base demand development is one of the more difficult elements in developing a calibrated and validated base model. A strategic model is often used to provide an initial set of demands *"prior matrix"*. A strategic model is a higher order model which relies on land use and household travel information to derive travel demands and patters across the metropolitan area.

As the strategic model is less detailed (but covers a wider area), the prior matrix typically requires adjustments to better reflect turning counts in the study area. This process is a fine balance between matching traffic counts on the network and maintaining trip patterns in the prior matrix.

Eastern Freeway

The base model demands have been obtained by obtaining a prior matrix to develop existing demand matrices for the Eastern Freeway. The process described by SmedTech is considered appropriate for calibration and validation of the model.

M80

The base model demand has been developed using strategic trip patterns from the Melbourne Integrated Transport Model (MITM), turning count survey data and OD survey data. The processes to develop existing demand matrices for the M80 Freeway, as described by SmedTech, is considered appropriate for calibration and validation of the 2012 base model.

3.5.2 Future Demand Matrices – Growth

The process used to determine growth and develop future demand matrices as outlined in the TIA report is consistent with industry standards, however, clarification is required to understand:

i The method of growth rate linear or the average annual growth rate
ii How demand for new links were calculated.

As demand matrices were provided for the existing and future models, further analysis has also been undertaken with regards to these files. It is noted that analysis of the M80 model demands had not been undertaken as the base model has not been provided for this review.

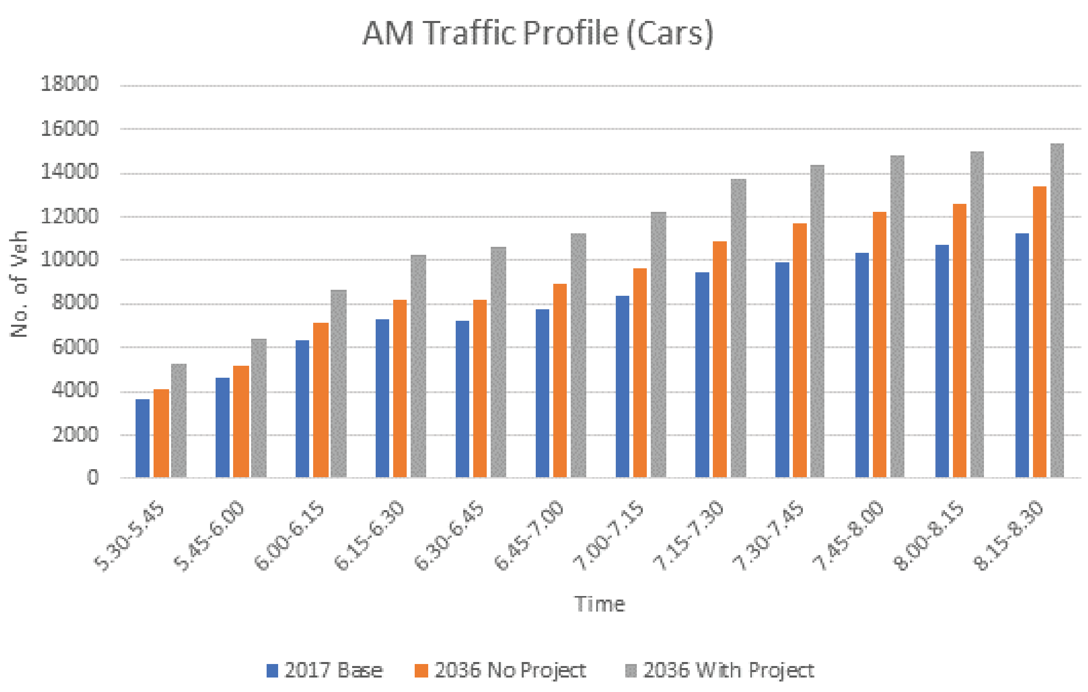
Eastern Freeway

The process outlined in the TIA for development of future No Project and With Project demands is reasonable with growth determined from the application of the Zenith strategic transport model. A comparison of total trips in the existing 2017 demand matrices and the future No Project model indicated an annual growth rate of approximately 1% per annum which is considered logical. However, further analysis of individual zones highlighted that numerous zones with low generation rates decrease the total number of trips in the future scenario which is unusual. Enquiries with SmedTech has identified that this was due to rounding in the development of the future demands. SmedTech has indicated the process has been updated to rectify this issue which is considered acceptable.

3.5.3 Demand Profile – Capacity Constraining

Global demand time profiles for the base conditions and future No Project and With Project cases have been compared to understand differences in the profile across the network. The results show that global demand profiles are consistent between the base and future models for both the Eastern Freeway and M80 models. An example of the global demand profile comparison can be seen in Figure 3.4 which shows the demand profile for AM peak period for cars in the Eastern Freeway models.

Figure 3.4: Comparison of demand Eastern Freeway AM peak models



Although Figure 3.4 shows consistent profiling of the global demands in the base and future models, further analysis has been undertaken to understand why peak spreading has not followed the global profile. The analysis of the demands at an individual zone level showed that fluctuations have occurred at individual origin-destination pairs level. For example, a comparison of demand zones 52 (Mitchem Road) and 53 (Springvale Road) situated in close proximity to each other has been undertaken. Figure 3.5 shows the location of the zones while Figure 3.6 and Figure 3.7 show the profile for the AM peak period.

Figure 3.5: Centroid locations for Eastern Freeway model

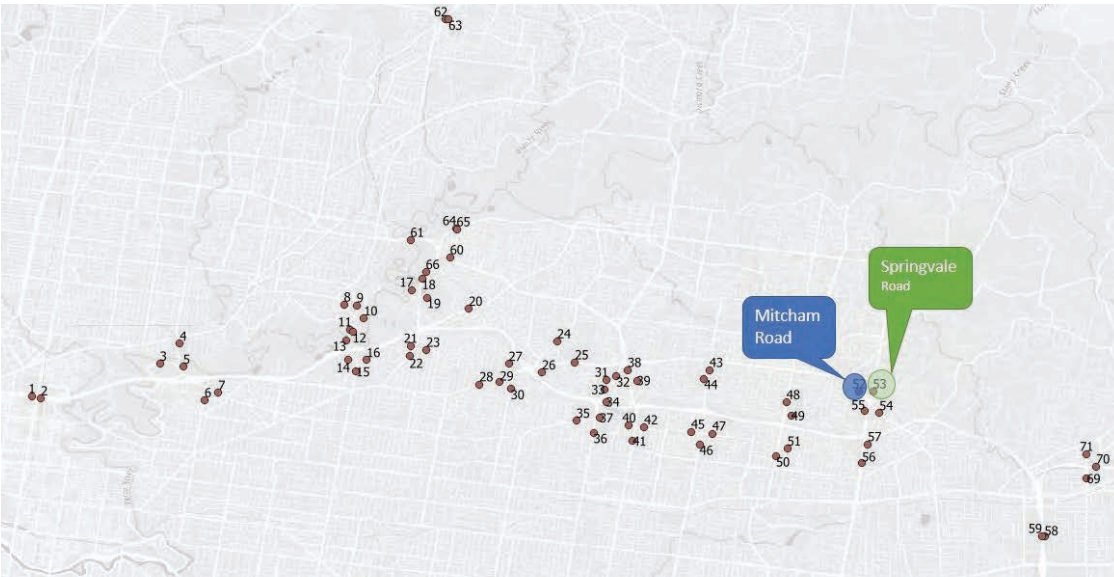


Figure 3.6: Demand profile Origin 52 during the AM peak

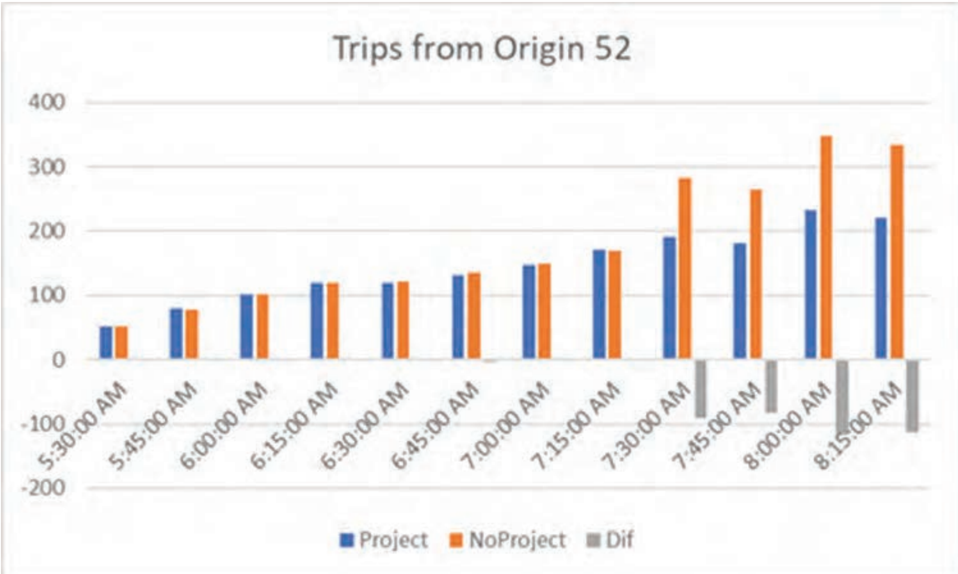


Figure 3.7: Demand profile Origin 53 during the AM peak

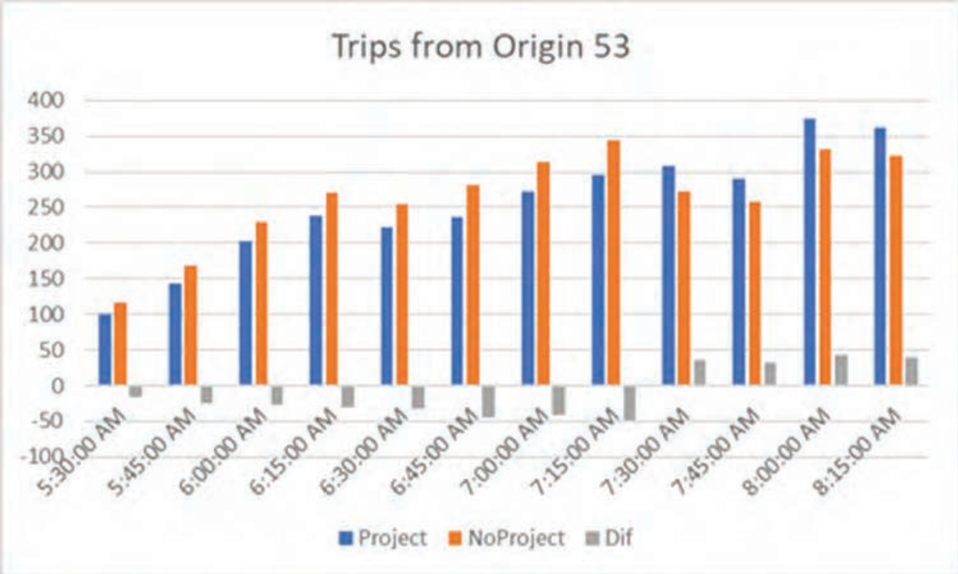


Figure 3.6 and Figure 3.7 indicate that adjustments to the profile have occurred at 7:30 with significant changes to the With Project case relative to the No Project case. However, the changes are in the opposite direction with Origin 52 showing an increase which may be acceptable but is not intuitive.

GTA made the following two recommendations, requesting additional clarification on the capacity constraining process.

Recommendation Thirteen V1: Clarification required as to the process used to constrain capacity to enable GTA to determine the acceptability and appropriateness.

Recommendation Fourteen V1 In addition to the above, further clarification as to the methodology used to profile demand being generated in the model at proposed new links in the future project scenario is recommended.

Information provided by SmedTech in response to the above recommendations reveal that capacity constraints within the micro-simulation model have been applied to the NEL and Eastlink tunnels and Middleborough Road south of the Eastern Freeway to VicRoads' satisfaction.

The change in profile to Origin 52 has been attributed to traffic inputs and modified distribution patterns for this zone between the No Project and With Project cases, particularly with the improvement of performance of the freeway network and noting that the arterial traffic peaks occur later than freeway network peaks.

The explained rationale for capacity constraints and profiling are considered acceptable. GTA believe this topic is sufficiently important to warrant further discussion in the TIA and therefore propose the following two recommendations.

Updated Recommendations

Recommendation Thirteen V2: Ensure the TIA provides a suitable level of explanatory commentary on the applied constrained capacity methodology and confirming this was applied consistently across the No Project and With Project cases.

Recommendation Fourteen V2: Ensure the TIA provides a suitable level of explanatory commentary on the methodology applied to profile demands being generated in the future models.

3.6 Development of Options for Assessment

Future models are developed where the proposed scenario is to be tested against a do minimum scenario to identify the benefits of the proposed project. The definition of what is included in the project and do minimum scenarios is critical to ensure the true benefits of the project are defined. It is quite common for soft solutions such as ramp metering or improved signal timings to be included in all options for testing as it is likely they would be undertaken for the future network. GTA initially found that there was not sufficient information to determine what was included in the No Project scenario.

Recommendation Fifteen: Provide clarification and explanation of decisions made when defining the network upgrades included in the No Project (i.e. do minimum) scenario.

Information provided by SmedTech in response to recommendation fifteen, outlines that the network upgrades were defined in the Victorian Government Reference Case V1.09. GTA consider this recommendation to have been adequately addressed.

One upgrade that was not included within the reference case is that every signalised intersection in the model extent has been re-phased to take into consideration the changes in traffic distribution. It is recommended that the project ensure that the wider traffic impacts of re-phasing signals in the vicinity of the project are monitored.

4. Peer Review Recommendation Summary

Based on the information and models provided, it appears that SmedTech have adopted a sound and reasonable modelling approach to the model build and option testing. There are a small number of areas in which further improvements are recommended as they may impact outcomes of the model testing and the EES assessment. These components are summarised in Table 4.1.

Table 4.1: Peer Review Recommendations

Component	Recommendations	Importance	Status
Model Extents	***Recommendation One V1:*** *Further investigation should be undertaken to understand the impacts the restrictions in capacity at the western end of the network would have on the project. The operational effects of these restrictions should be replicated sufficiently in the prepared models.*	Medium	Resolved
	Recommendation One V2: Replicate the operational effects associated with the Hoddle Street and Eastern Freeway junction to ensure those characteristic elements are appropriately considered on the operation of the broader corridor.	Medium	Outstanding
Survey Data	***Recommendation Two V1:*** *If it has not already been completed, an independent check be completed on the validity and conformity of the raw survey data to ensure it is deemed appropriate to use.*	Minor	Resolved
	Recommendation Two V2: Ensure suitable documentation is available on file (and accessible) which demonstrates the validity and conformity of the raw survey data in the event that a request is made to demonstrate adequacy and confirm VicRoads were consulted and were satisfied with the adopted survey data.	Minor	Outstanding
	Recommendation Three V1: *Further analysis and investigation be undertaken to ensure traffic survey data is representative of average conditions.*	Minor	Resolved
	Recommendation Three V2: Ensure suitable documentation is available on file (and accessible) which demonstrates existing traffic performance has been adequately documented including queuing and general vehicle delay observations out in the field.	Minor	Outstanding
	Recommendation Four: *Complete a comparison between the 2012 and 2017 data to ensure the suitability of the data.*	Minor	Resolved
	Recommendation Five V1: *Update the M80 calibration and validation report to include details of the extension of the model to include the NEL corridor.*	Minor	Resolved

Component	Recommendations	Importance	Status
	Recommendation Five V2: Provide written documentation which outlines and summarises the issues raised by the community and stakeholders, the dates and time ranges of visits completed; observations recorded on those sites visits and changes made to the base model to satisfactorily replicate observed network performance. This documentation should also demonstrate that the adjustments made to the M80 model (2012 data) are sufficiently robust and thorough. This summary paper should subsequently confirm outputs such as queuing on key parts of the network are consistent with field observations relied upon to calibrate the existing (2017) base condition.	Medium	Outstanding
Simulation Period and Seeds	***Recommendation Six V1:** Additional clarification is required to support the model simulation period ending at 8:30am, and the reported period in the TIA should be updated to reflect the simulation period.*	Medium	Resolved
	Recommendation Six V2: Ensure the reported period in the TIA reflects the adopted simulation period.	Minor	Outstanding
	***Recommendation Seven:** Consider updating seeds to be consistent between models and undertake stability checks.*	Minor	Resolved
Speed distributions	***Recommendation Eight:** Consider adjusting the speed distributions of the Eastern Freeway to form a more consistent approach as is used in the M80 models.*	Major	Resolved
Vehicle Classifications	***Recommendation Nine V1:** It is suggested the vehicle types and compositions should be more thoroughly addressed in the reports, however GTA notes that the decreased proportion in the Eastern Freeway models and the LCV's modelled with HGV model distributions in the M80 models, will create more conservative project case models.*	Medium	Resolved
	Recommendation Nine V2: It is recommended the vehicle types and compositions should be more thoroughly explained in the reports to ensure audience appreciation of the applied methodology.	Minor	Outstanding
Public Transport	***Recommendation Ten:** Update the dwell times reported in the M80 calibration and validation report or provide clarification as to why there is a discrepancy between the reported and modelled dwell times.*	Minor	Resolved
Behaviour Types	***Recommendation Eleven V1:** Provide further detail to clarify the purpose for the difference in link types in the Eastern Freeway base model.*	Major	Resolved
	Recommendation Eleven V2: Provide within the NEL TIA suitable and sufficient detail on driver behaviour adjustments made to the prepared Eastern Freeway models where an inconsistency or deviation from the base model exists.	Minor	Outstanding
	***Recommendation Twelve V1:** Adjust the M80 No Project model to ensure the same vehicle behaviour is established on both the No Project and With Project models where similar traffic environments occur unless suitable reasoning can be provided for any differentiation.*	Minor	Resolved

Component	Recommendations	Importance	Status
	Recommendation Twelve V2: Adjust the M80 No Project model to ensure the same vehicle behaviour is established on both the No Project and With Project models where similar traffic environments occur. Where deviations from this approach have occurred provide suitable and sufficient detail in the NEL TIA.	Minor	Outstanding
Demand Profile / Capacity Constraints	***Recommendation Thirteen V1:*** *Clarification required as to the process used to constrain capacity to enable GTA to determine the acceptability and appropriateness.*	Medium	Resolved
	Recommendation Thirteen V2: Ensure the TIA provides a suitable level of explanatory commentary on the applied constrained capacity methodology and confirming this was applied consistently across the *No Project* and *With Project* cases.	Minor	Outstanding
	Recommendation Fourteen V1: *In addition to the above, further clarification as to the methodology used to profile demand being generated in the model at proposed new links in the future project scenario is recommended.*	Medium	Resolved
	Recommendation Fourteen V2: Ensure the TIA provides a suitable level of explanatory commentary on the methodology applied to profile demands being generated in the future models.	Minor	Outstanding
Options assessment	***Recommendation Fifteen:*** *Provide clarification and explanation of decisions made when defining the network upgrades included in the No Project (i.e. do minimum) scenario.*	Minor	Resolved

5. Conclusion

Based on the analysis and discussions presented within this report, the modelling methodology is considered adequate for its intended purpose, bearing in mind both the range and intention of the recommendations outlined in Table 4.1. Where issues were identified, enquiries with SmedTech have revealed an acceptable approach was adopted.

Appendix A

Review Schedule

A table of link behaviour types has been completed and highlights values which differ from the default link types used.

Behaviour Type	CC0	CC1	Waiting Time before diffusion	Consider Subsequent static routing	Safety distance reduction factor	Max deceleration for cooperative breaking	Cooperative Lane Change	Smooth closeup behaviour	Minimum lateral standing distance
1 - Urban (motorized)			**300s**	×	0.6	-3m/s2	×	×	**1.0m**
10 - Urban Default			60s		0.6	-3m/s2	×		0.2m
6 - Urban (merge)			**300s**	×	**0.1**	-3m/s2	×	×	**1.0m**
11 - Urban Merge			60s		0.2	-9m/s2	×		0.2m
3 - Freeway (free lane selection)	1.5	**2**	**300s**	×	0.6	-3m/s2	×	×	**1.0m**
20 - Freeway Basic	1.5	1.1	60s		0.1	-3m/s2	×		0.2m
21 - Freeway Constrained120	1.5	**1.2**	60s		0.6	-3m/s2	×		0.2m
23 - Freeway Constrained130	1.5	**1.3**	60s		0.6	-3m/s2	×		0.2m
27 - Freeway Basic Queue	**3.0**	**1.05**	60s		0.6	-3m/s2	×		0.2m
7 - Freeway (merge)	1.5	**2**	**300s**	×	**0.1**	-3m/s2	×	×	**1.0m**
28 - Freeway Merge (mild)	1.5	**1.0**	60s		0.4	**-6m/s2**			0.2m
29 - Freeway Merge (aggressive)	1.5	**0.9**	60s		0.2	**-9m/s2**			0.2m

Appendix B

Link Types and Driver Behaviour Memo

Memo

To	GTA		
Copy to			
From	Tony Frodsham	Date	19/09/2018
Subject	Link Types and Driver Behaviour - NEL	Job no.	P0015

Purpose

The purpose of this memo is to respond to GTA's request to understand the changes that have been made to the driver behaviour in the microsimulation model between the no project and project models.

Overview

A number of different link types have been developed for the NEL VISSIM model with each link type including slightly different driver behaviour parameters. These link types have been applied to sections of roadway within the network where either driver behaviour or link capacity is noted to vary from that which results from using the standard VISSIM default behavioural parameters.

Differences in driver behaviour and link capacity can occur for a variety of reasons in a freeway or arterial network. Examples of factors that may impact these include freeway alignment and geometry, lane widths, sightlines, driver perception and driver familiarity with both the freeway design and the expected traffic conditions.

It is important that a methodical and consistent approach is taken when making adjustments to driver behaviour in VISSIM. Link type behaviours should therefore only be changed within the model once it has been confirmed that the model is simulating the correct traffic volumes and user class splits through the relevant sectors of freeway, and that the matrix profile data feeding that traffic into the model is also correct. In addition, it should be ensured that reasonable lookahead values have been specified for exit points and any other lane changing influences downstream. If all of these criteria have been met and the default link behaviour does not replicate the site observations, then it is reasonable to consider adjusting the parameters to account for local driver behaviour and any other factors that may be influencing link capacity.

The use and application of these adjusted link types is drawn from experience in modelling previous local projects together with analysis of the video data from the extensive travel time surveys undertaken by Austraffic. In addition, SVLO plots have been used to ensure that the model is producing congestion in the correct locations and at the correct times of day. This assists in calibrating the impact of the behavioural adjustments in the model against the actual freeway performance on the day of survey.

Behavioural parameters that have been adjusted for the model can essentially be categorised as applying to two key types of freeway sectors as follows:

- Mid-block freeway sectors; and
- Merge and weave freeway sectors.

Mid-Block Sectors

Parameter Development

Link capacity for mid-block freeway segments was primarily stratified using the CC1 parameter. The CC1 parameter has a direct influence on the capacity of the freeway link by adjusting a proportion of the overall headway that drivers seek to allow between themselves and the vehicle directly in front of them. The use of a larger CC1 value will have the impact of reducing the overall capacity that can be achieved on the relevant link. The application of this technique allowed the adjustment of link capacity at locations where the site data and observations indicated that capacity was impacted by a factor that was outside the normal coding adjustments (ie signposting, traffic volumes and traffic profiling).

Table 1 outlines the three link behaviours that were developed in order to adjust the capacity of the freeway mid-block segments in the NEL VISSIM model.

Table 1 – Link behaviours

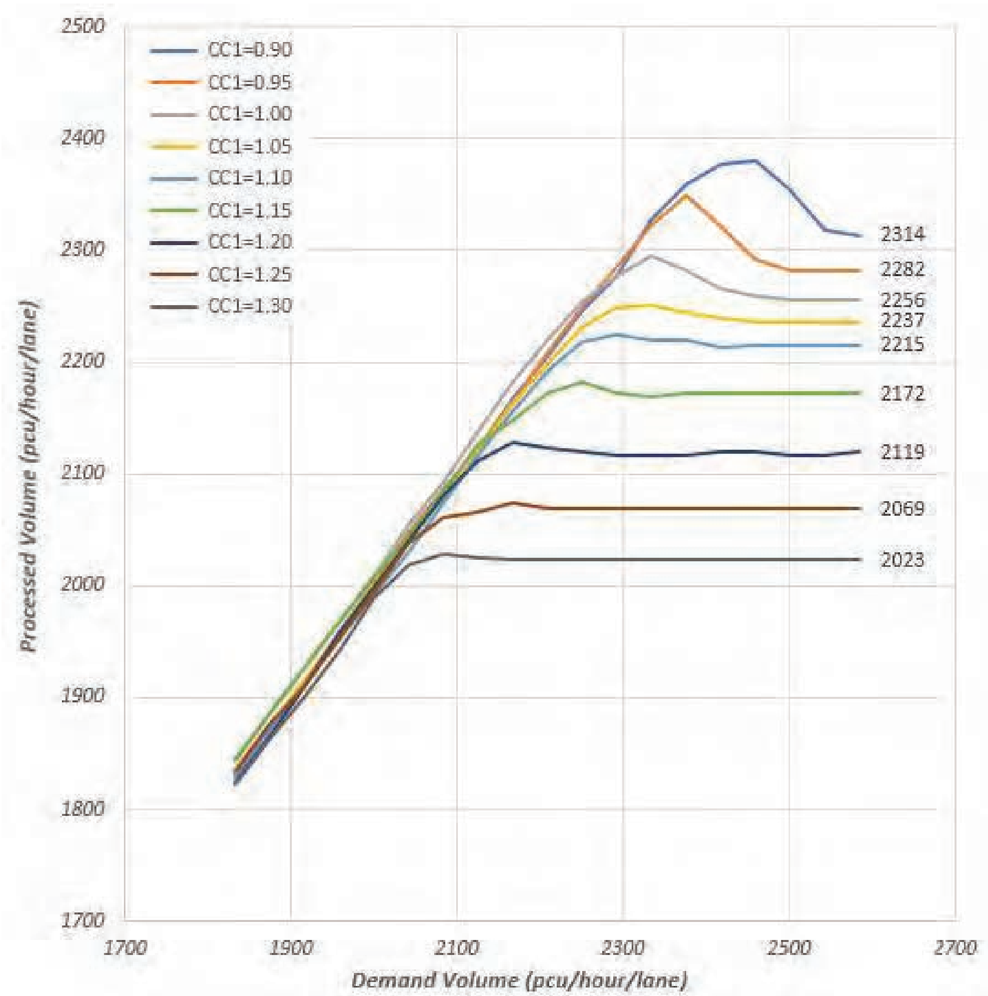
Name	Description	Parameter Changes	Maximum Link Capacity*
Freeway Basic	Standard sector	**CC1 = 1.1**	Approx. 2,200 pcu/hr/ln
Freeway 120	Constrained sector	CC1 = 1.2	Approx. 2,100 pcu/hr/ln
Freeway 130	More Constrained sector	**CC1 = 1.3**	Approx. 2,000 pcu/hr/ln

** Maximum Link Capacity calculation assumes optimal driving conditions with no forced lane changing*

The development of these parameters was assisted by undertaking some basic research into the impact of the CC1 value upon link capacity in VISSIM 9 and then cross-referencing this against SVLO data for detectors along the Eastern Freeway on the day of survey.

A number of simple VISSIM link models were run with varying CC1 values under 50 separate seed scenarios. The average link capacity under each scenario was then assessed by plotting the traffic processed by the link under an increasing traffic demand. Figure 1 plots the results and provides an indication of the maximum link capacity that might be achieved under each CC1 setting and under optimum flow conditions.

Figure 1 – Impact of altering CC1 values



Springvale Road to Blackburn Road

The Freeway 130 link behaviour was applied in the 2017 Base model in areas between the Springvale Road west-facing ramps and the Blackburn Road overpass in both directions of travel. This area was subject to delays in both modelled time periods in the peak direction of travel. Traffic volumes were calibrated closely to observed values and profiled using relevant count data, whilst ramp to ramp traffic movements were calibrated against origin-destination surveys to ensure that any weave movements and lane changing were replicated. SVLO data, travel time surveys and video recordings provided evidence of the congestion and conditions experienced throughout the peak periods. Further, discussion with VicRoads provided additional background to the existence of congestion at these locations.

Initial model runs showed that traffic flow through these areas was significantly too fast in the models, particularly in the inbound direction. Therefore, in order to replicate the reduction in capacity indicated by the available data the Freeway 130 link behaviour was applied at these locations. This has the impact of reducing capacity and better replicating the observed congestion at these locations.

Under the 2036 Project scenario the area between the Springvale Road west-facing ramps and the Blackburn overpass is proposed to be re-aligned and significantly widened. The operation of the west-facing entry ramp merge will change from a single lane to a double lane ramp entry with a four lane cross-section continuing under Blackburn Road. In the outbound direction the three lane pinch-point beneath Blackburn Road becomes five lanes and this significantly simplifies access to the eastbound Springvale Road offramp. Since the infrastructure at this location will undergo significant changes in both directions it was not considered appropriate to carry the capacity constraints from the 2017 Base models into the 2036 Project models.

Doncaster Bend to Elgar Road

The Freeway 120 link behaviour was applied in the 2017 Base model in the outbound direction between the Doncaster Road bend and the short weave area between Doncaster Road and Elgar Road. This area was subject to heavy delays in the PM peak period and formed a part of the lengthy queuing that developed between Elgar Road back through the Doncaster Road bend and back towards the Chandler Highway interchange.

Once again, the area in question was first calibrated using ramp counts, ramp origin-destination surveys and profiled accurately. SVLO data, travel time surveys and video recordings provided a detailed understanding of traffic conditions throughout the period and further information was gained from VicRoads. After an initial suite of model runs indicated that the basic parameters could not replicate the delays experienced on the day of the surveys the Freeway 120 link behaviour was applied between the Doncaster Road bend and the Elgar Road exit ramp in order to reduce the capacity of this section of carriageway. This more closely matched the observed traffic conditions based on the available evidence.

Under the 2036 Project scenario the area between the Doncaster Road bend and Elgar Road eastbound offramp will be completely rebuilt. This will include the provision of a central express carriageway with three lanes in each direction and large adjacent three lane collector-distributors with a four lane weave for the eastbound Doncaster Road to Elgar Road section. In addition, the geometry of the Doncaster Road bend will be softened to allow a larger radius curve. Since the infrastructure at this location will undergo significant changes in both directions it was not considered appropriate to carry the capacity constraints from the 2017 Base models into the 2036 Project models.

Mid-block Rolling Queues

In addition to the link capacity adjustments one further mid-block driver behaviour was developed for the NEL VISSIM model. This related to the daily queuing that occurred for long periods on the Eastern Freeway during both peak periods. Specifically, this related to citybound queuing upstream of the westbound Elgar Road onramp in the AM peak period, and outbound queuing upstream of the eastbound Tram Road onramp in the PM peak period. These locations were subject to consistent and lengthy queues on the freeway that occurred every weekday and were well known to regular commuters.

During model development and calibration, it became clear that the standard VISSIM parameters were not suitable to accurately model the behaviour of traffic in these queues. Calibration outputs for entry ramps, exit ramps and mid-block sectors showed that the number of vehicles queued at these locations on the freeway were correct at any given time. However the queue lengths were still significantly too short in many cases. Assessment of the video files showed that much of this queuing took the form of a very slow and extended rolling queue rather than the closely spaced queuing that VISSIM will typically simulate under the default parameters. This behaviour is likely to have occurred due to the high level of familiarity of drivers with these queues.

As a result of this assessment an adjustment was made to the CC0 parameter in order to simulate a more extended queue formation as observed in the travel time video files. The CC0 parameter provides VISSIM with the distance that vehicles will keep between themselves and the preceding vehicle in a queuing environment. It was found that an increase from 1.5m to 3.0m would more accurately simulate the queuing formation observed at these locations whilst maintaining the integrity of the arrival and exit volumes into and out of the queue. The changes to the CCO parameters are presented in Table 2.

Table 2 – CCO parameter changes

Name	Description	Parameter Changes
Freeway queue	Slow rolling queue	CCO = 3.0

Merge and Weave Sectors

Merge and weave sectors often require adjustments to driver behaviour in microsimulation models since the default parameters are generally not able to account for the significantly different driving conditions observed at these locations. Whilst lane changing on mid-block sectors is typically discretionary, lane changing in merge and weave sectors is often a requirement. It is therefore far more likely that drivers will (at least temporarily) accept shorter headways and undertake less cautious driving manoeuvres at these locations.

In order to retain a consistent application of link behaviour at merge and weave points throughout the NEL model two separate merge behaviours have been developed. These simulate a 'mild' and an 'aggressive' driver approach to merging and weaving by allowing drivers to accept shorter headways and to apply greater deceleration in each case. It should be noted that this approach has been successfully used in other recent large scale Victorian freeway models such as the West Gate Tunnel project.

Table 3 lists the two merging behaviours that have been used in the NEL VISSIM model and the parameters that have been adjusted in each case.

Table 3 – Driver behaviours

Name	Description	Parameter Changes
Mild	Standard merge or weave	CC1 = 1.0 Accepted deceleration = -1.0 Min Headway = 0.5 Safety Distance Reduction Factor = 0.4 Max Deceleration Co-operative = -6.0
Aggressive	Short merge or weave	CC1 = 0.9 Accepted deceleration = -1.0 Min Headway = 0.4 Safety Distance Reduction Factor = 0.2 Max Deceleration Co-operative = -9.0

The application of these two merge and weave behaviours has been undertaken on the basis of the length of the merge or weave area available in any given freeway sector. As such, changes to the merge behaviours have been applied between the no project and project models in the following situations:

- Where a standard entry ramp merge has been converted to a two-lane entry, the driver behaviour has been changed from mild to aggressive to allow for the short merge;
- Where a two-lane entry has been converted to a single lane merge, the driver behaviour has been changed from aggressive to mild to allow for the longer merge;

- Where a short weave section has been created, the driver behaviour has been set to aggressive as drivers are required to change lanes rapidly; and
- Where a long weave section has been created, the driver behaviour has been set to mild as drivers have sufficient time to change lanes.

Appendix C

Micromodel peer review response

Memo

SMEDTECH TECHNICAL & STRATEGIC

To	GTA		
Copy to			
From	Tony Frodsham	Date	24/09/2018
Subject	Micromodel peer review response	Job no.	P0015

Purpose

The purpose of this memo is to respond to GTA's comments on the microsimulation model and to provide information on the changes that have been incorporated into the models where required.

The GTA recommendations and our responses are provided in Table 1.

Table 1 – Driver behaviours

Recommendation	Response
Recommendation One: Further investigation should be undertaken to understand the impacts the restrictions in capacity at the western end of the network would have on the project. The operational effects of these restrictions should be replicated sufficiently in the prepared models.	The scope of the models was discussed and agreed with VicRoads. This included the decision not to include the Hoddle Street interchange. However, we are investigating the impact of placing signals at the western end of the freeway.
Recommendation Two: If it has not already been completed, an independent check be completed on the validity and conformity of the raw survey data to ensure it is deemed appropriate to use.	The survey data has been shared with VicRoads for their information and review with no issues raised.
Recommendation Three: Further analysis and investigation be undertaken to ensure traffic survey data is representative of average conditions.	We have compared the SVO data for the day of the survey with the SVO data for the full month and found that the survey day was representative of typical traffic volumes
Recommendation Four: Complete a comparison between the 2012 and 2017 data to ensure the suitability of the data.	Traffic volumes in the 2012 model were factored up to 2017 volumes using VicRoads data such as SVO and SCATS and surveys such as ATC's.
Recommendation Five: Update the M80 calibration and validation report to include details of the extension of the model to include the NEL corridor.	It is not proposed to update the calibration and validation report of the M80 model. It was not possible to collect new turning movement count data due to works on the M80 Ring Road and rail closures which impacted traffic conditions within the area, hence using other data sources to factor the 2012 volumes. Turning movements have recently been undertaken at the intersection of Grimshaw Street and Greensborough Road. A comparison of the 2017 modelled volumes and the 2018 observed volumes are presented in Table 2 and Table 3. The volumes presented are for the two-hour peak period. Table 2 shows that in the AM peak, the modelled volumes are slightly higher than the observed volumes, while the PM peak volumes are similar. Table 3 shows that the volumes are very similar, except for those relating to Erskine Road where the modelled volumes are generally higher.

Recommendation	Response
	The roads within the microsimulation model generally match those within the strategic model to enable the future forecasting of volumes. This may have resulted in roads such as Erskine Road being allocated more traffic as other minor roads, such as Moorwatha Street and Edward Street, are not included in the strategic model. On-site observations have been used to assess the performance of the factored models, with the models generally reflecting the level of congestion and traffic performance. As the 2017 models are not being directly used as part of the EES assessment, their performance and alignment with the observed traffic counts are considered acceptable.
Recommendation Six: Additional clarification is required to support the model simulation period ending at 8:30am, and the reported period in the TIA should be updated to reflect the simulation period.	Analysis of the SVO and recorded data showed that traffic volumes on the Eastern Freeway peak early and then drop off throughout the morning peak period. Based on these on-site observations, it was decided to model the 6:30 to 8:30 peak for the morning. This methodology was discussed and agreed with VicRoads The profile of traffic crossing the Yarra River is presented in Figure 1.
Recommendation Seven: Consider updating seeds to be consistent between models and undertake stability checks.	This was an error and has been corrected in the most recent model runs. We will also undertake some stability tests and provide data with the revised model runs.
Recommendation Eight: Consider adjusting the speed distributions of the Eastern Freeway to form a more consistent approach as is used in the M80 models.	All Eastern Freeway models have been re-run with speed distributions consistent with the M80 models as recommended.
Recommendation Nine: It is suggested the vehicle types and compositions should be more thoroughly addressed in the reports, however GTA notes that the decreased proportion in the Eastern Freeway models and the LCV's modelled with HGV model distributions in the M80 models, will create more conservative project case models.	The correct model types have been assigned to the correct user classes in all models in the revised model runs - this was an error in the original modelling. In addition, the proportion of small HGVs has been made consistent (22) in all 2036 models - again this was an error in one of the original models. This change in proportions was to reflect the splitting out of LCVs to be a new user class in the 2036 models and was based upon ATC data from the study area.
Recommendation Ten: Update the dwell times reported in the M80 calibration and validation report or provide clarification as to why there is a discrepancy between the reported and modelled dwell times.	This has been adjusted to a 10 second dwell time for all PT lines across all models to maintain consistency.
Recommendation Eleven: Provide further detail to clarify the purpose for the difference in link types in the Eastern Freeway base model.	An updated memo has been produced outlining the methodology behind the development of the link type changes. This provides more detail on the locations that these have been used at, the reasoning behind their use and the impacts. It also outlines the reasons that some of these link types have not been carried forward to the Project scenarios.
Recommendation Twelve: Adjust the M80 No Project model is adjusted to ensure the same vehicle behaviour is established on both the No project and Project models where similar traffic environments occur unless suitable reasoning can be provided for any differentiation.	The M80 No Project models have been revised to have consistent link types with the M80 Project model where infrastructure is identical.
Recommendation Thirteen: Clarification required as to the process used to constrain capacity to enable GTA to determine the acceptability and appropriateness.	Capacity constraints within the microsimulation model have been applied to the tunnels (NEL and EastLink) based on analysis undertaken by VicRoads. The other location where a capacity constraint has been applied is to Middleborough Road south of the Eastern Freeway.

Recommendation	Response
	The change in profile identified at Origin 52 is due to a significant change in traffic input at this zone and also a change to the distribution of traffic from this origin. The profile for each origin zone is a combination of local arterial and freeway ramp profiles, depending on each individual OD cell. If the distribution of traffic changes between scenarios then the overall profile will be adjusted accordingly as OD cell values go up or down. Local arterial traffic has a significantly later peak than traffic bound for the freeway in the AM period and with a significant increase in arterial traffic generated from this zone in the No Project scenario this has been reflected in the overall profiling - along with a number of other traffic OD distribution changes in both the Project and No Project scenarios.
Recommendation Fourteen: In addition to the above, further clarification as to the methodology used to profile demand being generated in the model at proposed new links in the future project scenario is recommended.	Profiling is undertaken by origin and takes into consideration where the traffic is turning towards the freeway or continuing on the arterial network. Traffic travelling along new links will be profiled by the route that they take - ie specific freeway ramp or arterial movement
Recommendation Fifteen: Provide clarification and explanation of decisions made when defining the network upgrades included in the no project (i.e. do minimum) scenario.	The bulk of the network upgrades were as defined in the Victorian Government Reference Case V1.09. The only changes to this are the additional capacity on Chandler Highway as this has a short section of two lanes between the Yarra River and Eastern Freeway. The lane arrangement at the intersection of Belmore Road and Elgar Road has also been changed in the project model to allow for the increased left turn volume from Belmore. Every signalised intersection has been rephased to take into consideration the changes in traffic distribution. The phasing has been developed to achieve a level of service of D (or better) for the whole intersection.

Figure 1 – Existing traffic profile – Eastern Freeway

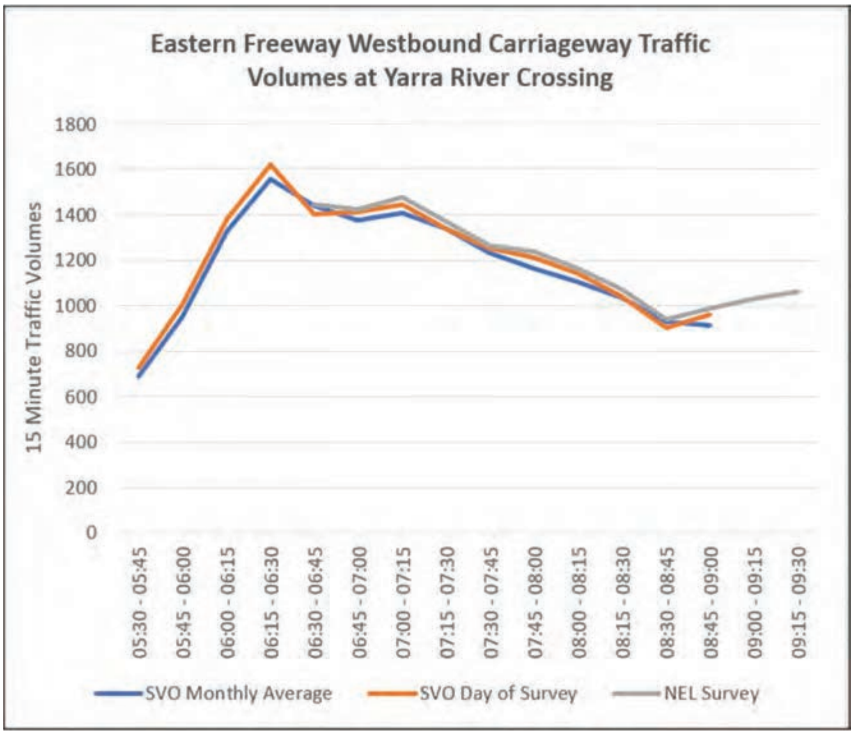


Table 2 – Grimshaw/Greensborough intersection base volumes

Approach	Movement	2hr AM peak		2hr PM peak	
		Observed	Modelled	Observed	Modelled
Greensborough Road south	Left	80	160	100	230
	Through	1,920	2,150	3,060	2,990
	Right	410	310	910	950
Grimshaw Street east	Left	530	610	510	530
	Through	1,450	1,310	1,030	1,120
	Right	1,310	1,310	1,180	1,040
Greensborough Road north	Left	560	870	1,560	1,700
	Through	3,280	3,960	2,540	3,010
	Right	590	610	410	470
Grimshaw Street west	Left	1,040	500	1,150	950
	Through	820	780	1,040	1,190
	Right	290	370	340	340

Table 3 – Erskine/Greensborough intersection base volumes

Approach	Movement	2hr AM peak		2hr PM peak	
		Observed	Modelled	Observed	Modelled
Greensborough Road south	Left	300	500	140	300
	Through	2,800	2,900	3,630	3,900
Erskine Road west	Left	130	200	520	800
	Right	320	300	660	600
Greensborough Road north	Through	3,860	3,600	3,140	3,200
	Right	300	900	260	300

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Appendix B – VLC transport modelling reports

Veitch Lister Consulting Pty Ltd

Prepared for

North East Link Project

Transport Modelling for North East Link

Transport Modelling Summary Report

March 2019

North East Link

Transport Modelling Summary

Project No. 16-081

Date	Revision	Prepared By	Checked By	Approved By	Description
30/08/2018	A	LL	AA	LMcG	Draft for comment
26/11/2018	B	AA	TV / LMcG	TV	Updated for EES
21/01/2019	C	AA	LMcG	TV	Updated for EES
22/03/2019	D	AA	LMcG	TV	Minor update - updated client name

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1. Introduction

1.1 Project background and context

The North East Link Project (NELP) appointed Veitch Lister Consulting (VLC) to provide strategic transport modelling services for North East Link. These services included:

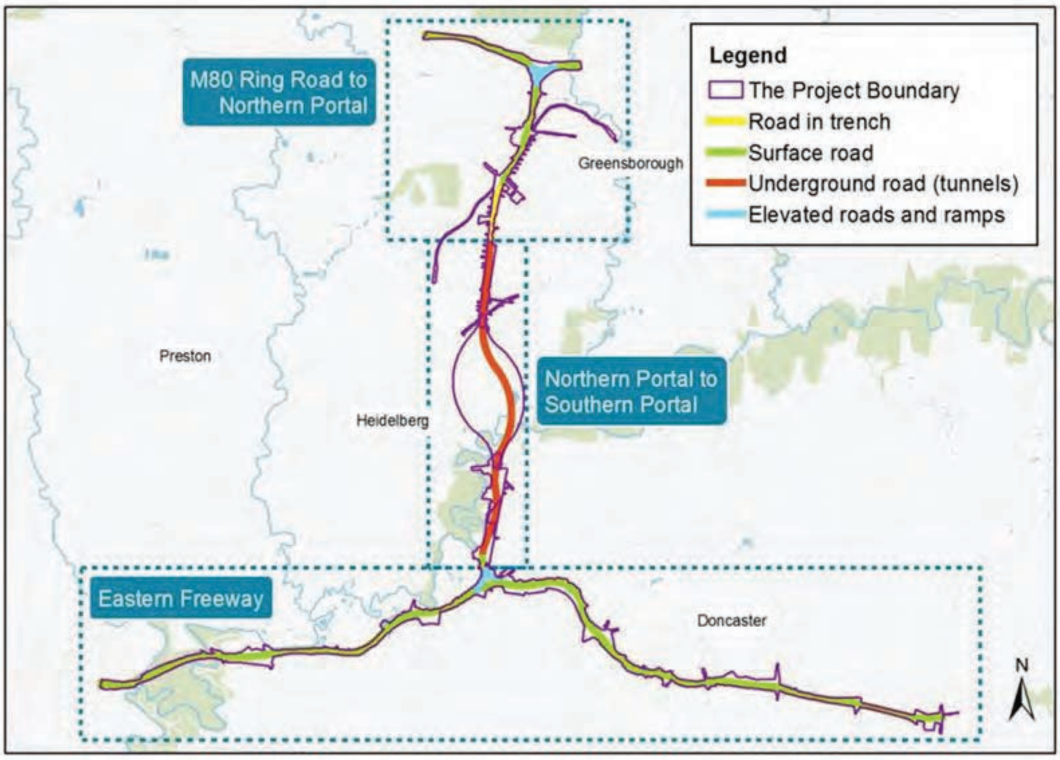
- Set up and model preparation of the North East Link transport model
- Input into the options assessment
- Preparation of the business case forecasts for the preferred project
- input into the reference design and Environment Effects Statement (EES).

This document summarises the strategic transport modelling undertaken for the North East Link EES.

North East Link ('the project') is a proposed new freeway-standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway and includes works along the Eastern Freeway from near Hoddle Street to Springvale Road.

The North East Link boundary is shown in Figure 1.1.

Figure 1.1 - North East Link boundary



Source: North East Link Authority

The impact of the new link on the transport task was examined using the Zenith strategic transport model.

The model was used to forecast the impact of North East Link on travel patterns across two distinct areas:

- Metropolitan Melbourne – defined by the Australian Bureau of Statistics' Greater Capital City Statistical Area (GCCSA)
- The project study area – which includes part or all of the municipalities of Banyule, Boroondara, Darebin, Manningham, Maroondah, Nillumbik, Whitehorse, Whittlesea and Yarra.

These areas are shown in Figure 1.2 and Figure 1.3 below.

The model was also used to forecast demand along the Eastern Freeway corridor and M80 Ring Road/north-east corridor to input into the microsimulation modelling process.

Figure 1.2 - Melbourne: Greater Capital City Statistical Area (GCCSA)

Figure 1.3 - North East Link study area

1.2 Scope of this report

This Appendix summarises the strategic modelling undertaken for the North East Link EES, including modelling methodologies, assumptions and high-level results.

Five '*core*' scenarios were developed for the project:

- 2016 base year scenario
- 2026 base case (no project) scenario
- 2026 North East Link project case scenario
- 2036 base case (no project) scenario
- 2036 North East Link project case scenario.

Section 2 discusses development and testing of the base year (2016) model. Section 3 discusses the development of the future year scenarios (2026 and 2036). Section 4 highlights key technical issues relevant to the forecasting for this project. Section 5 provides a high-level summary of the forecasting results.

This report does not contain detailed results, including the effects of the project compared with a 'no project' scenario. Those results are provided in the impact assessment detailed in Technical report A – Traffic and Transport. The detailed results from the technical report have also been applied to develop the North East Link reference design, and to support the impact assessments for air quality, noise, social and human health provided in Technical report B – Air quality, Technical report C – Surface noise and vibration, Technical report I – Social and Technical report J – Human health.

1.3 The Zenith model

1.3.1 Background

The strategic transport modelling for North East Link was undertaken using VLC's Zenith model, which covers metropolitan Melbourne and the regional cities of Geelong, Bendigo, Ballarat and Traralgon.

Figure 1.4 - Coverage of the Zenith model

The Zenith model has been developed to its current state over more than 20 years and has been applied to many major projects for the Victorian Government, including CityLink, EastLink, the West Gate Tunnel Project, the CityLink-Tulla widening, East West Link and the Metro Tunnel.

The Zenith model was most recently recalibrated in 2014, using a Victorian Government survey of travel behaviour in Victoria, the *Victorian Integrated Survey of Travel and Activity* (VISTA). While the survey was conducted from 2007 to 2010, Victorian Government research indicates that travel behaviour across Melbourne has not changed significantly since that time (DEDJTR, 2013)[1].

[1] Department of Economic Development, Jobs, Transport and Resources. "*Travel in metropolitan Melbourne, VISTA Survey 2013*"

Reports summarising the structure of the Zenith model and its parameters (that is, it's equations) are available on VLC's website at <www.veitchlister.com.au/our-company/zenith>. The most relevant documents are:

Zenith framework working papers

- Zenith Framework Working Paper A: Model Design and Architecture
- Zenith Framework Working Paper B: Household Segmentation
- Zenith Framework Working Paper C: Trip Productions
- Zenith Framework Working Paper D: Travel Market Segmentation
- Zenith Framework Working Paper E: Destination Choice
- Zenith Framework Working Paper F: Period Allocation
- Zenith Framework Working Paper G: Mode Choice
- Zenith Framework Working Paper H: Static Traffic Assignment
- Zenith Framework Working Paper I: Static Transit Assignment.

Zenith Victorian working papers 3.0.0

- Working Paper 2 – Review of VISTA
- Working Paper 3 – Household Segmentation Model
- Working Paper 4a – Home Based Trip Production Model
- Working Paper 4b – Non Home Based Trip Productions
- Working Paper 5 – Travel Market Segmentation Model
- Working Paper 6 – Destination Choice Model
- Working Paper 7 – Period Allocation Model
- Working Paper 8 – Mode Choice Model
- Working Paper 9 – Model Validation.

1.3.2 Toll road track record

Zenith has a credible track record of forecasting traffic on toll roads in Australia. For Victoria's EastLink toll road, VLC traffic forecasts for the Victorian Government were within 10 per cent of the eventual traffic volumes. In comparison, the winning bidder's forecasts for EastLink were much higher.

Zenith models have also been used to produce credible traffic forecasts for other toll roads where the forecasts of bidders were overly optimistic.

Table 1.1 on the next page provides a comparison between Zenith forecasts for four recent toll roads, the observed volumes approximately 18 months after opening, as well as the winning bid forecasts. In every instance, the Zenith forecasts were the most accurate.

Table 1.1 - Comparison of forecasts

Toll Road	Actual daily traffic volume	Winning bid forecast daily traffic volume (difference)	Zenith forecast daily traffic volume (difference)
Cross City Tunnel, Sydney	32,500	90,000 (+57,000 / +175%)	30,000 (-2,500 / -8%)
Lane Cove Tunnel, Sydney	57,000	~115,000 (+58,000 / +100%)	62,000 (+5,000 / +9%)
Clem 7, Brisbane	26,000	109,000 (+83,000 / +320%)	34,000 (+8,000 / +31%)
Airport Link, Brisbane	53,300	195,000 (+142,000 / +265%)	54,000 (+700 / +1%)

Zenith's forecasts for the roads listed in the Table were prepared before their construction. For Brisbane's Airport Link tunnel, the forecasts were made public[2] before the tunnel's opening. These forecasts were not used in any way by the toll road bidders or operators.

While past forecasting accuracy does not guarantee future forecasting accuracy, the track record of Zenith suggests that the fundamentals of the Zenith model are sound. The forecasts for North East Link have been prepared using the same approach.

1.4 Limitations and interpretation

Transport models have numerous limitations which should be considered when interpreting the resulting traffic forecasts.

In particular, transport models rely on numerous third-party data sources, including forecasts of population, demographics, employment, education enrolments, port trucks and air travel. They also rely on assumptions about future transport infrastructure, future technology and future travel behaviour, and use methodologies that simplify certain aspects of the real world. Many of these data sources, assumptions and methodologies are inherently uncertain, meaning the traffic forecasts are also uncertain.

The future assumptions included in the modelling (including their source) are discussed in Section 3 and a general summary of model limitations is provided in *Appendix A: Model limitations.*

[2] <https://veitchlister.com.au/zenith-airport-link-forecasts-update/>

2. Base year model validation

In traffic forecasting, it is common to develop a '*base year*' model representing a year in the recent past. The main reason to develop a base year model is to verify that the model adequately reflects existing conditions, such as traffic volumes, public transport patronage and travel speeds. Various other checks are also performed, such as examining the sensitivity (or elasticity) of the model results to changes in individual inputs and ensuring that the model results are suitably converged (that is, stable). This overall process of checking the reasonableness of the base year model is commonly referred to as '*model validation*'.

In this case, 2016 was chosen as the base year due to its alignment with the 2016 Australian Bureau of Statistic (ABS) Census.

The Victorian Government has prepared two transport modelling guidelines that specifically relate to traffic model validation, including:

1. The VicRoads *Transport Modelling Guidelines, Volume 2: Strategic Modelling, Version: Draft 3* (April 2012) sets out the approach and criteria recommended by VicRoads for the validation of strategic transport models

2. The Victorian Department of Economic Development, Jobs, Transport and Resources (now known as the Victorian Department of Transport) *Strategic Transport Model Elasticity Guidelines (*December 2015) sets out 'dynamic validation' realism tests (sensitivity scenarios on the base case transport model) and provides a range of approximate elasticity values. These ranges have been estimated by the Department, while ranges developed from local data are not utilised. For this reason, the modelled results were compared with elasticity ranges from both international estimates, as well as the Department's estimates.

During this project, a large number of traffic and public transport counts and surveys were received from NELP and VicRoads for the purposes of validating the model in the North East Link study area. The data used for validation included:

- Peak period and daily traffic counts
- Commercial vehicle daily counts
- Travel time surveys
- CBD cordon train passenger loads
- Bus passenger boardings by route.

Statistics summarising the *goodness of fit* between modelled and observed traffic counts (as compared with the VicRoads targets) are shown in Table 2.1. The Table shows that the model meets the VicRoads targets for the AM peak, PM peak and across the whole day.

Table 2.1 - Traffic validation against VicRoads validation guidelines

Statistics	VicRoads Targets	AWDT AM	AWDT PM	AWDT Total
R-square	>0.9	0.905	0.923	0.978
Gradient	Between 0.9 and 1.1	0.986	0.988	0.994
% RMSE	<30	26.7	23.8	13.7
All	as above	✓	✓	✓

More detailed model validation results are provided in *Appendix B: Local area model validation*. Based on these results, we consider the base year model provides a sound foundation for forecasting traffic in the North East Link study area.

However, it should be noted that a sound base year model does not guarantee accurate forecasts, primarily because future year models depend on many assumptions about future changes in population, demographics, economic conditions, technology and travel behaviour.

3. Future year assumptions

3.1 Overview

This section discusses the transport modelling assumptions used in the future year scenarios. Four '*core*' future scenarios were developed for the project:

- 2026 base case (no project) scenario
- 2026 North East Link project case scenario
- 2036 base case (no project) scenario
- 2036 North East Link project case scenario.

2036 is the core evaluation year for the traffic and transport impact assessment of the North East Link EES as it aligns with typical practice of evaluating projects approximately 10 years after opening. It also coincides with Transport for Victoria (TfV) transport modelling reference case forecasts (v1.09). The 2026 scenarios were also developed to inform other specialist assessments where required.

Most of the future base case assumptions were sourced from the TfV transport modelling reference case. These are listed in detail in the following documents provided in *Appendix C: Model development*:

1. TfV Transport Modelling Reference Case v1.09, Interim Road Networks (170710) & VIF2015 Land Use, by TfV, received 12 July 2017
2. 20150417 - Copy of (DOC-15-101558) -- MM Demand Forecast Spec Ver A1, 17 April 2015, Public Transport Victoria.

Table 3.1 summarises the sources of the key transport model assumptions.

Table 3.1 - Sources of model assumptions

Model component	Assumption source
Demographics / land use	TfV transport modelling reference case, using Victoria in Future (VIF2015)
Road network	TfV transport modelling reference case, road project list
Public transport network	TfV transport modelling reference case, using Melbourne Metro (now Metro Tunnel Project) Rail, Tram & Bus Service Plans
Commercial vehicle demand	TfV transport modelling reference case, with adjustments as instructed by TfV
Airport passenger demand	TfV transport modelling reference case, using PwC 2014 air side / land side analysis for MRL
Fuel prices	NELP business case advisors, using forecasts by World Bank and EIA
Parking costs	TfV transport modelling reference case, using forecasts by Frontier Economics
Public transport fares	TfV transport modelling reference case, committed increases only

Further detail on each of the above assumptions is below.

3.2 Population, demographics and employment

TfV provided forecasts of population, demographics and employment as part of its transport modelling reference case, based on *Victoria In Future 2015* forecasts. On advice from TfV this version was used, as more recent demographic forecasts were not ready to be used for modelling purposes.

Some adjustments and additions were made to the data to match the variable definitions required by the Zenith model. In summary, they included:

- Addition of average car ownership for each travel zone
- Adjustments to enrolment information, to reflect the number of students utilising tertiary institutions on a typical weekday
- Addition of blue- and white-collar splits for each employment category.

These adjustments and additions are discussed in more detail in Appendix C.4.1.2.

3.3 Road network

Future road network specifications were provided by TfV as part of its transport modelling reference case (Interim Road Networks), detailing a list of proposed upgrades.

Key projects included in the 2036 base case road network are:

- CityLink-Tulla Widening (M1 to Melbourne Airport)
- M80 Upgrade (M1 to Greensborough Hwy)
- West Gate Tunnel
- Monash Freeway upgrade, stage 1 and stage 2
- Aitken Boulevard (E14).

Key projects excluded from the 2036 future base case are:

- North East Link (‘the project’)
- Craigieburn Bypass widening
- EastLink widening
- Williamsons Road/Fitzsimons Lane widening
- East West Link – Western Section (WestLink) and Eastern Section
- Outer Metropolitan Ring (OMR) Road, including E6.

Further details of the road network assumptions are provided in Appendix C.4.2.1.

3.4 Rail network

Future rail networks were based on the PTV Metro Tunnel project service plans, and then adapted to follow the assumptions detailed in the TfV transport modelling reference case.

Key projects included in the 2036 base case rail service plans are:

- Fare Zone change to remove Zone 2 (by extending the Zone 1/2 overlap)
- Regional Rail Link
- Mernda Extension
- Metro Tunnel
- Baxter extension
- Wallan electrification
- Melton electrification.

The following projects have been excluded from the 2036 base cases:

- Melbourne Airport Rail Link
- Avalon Airport Rail Link
- Rowville rail/tram
- Clyde electrification and extension
- Clifton Hill Metro/Melbourne Metro 2 from Clifton Hill to Newport
- Suburban rail loop
- Doncaster rail
- Geelong electrification
- Pakenham East electrification and extension
- Wollert extension.

Detailed rail service plans for 2026 and 2036 are provided in Appendix Table C.20 and Appendix Table C.21.

3.5 Tram network

Future tram networks were based on the PTV Metro Tunnel project tram service plans and then adapted to follow the assumptions detailed in the TfV transport modelling reference case.

Key projects included in the 2036 base case scenario tram service plans include:

- Fare Zone change to incorporate the free trams in the CBD
- Parkville package
- Route 68 becomes Glenferrie Road Shuttle (Malvern to Caulfield)
- Extension of Route 11 to Fishermans Bend
- Extension of Routes 70 and 75 to E-Gate

- Extension of Route 48 to Doncaster Park and Ride
- Extension of Route 3 to East Malvern Station
- Extension of Route 5 to Footscray via Dynon Road.

Detailed tram service plans are provided in Appendix Table C.22.

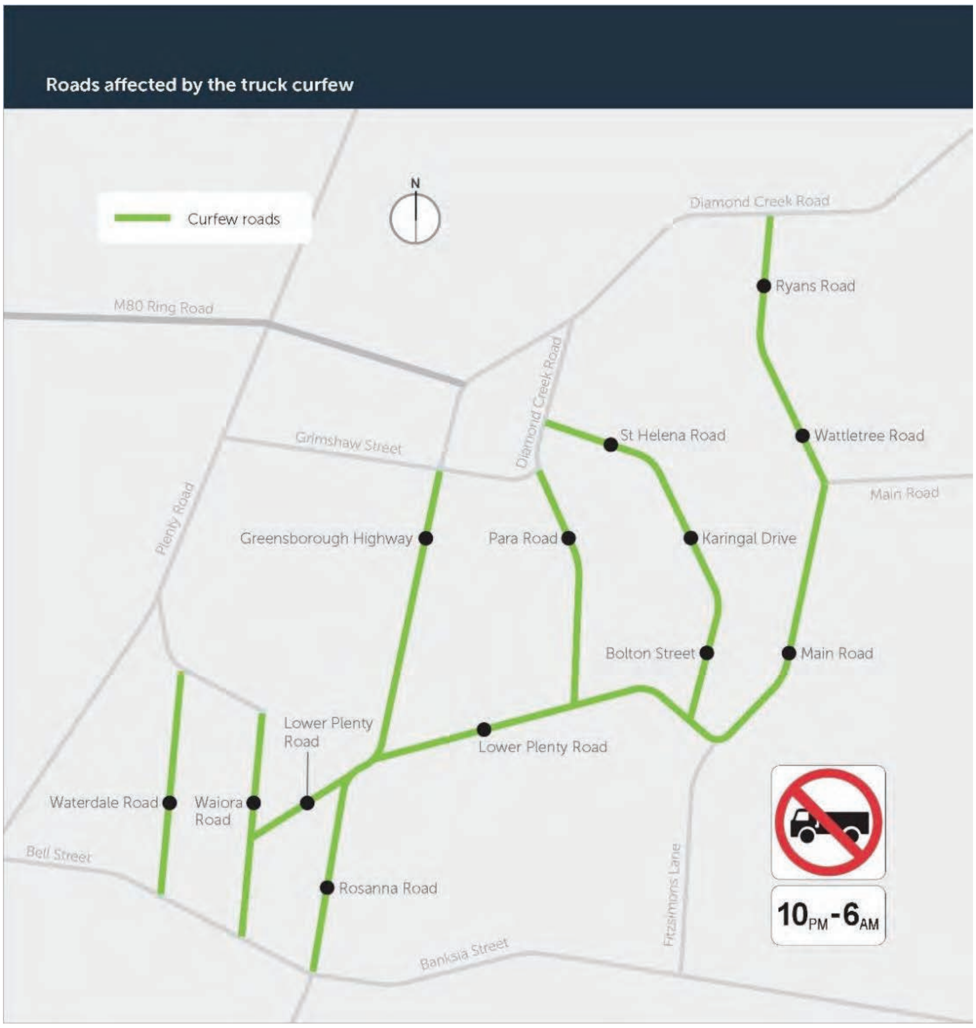
3.6 Bus network

Future metropolitan bus networks (including SmartBus) were provided by TfV as part of its transport modelling reference case. The assumed bus service plans for 2026 and 2036 are detailed in Appendix Table C.23 and Appendix Table C.24.

3.7 Commercial vehicle bans and curfews

The model's transport network contains commercial vehicle (CV) bans, reflecting curfews and infrastructure constraints. The future year models include the night-time North East truck curfew trial implemented by VicRoads in 2017, as shown in Figure 3.1. The full set of commercial vehicle bans and curfew assumptions are detailed in Appendix C5: Commercial vehicle bans.

Figure 3.1 - North east truck curfew trial



Source: VicRoads website

3.8 Commercial vehicle demand

The model separately forecasts light commercial vehicle (LCV) and heavy commercial vehicle (HCV) trips. The model's forecasts of LCV and HCV trips are tied to growth in employment by industry and occupation. The number of LCV and HCV trips generated by each job (in a specific industry by occupation) has been assumed to remain fixed in the future.

HCV trips generated by port terminals are treated separately within the model, with the forecast number of HCV trips for each port terminal sourced from the TfV transport modelling reference case, with the addition of supplementary information from the Victorian Government, as detailed in Appendix C.4.3.

3.9 Airport passengers

The model includes travel made to and from the airport by employees, passengers and people who are dropping passengers off or picking them up. Passengers are segmented into eight categories, based on all combinations of:

- Leisure vs business travel
- Domestic vs international travel
- Local vs visitor travel.

The model requires as input an estimate of the number of passengers in each of the eight categories, at each airport. In this instance, forecast passenger movements at Melbourne Airport and Avalon Airport were sourced from the TfV transport modelling reference case. The airport demand assumptions are detailed in Appendix C.4.4.

3.10 Transport costs

The model is sensitive to real changes in transport costs including:

- Parking costs
- Toll levels
- Fuel costs;
- Public transport fares.

The assumed future parking costs, toll levels and public transport fares were sourced from the TfV transport modelling reference case and are documented in Appendix C.4.5.

The future fuel cost assumptions were sourced from North East Link business case advisors. These assumptions are summarised in Table 3.2 with more detail provided in Appendix C.4.5.1.

Table 3.2 - Assumed change in real fuel cost (that is, over and above CPI)

Period	Real fuel cost growth rate (CAGR)
2011-2021	-2.94% p.a.
2021-2031	0.03% p.a.
2031-2036	0.03% p.a.

3.11 Growth in value of travel time savings

In situations where real wages grow over time, the real monetary amount that drivers are willing to pay to save travel time (referred to as value of travel time savings, or VTTS) can also increase.

The modelling assumes that VTTS will grow by 1.55% CAGR to 2036 in real terms (that is, over and above CPI) for cars and commercial vehicles. More information relating to VTTS is included in Appendix C.4.7.

3.12 North East Link project assumptions

This section gives a high-level overview of how North East Link has been incorporated within the model.

- A new freeway link between the Eastern Freeway and M80 Ring Road with interchanges at the Eastern Freeway (near Bulleen Road), Manningham Road, Lower Plenty Road (with south-facing ramps at Greensborough Road), Grimshaw Street and the M80 Ring Road (at Greensborough Bypass)
- An upgrade of the Eastern Freeway with additional lanes between Springvale Road and Chandler Highway
- An upgrade of the M80 Ring Road between Plenty Road and the Greensborough Bypass
- A new Doncaster Busway system consisting of dedicated bus lanes and priority treatments on the Eastern Freeway.

For a detailed description of the project, refer to EES Chapter 8 – Project description.

Figure 3.2 - North East Link project overview

More information relating to the project assumptions within the transport model is included in Appendix C.5.

4. Model run process

This section highlights some key technical issues that are relevant to the forecasting for this project. The topics discussed are:

- The approach to future trip distribution
- The treatment of induced demand
- The approach to predicting the proportion of drivers who are willing to pay tolls.

This section does not provide a comprehensive description of the Zenith model run process. Further technical information can be found in the technical reports referred to in Section 1.3.1, while key limitations related to the model run process are discussed in Appendix A.4.

4.1 Future trip distribution

The modelling for this project has been developed with an awareness of TfV's transport modelling guidelines which were published in 2017. In general, the Zenith model is consistent with those guidelines. However, one area where Zenith takes a different approach to that recommended in the TfV guidelines is *future trip distribution*.

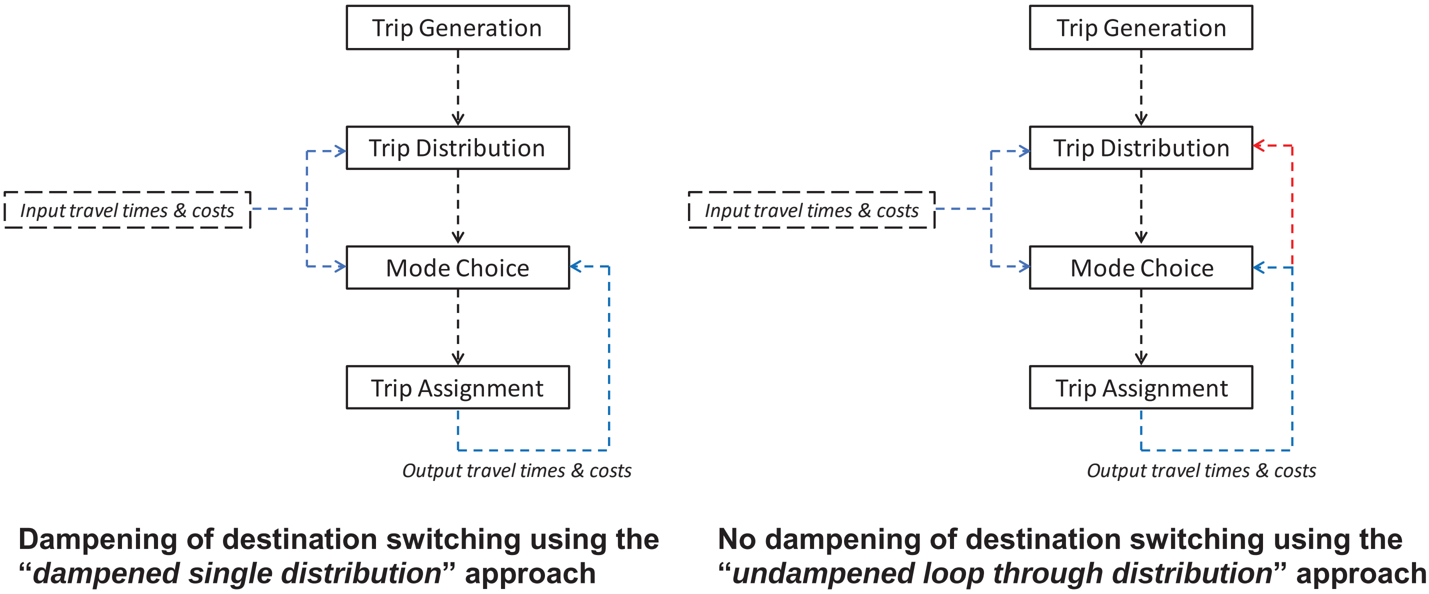
The conventional four-step model has four main steps: trip generation, trip distribution, mode choice and assignment. It is possible to feed the transport costs output from the final step (assignment) back to the earlier steps as part of an iterative process. This iterative process can be run until an equilibrium between demand and supply is reached.

The approach recommended by the TfV guidelines is to feed the future transport costs back through both the trip distribution and mode choice steps. This is referred to as the *undampened loop through distribution* approach.

In the approach taken for North East Link, future transport costs are only fed back through mode choice. This means that trip distribution is only run once, using the transport costs that are fed into the first iteration. In this approach, the first iteration transport costs are derived by assigning base year (2016) travel demands onto the future year network. This means that the re-distributional impacts of new transport infrastructure, and thus induced demand, are accounted for. This approach is referred to as the *dampened single distribution* approach.

The difference between the two methodologies is shown in Figure 4.1.

Figure 4.1 - Structure of a four-step model with feedback



The primary rationale for the *dampened single distribution* approach (left) is that it has historically produced more realistic forecasts of future travel demands. In particular, it was found that the *undampened loop through distribution* method forecasts that the distance travelled per capita will reduce over time, whereas in reality it has tended to increase overtime due to, among others, the steady expansion of the urban area. The *dampened single distribution* approach produces forecasts that are more consistent with observed trends. Some of the analysis underpinning these conclusions is presented below.

There are other theoretical issues which may help to explain why the *dampened single distribution* approach produces more realistic forecasts. These include:

- The *undampened loop through distribution* approach assumes that changes in accessibility instantaneously affect travel patterns. However, travel patterns are often the result of long-term decisions (that is, where to live, work and study) which are only made periodically, and play out over many years.
- It is commonly assumed that the parameters in the trip distribution model will remain constant as the urban area expands. This may be a false assumption which might cause the *undampened loop through distribution* approach to overstate trip shortening.
- Four step models do not account for peak spreading, whereby people can travel earlier or later to avoid peak congestion levels. Instead, four step models typically assume that the percentage of trips made at peak times will remain constant into the future. Consequently, in four step models, people a forced to respond to peak congestion by making other changes to their behavior (such as shortening their trips). Therefore, models using *undampened loop through distribution* over-state the amount of trip shortening which occurs in the future.

For the above reasons, the *dampened single distribution* approach has been applied to North East Link.

4.1.1 Comparison against past trends

An assessment was undertaken by VLC to determine the ability of the two approaches to explain past trends in kilometres travelled per capita. This was done by using a technique known as *backcasting*. Where *forecasting* involves using the model to make future predictions (based on assumptions about future population growth), *backcasting* involves using the model to make predictions of the past, using model inputs that reflect past conditions.

Backcasting is a highly useful exercise, because a model which validates well across multiple past years is more likely to provide more reliable demand forecasts. It can also be used (as in this case) to determine which methodologies produce better results across time.

For this investigation, scenarios representing each of the ABS Census years of 1996, 2001, 2006 and 2011 were developed and the results were compared with historical data.

In Figure 4.2 it can be seen that the *dampened single distribution* approach adopted for the evaluation of North East Link predicts that kilometres travelled per capita increase gradually from 1996 to 2006 before plateauing from 2006 to 2011. In contrast, the *undampened loop through distribution* approach predicts a gradual reduction in kilometres travelled per capita over time. The historical data (sourced from BITRE) shows a gradual but steady increase in the period leading up to 2005, a step change reduction from 2004 to 2009, and then a plateau from 2009 to 2015.

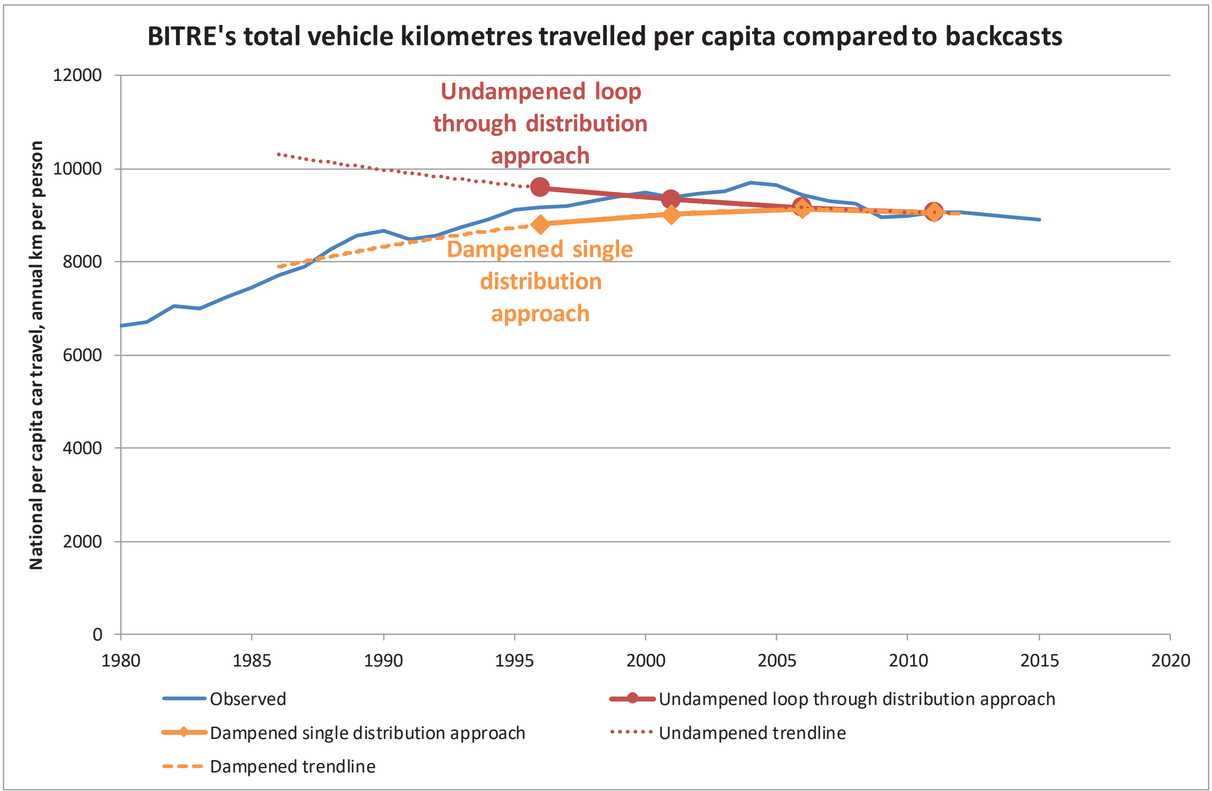
With the exception of 2004 to 2009, the gradual increase and plateau predicted by the *dampened single distribution* approach is more consistent with the historical data. The period 2004 and 2009 was shaped by a number of one-off changes, including:

- A significant increase in fuel prices
- A reduction in licence holding and car use among young people
- A large increase in CBD employment
- Increased parking levies in the CBD
- The global financial crisis.

The first four of these changes contributed to a significant shift to public transport while the global financial crisis saw an increase in unemployment, resulting in reduced demand for travel in 2008 and 2009.

The trend post 2009 indicates that distance travelled per capita is approximately stable, which is consistent with the single distribution approach.

Figure 4.2 - Backcasting validation results (vehicle kilometres per capita)



Source: BITRE 2015, VLC analysis

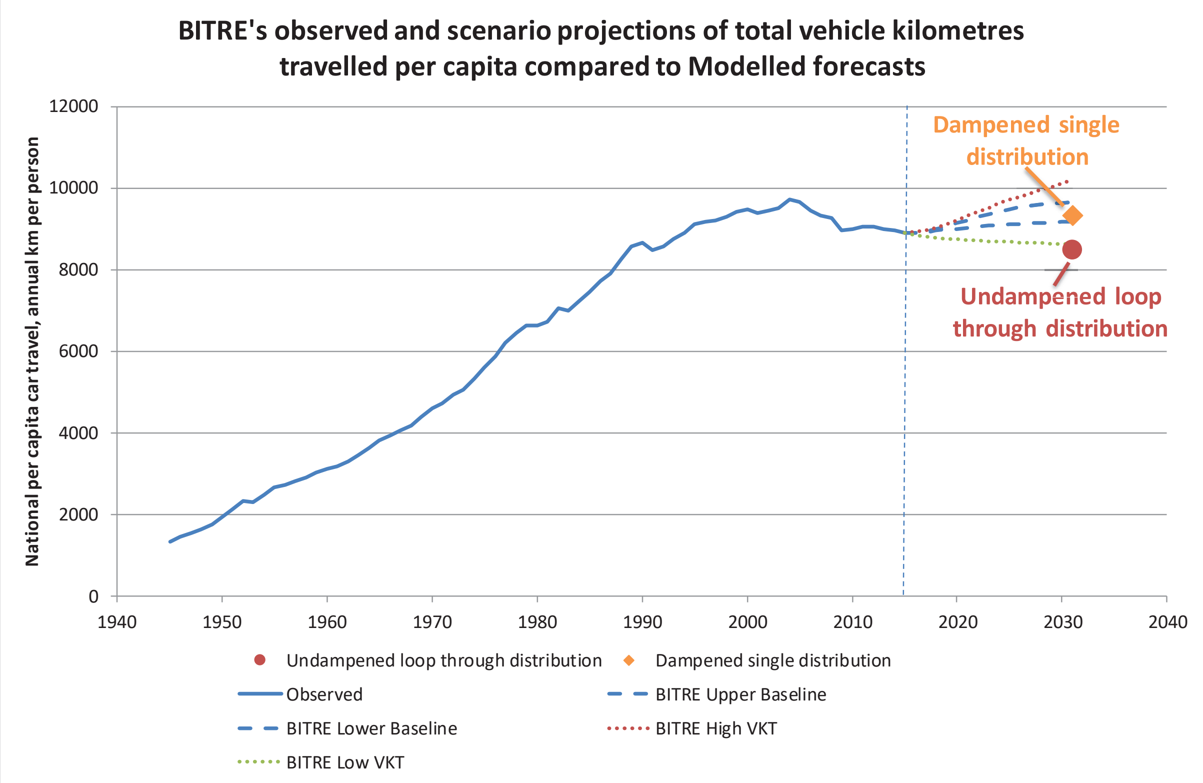
4.1.2 Comparison of forecasts against BITRE forecasts

BITRE also provides a range forecasts including upper and lower baseline, low vehicle kilometres travelled (VKT) and high VKT, where the growth in VKT per capita from 2015 to 2030 is:

- Upper baseline + 8 per cent, or 0.5 per cent per annum
- Lower baseline + 3 per cent, or 0.2 per cent per annum
- High VKT + 14 per cent, or 0.8 per cent per annum
- How VKT – 3 per cent, or -0.2 per cent per annum.

The modelled and BITRE VKT per capita forecasting results are shown in Figure 4.3. The high-level forecasting results indicate that the *dampened single distribution* approach produces results close to the centre of the BITRE forecasts, while the results of the *undampened loop through distribution* approach were closer to BITRE's low VKT scenario.

Figure 4.3 - Forecasting results (total vehicle kilometres)



Source: BITRE 2015, VLC analysis

In considering the reasonableness of the forecasts, it is also worth considering whether the factors that historically caused growth in kilometres travelled per capita to increase are still present today and are expected to persist into the future. The two main historical factors have been:

- Increases in drivers licence holding and car ownership among the population
- Steady expansion of the urban area – as the urban footprint of Melbourne has expanded[3], the households moving into outer suburbs have needed to travel further and drive more to reach destinations such as workplaces and shops.

In looking to the future, our assessment is that the historical increases in drivers licence holding and car ownership have now largely stabilised. As older cohorts progress into retirement, vehicle use among this age group is expected to further increase; conversely younger age groups may drive less.

However, the gradual expansion of the urban area continues, albeit at a progressively slower rate[4]. Much of this growth occurs in outer fringe suburbs with higher car dependence. *Victoria in Future* population forecasts indicate this trend is expected to continue[5], which

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[3] McGeoch, Craig A, 2011. *30 years of travel in Melbourne: 1978/79 and 2007/08*. Australasian Transport Research Forum
[4] Grattan Institute, 2018. *Remarkably adaptive Australian cities in a time of growth.*
[5] The Age on-line, [City's continued sprawl costing those with the least the most]() (as of 3 October 2018)

provides support for the stable or slightly increasing distance travelled per capita forecast by the *dampened single distribution* approach.

4.2 Induced demand

In response to issues raised in several VAGO reports[6], the Victorian Government prepared transport modelling and economic appraisal guidelines[7] to oversee the appraisal of major projects such as North East Link. In relation to induced demand, these guidelines state that:

> *'The transport modelling runs must include the effects of induced traffic arising from projects considered'.*

They further define the elements of induced demand as shown in Table 4.1. While they are largely consistent with VAGO's definitions, the guidelines also define minimum requirements for addressing behavioural response in a strategic transport model:

> *'…behavioural responses 1 through 4 will be accounted for in the modelling. This is regarded as the minimum requirement for consideration of these effects.'*

Table 4.1 - Traffic classification by behavioural response

Behavioural Response	Definition	Classification from the perspective of: Demand associated with the project	Classification from the perspective of: Demand within the entire multi-modal transport system	Description
1. No change in behaviour	Fixed matrix, no change in journeys	Base Load or Traffic		Guidelines minimum requirements
2. Route change	Travellers have same origin and destination and make the same journeys but use the improved route	Re-assigned or Diverted Traffic		NEL project
3. Mode change	Passengers switch mode because the improvement makes the new route more attractive		Normal Load or Traffic	
4. Destination change	Travellers decide to travel to more distant destinations because of the improvement makes the journey time acceptable (redistribution)			
5. Time of travel change	Travellers decide to travel in the commuting peak period because the improvement reduces journey times to an acceptable level	Induced Traffic		NEL Project*
6. Trip frequency increase	Travellers are willing to make additional journeys because of the improvement			
7. Generated or new (e.g. from different land use patterns)	People and businesses relocate to take advantage of the improvement and so make journeys that are new to the area.		Generated Traffic	NEL Project**

* estimated by an adjustment outside the strategic model
** generated by a project-specific land use scenario

Table 4.1 has been modified to highlight the minimum requirements required by the guidelines (as seen in the blue box) and the components of behavioural response incorporated in the North East Link traffic forecasts (as seen in the green boxes), including:

[6] *Management of Major Road Projects, June 2011, Managing Traffic Congestion, April 2013, East West Link Project, December 2015*
[7] Guidelines for Transport Modelling and Economic Appraisal in Victoria, V3.03 December 2016

- No change in behaviour – base case (no project) travel behaviour
- Route change – existing car users who adjust their route as a result of the project
- Mode change – those who switch modes as a result of the project (such as switch from public transport to car or vice versa)
- Destination change – those who change their trip destination to take advantage of the accessibility offered by the project
- Time of travel change – estimated by an adjustment outside the strategic model to incorporate the effects of peak spreading
- Generated or new trips – generated by a project-specific land use scenario.

Trip frequency change refers to people willing to make completely new journeys because of the project. These trips would not exist (even via another route, destination or mode) in the scenario without the project but could exist in the project scenario.

According to VicRoads research[8], induced demand from trip frequency change (that is, making additional journeys) can be assumed to be negligible for a new road connection. This position is reconfirmed by DEDJTR[9] in its report responding to VAGO's issues on induced demand.

Based on this research, it can be concluded that any trip frequency change (that is, making additional journeys because of the project) would be small and would not lead to an invalid or misleading evaluation of North East Link.

4.3 Toll diversion traffic assignment

The Zenith traffic assignment algorithm allows for the inclusion of tolls (single tolls or multiple tolls) to influence driver route choice. A series of toll diversion curves are used to calculate the proportion of drivers that would pay a specified toll for a given travel time saving.

For the car travel market, separate toll diversion curves were applied for company cars, privately owned cars and trips to and from the airport. For commercial vehicles, separate toll diversion curves were applied for light commercial vehicles and heavy commercial vehicles.

Based on research undertaken in Melbourne, it was concluded that the accuracy of traffic forecasts under tolling regimes are significantly improved when this level of market segmentation is included in the traffic assignment process.

An example of toll diversion curves is presented in Figure 4.4 and show how the proportion of toll payers reduces as tolls are increased in the case where the tolled route offers a 10-minute time saving.

The toll diversion curves were originally derived from over 5,000 revealed preference interviews conducted in Melbourne and have been modified over time as travel behaviour in Victoria has evolved (for example, as a result of increases in real wages, proliferation of

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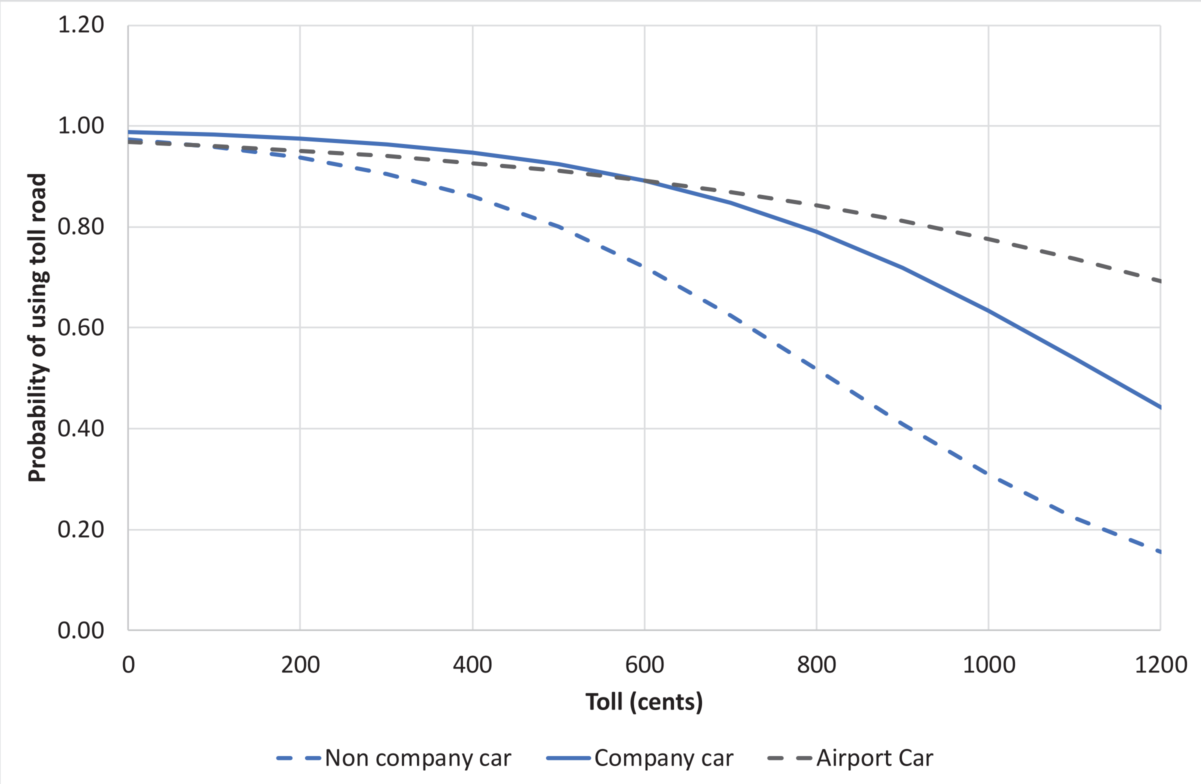
[8] VicRoads, *"Transport Modelling Guidelines - Volume 2: Strategic Modelling"*, April 2012
[9] Department of Transport Victoria, *"Induced Travel Demand - Draft Position Paper"*, November 2011

e-tags and acceptance of toll roads). The Zenith toll choice model has also been applied successfully in Sydney and South East Queensland.

Figure 4.4 - Example Zenith toll diversion curves



During the Zenith traffic assignment process, the trips travelling between each origin - destination zone pair are split into toll payers and non-toll payers, based on the *utility* of the tolled route options versus the best non-tolled route option. Utility is assumed to be a function of travel time, toll level, and the type of trip (such as company car, privately owned car and airport trips).

Toll payers are then distributed across the tolled route options based on their relative utility. This latter step is required when there is more than one tolled route option available for a given trip, which is the case for many trips in Melbourne.

5. Model results

This section of the report discusses the modelled forecasts for North East Link. Specifically, it highlights the area of influence of North East Link, the expected volumes on the network, and the impact of these on the network performance, level of service and resultant travel times, as well as the impact on the public transport demand.

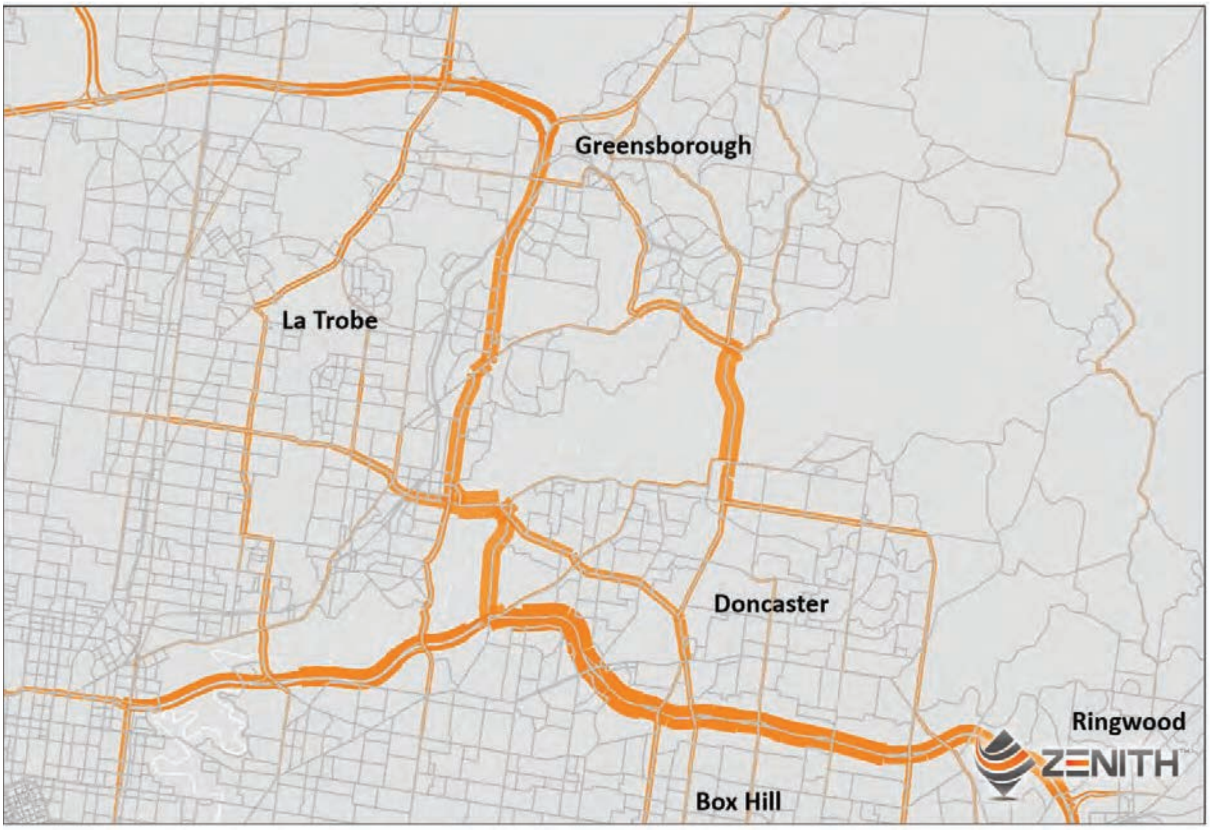
5.1 Market capture of North East Link

North East Link would have a significant impact on a large area of Melbourne's north-east. This section discusses the impact on the adjacent network, its sphere of influence as well as the level of induced demand.

5.1.1 Catchment of the expected users for North East Link

Figure 5.1 shows the re-routing of potential users from the adjacent road network to North East Link; that is, the potential market for the project. While the catchment covers roads over a large area of Melbourne, most potential users are expected to divert from Fitzsimons Lane and Manningham Road, along with Burke Road and Chandler Highway.

Figure 5.1 - Forecast market for North East Link users



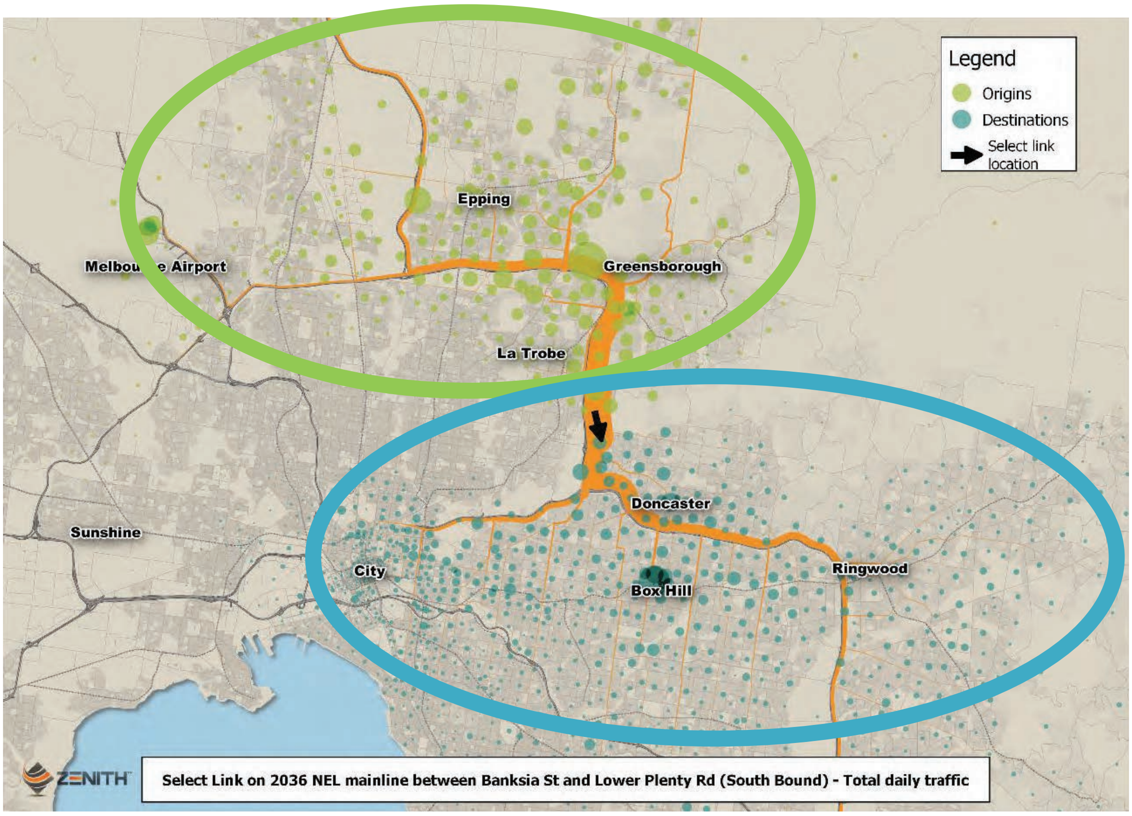
5.1.2 Origins and destinations of potential North East Link users

Figure 5.2 shows the expected origins and destinations for trips using the North East Link[10], thus indicating the extent of the project's sphere of influence.

To the north, the forecast catchment extends from the north-eastern suburbs such as Diamond Creek and Heidelberg to outer northern suburbs such as Epping and Mernda, and as far west as Melbourne Airport.

To the south, its catchment is broader, spanning across the inner, south-eastern and outer-eastern suburbs.

Figure 5.2 - Origins and destinations of trips using North East Link, daily



5.1.3 Induced demand of potential North East Link users

Given the extensive sphere of influence of North East Link, an analysis of the travel demand was undertaken.

The Zenith model was used to determine the potential induced demand, including:

- **Route choice** – existing car users who adjust their route to use the project
- **Mode choice** – travellers who switch mode, from public or active transport to driving along the project

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[10] This is based on select link traffic volumes, southbound at the Yarra River crossing

- **Re-distribution of trip destinations** – travellers who change their trip destination in order to take advantage of the enhanced accessibility offered by the project
- **Generated or new trips** – people or businesses who relocate to take advantage of the project, evaluated by a project-specific land use scenario.

To gauge the contribution of each individual component to North East Link, a waterfall analysis was undertaken as presented in Figure 5.3.

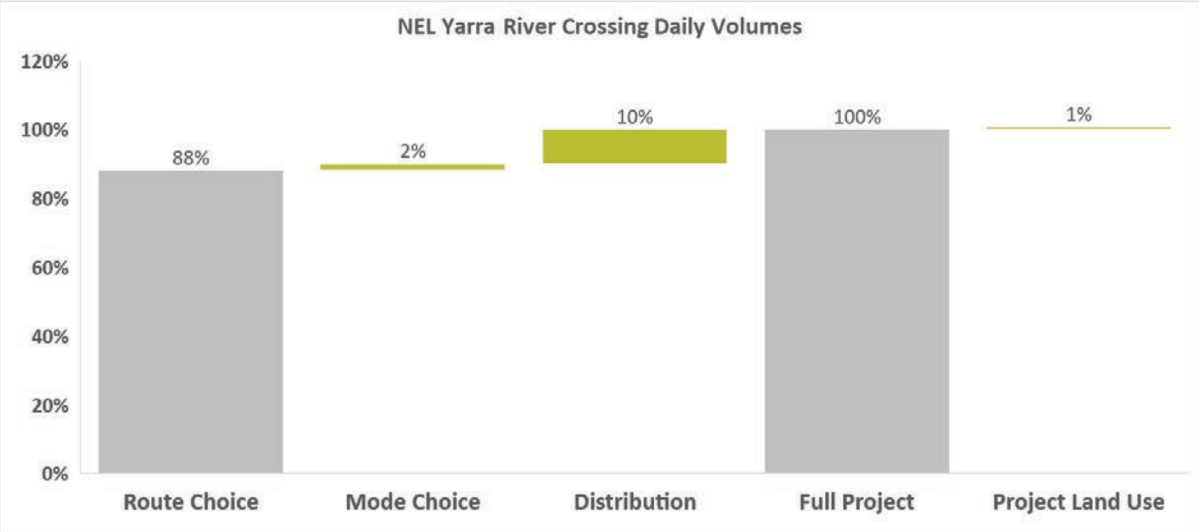
The vast majority of North East Link project users (approximately 88 per cent) are existing car users who divert to the North East Link from other routes such as Fitzsimons Lane, Greensborough Road, Rosanna Road and the Tullamarine Freeway.

The induced demand arising from mode shift is expected to contribute a further 2 per cent to the daily traffic volumes. The expected shift from public transport is offset by an increase in public transport trips due to the implementation of the Doncaster Busway.

Re-distribution of trip destinations is expected to have a bigger effect, contributing an additional 10 per cent.

Furthermore, new trips due to project-specific land use changes are expected to add an additional 1 per cent to the total daily traffic.

Figure 5.3 - Contribution of induced demand catchments to North East Link two-way daily volume growth



5.1.4 Route catchments of potential North East Link users

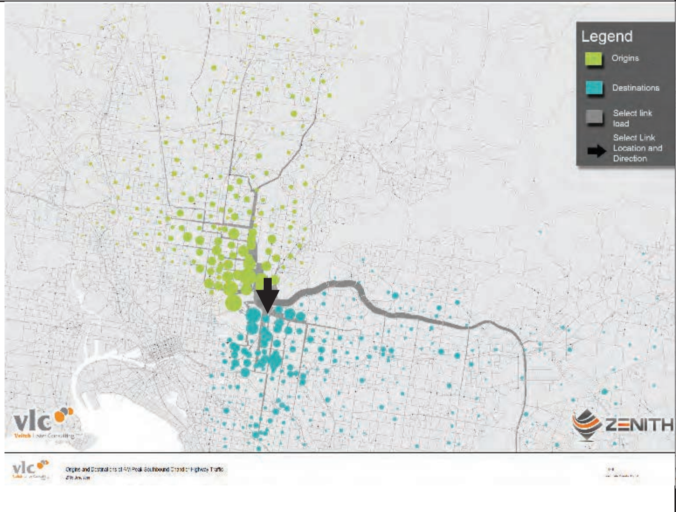
North East Link would provide an additional crossing to the Yarra River to the east of Melbourne. It is therefore plausible that potential demand for the project would be driven by demand on the existing crossings at Chandler Highway, Burke Road, Manningham Road, Fitzsimons Lane and the Warrandyte Bridge.

Figure 5.4 depicts the origins and destinations for daily southbound traffic along each of the existing river crossings in the base year. Each crossing, apart from Manningham Road, services a strong north-south movement, with origins typically more localised to the south of the M80 Ring Road and destinations more widespread across the eastern suburbs. In contrast, Manningham Road also services a distinct east-west movement via Bell Street.

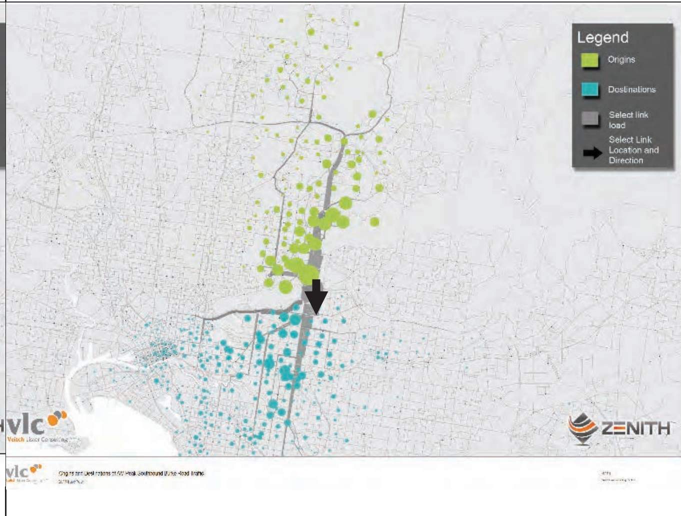
In general, the charts indicate that the Yarra River crossings carry a mix of shorter local trips, as well as longer trips representing orbital movements across the north-west and south-east. These competing demands for limited road space lead to increased congestion, which negatively impacts local residents, workers and businesses.

Figure 5.4 - Origins and destinations for modelled southbound traffic crossing the Yarra River

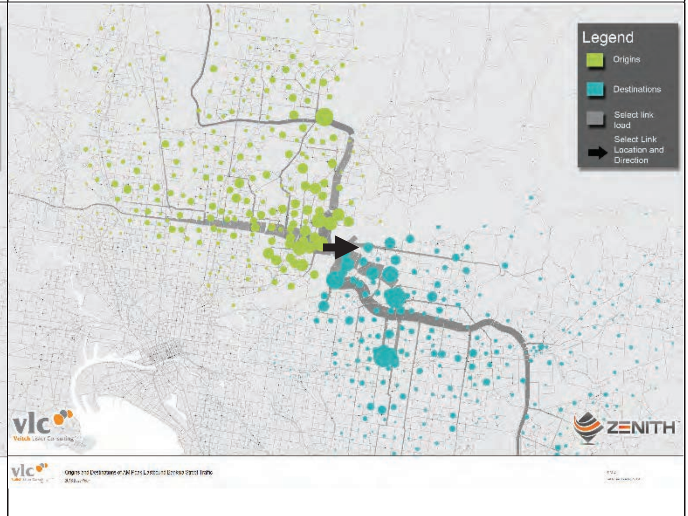
Chandler Highway



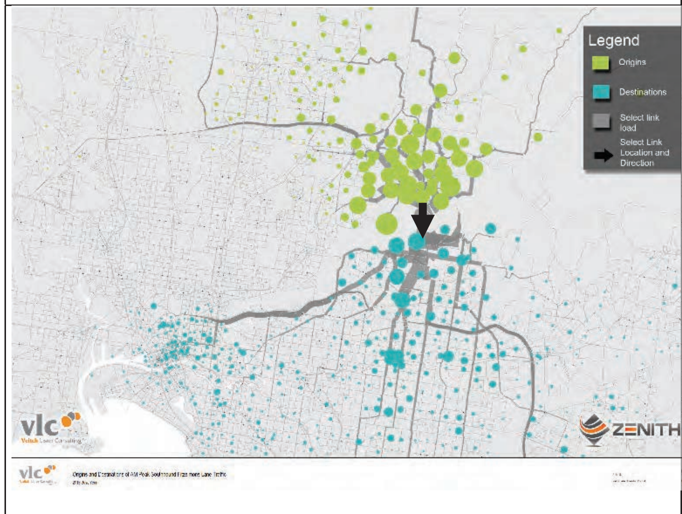
Burke Road



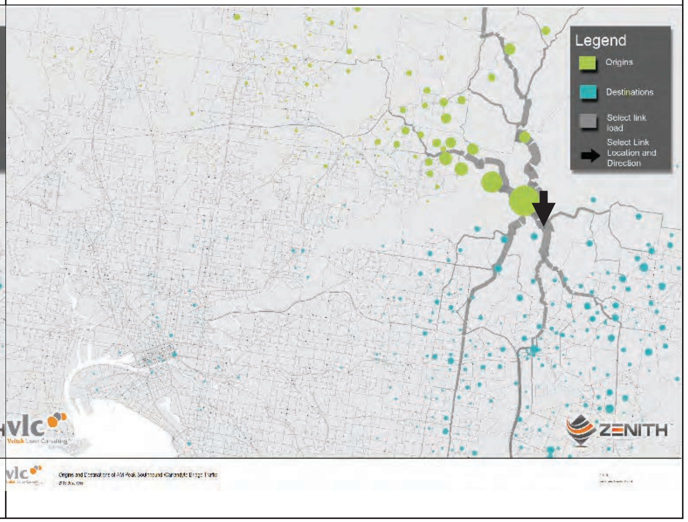
Manningham Road



Fitzsimons Lane



Warrandyte Bridge



5.2 Transport network performance statistics

Table 5.1 on the next page summarises the transport network performance indicators for each core scenario (2016, 2036 base case and 2036 project case) for Melbourne and the North East Link study area (refer to Figure 1.3), including the forecast trips and vehicle kilometres travelled by freeways and non-freeways, vehicle hours travelled and average speed.

The statistics indicate the future scenarios will be more congested, with trips, vehicle kilometres and vehicle hours all increasing. The north-east is typically more congested than the remainder of Melbourne, with average traffic speeds being slower than metropolitan Melbourne.

Table 5.1 - Transport network performance indicators, North East Link study area and Greater Melbourne

		Project Study Area			Greater Melbourne		
		2016 base	2036 base case	2036 project case	2016 base	2036 base case	2036 project case
Road Vehicle Trips	Daily	2,509,000	3,144,000	3,157,000	12,579,000	16,775,000	16,794,000
	AM Peak	393,000	467,000	469,000	1,998,000	2,575,000	2,578,000
	PM Peak	394,000	493,000	496,000	2,000,000	2,599,000	2,603,000
Vehicle kilometres travelled (VKTs)	Daily	22,342,000	28,780,000	30,493,000	123,577,000	178,393,000	179,727,000
	AM Peak	3,565,000	4,336,000	4,615,000	20,008,000	27,214,000	27,443,000
	PM Peak	3,746,000	4,585,000	4,892,000	21,100,000	29,087,000	29,341,000
Freeway VKTs	Daily	4,768,000	5,952,000	8,573,000	36,061,000	52,787,000	55,315,000
	AM Peak	647,000	753,000	1,152,000	5,053,000	6,925,000	7,319,000
	PM Peak	701,000	812,000	1,253,000	5,459,000	7,508,000	7,943,000
Non freeway VKTs	Daily	17,575,000	22,828,000	21,920,000	87,516,000	125,606,000	124,413,000
	AM Peak	2,918,000	3,583,000	3,463,000	14,956,000	20,289,000	20,124,000
	PM Peak	3,045,000	3,773,000	3,639,000	15,640,000	21,579,000	21,398,000
VHTs	Daily	586,000	846,000	845,000	2,771,000	4,356,000	4,338,000
	AM Peak	123,000	177,000	176,000	571,000	893,000	888,000
	PM Peak	122,000	176,000	174,000	571,000	907,000	902,000
Average speed	Daily	38.1	34.0	36.1	44.6	41.0	41.4
	AM Peak	28.9	24.5	26.2	35.0	30.5	30.9
	PM Peak	30.8	26.1	28.0	36.9	32.1	32.5

5.3 Traffic volumes

Figure 5.5 shows the effect of North East Link on the adjacent road network, by presenting the differences in daily traffic volumes between the 2036 base case and 2036 project case. Traffic reductions are shown in green, with increases shown in orange. It indicates that traffic will mainly be diverted from adjacent arterials, in particular on parallel north-south routes such as Plenty Road, Rosanna Road, Chandler Highway, Fitzsimons Lane and Warrandyte Bridge.

Certain roads are expected to carry more traffic as a result of North East Link, mainly due to their role as a feeder route to the project. In the north these include the M80 Ring Road, Greensborough Bypass and Plenty Road, while in the east these include Eastern Freeway feeder routes such as Elgar Road, Springvale Road and Bulleen Road.

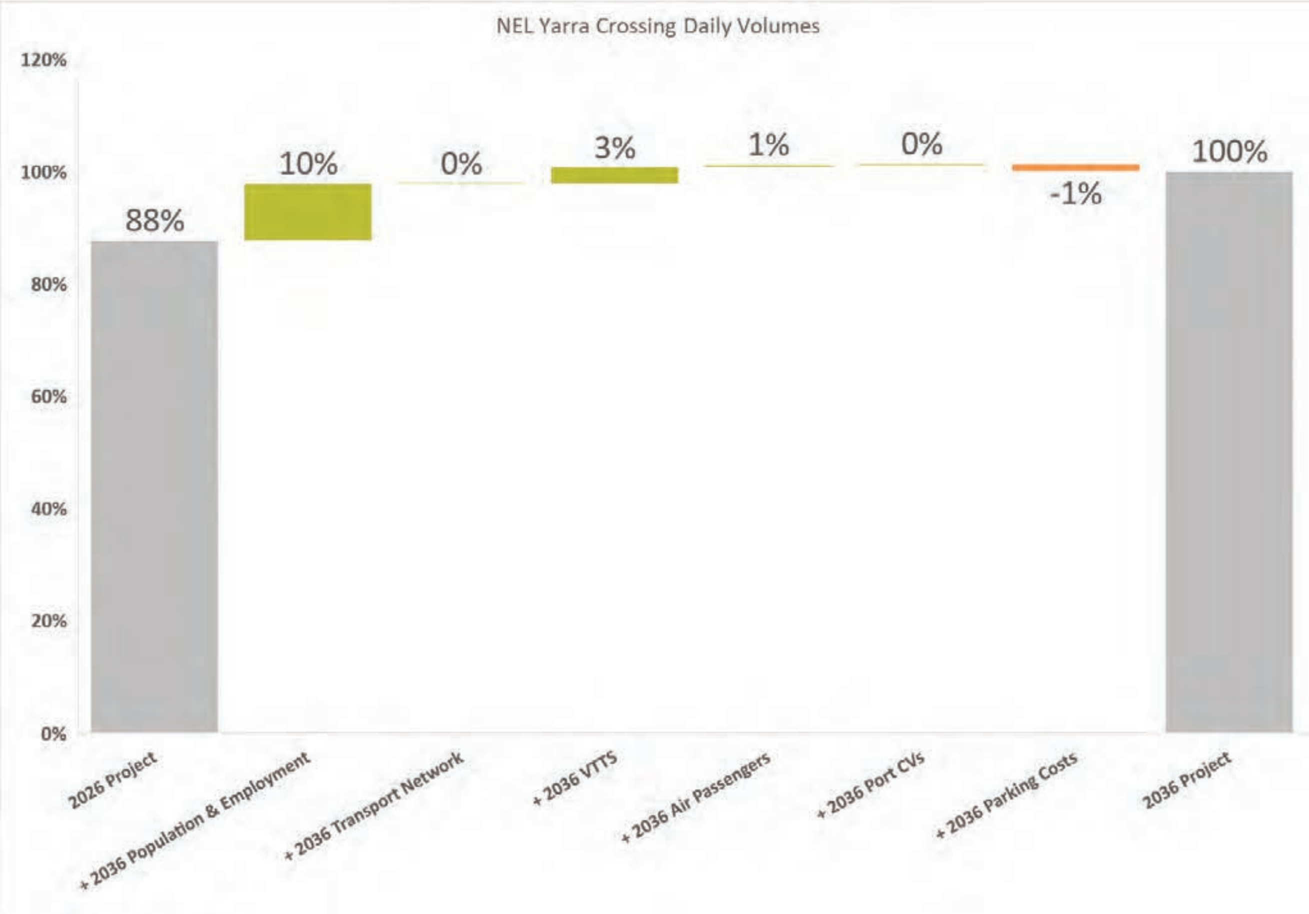
Figure 5.5 - Change in daily traffic volumes (project links faded)

Figure 5.6 presents a waterfall analysis, profiling the growth in daily total traffic volumes on the North East Link river crossing in the first 10 years, assumed to be 2026 to 2036. The chart shows that land use, including population and employment growth, is the largest contributor to the traffic growth on the project.

Assumptions surrounding increases to the value of travel time savings (VTTS) also contribute to the increase in traffic volumes, although to a lesser extent.

Traffic volumes from 2026 to 2036 seem relatively insensitive to other assumptions such as the future transport network, airport and port commercial vehicle growth, as well as parking price increases. In the North East Link corridor, the road network assumptions only change a little (such as Templestowe Road) from 2026 to 2036.

Figure 5.6 - 2026 to 2036 waterfall analysis, growth in North East Link traffic volumes



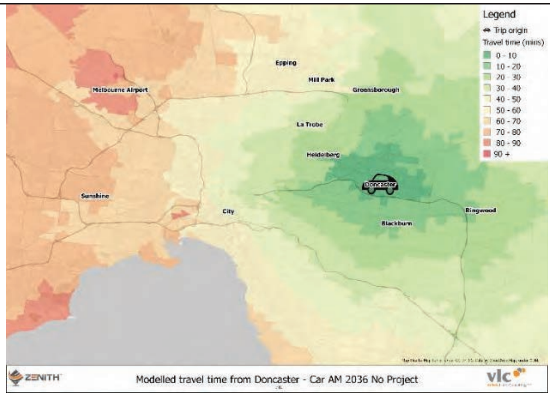
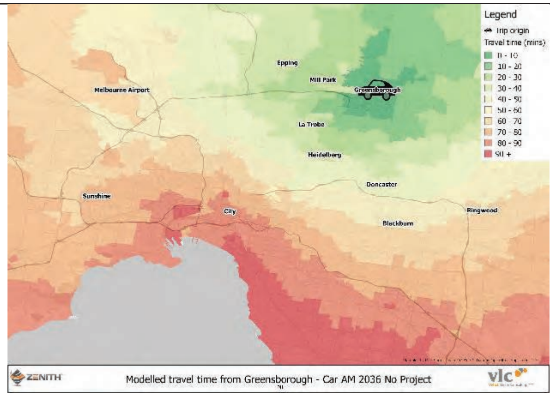
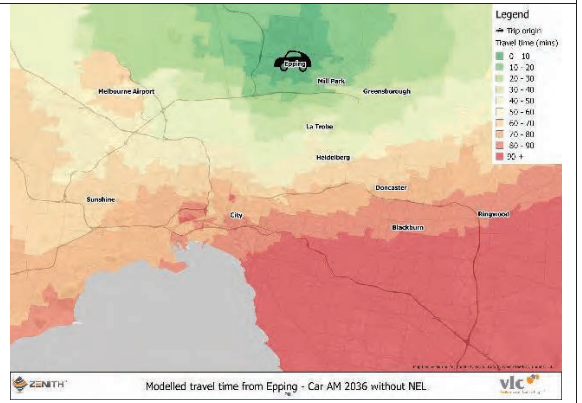
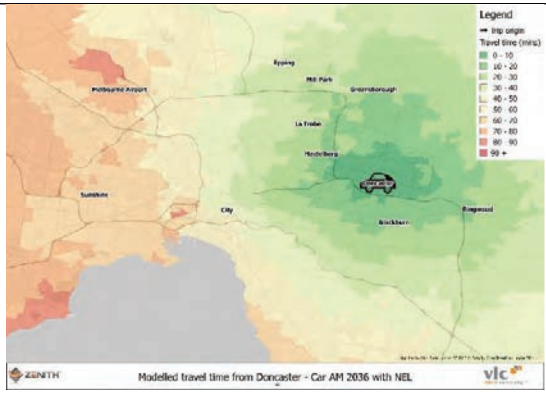
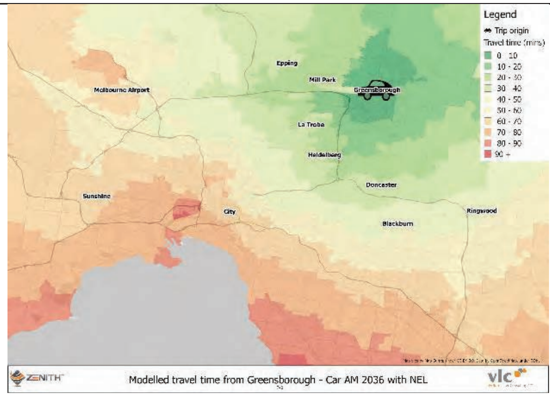
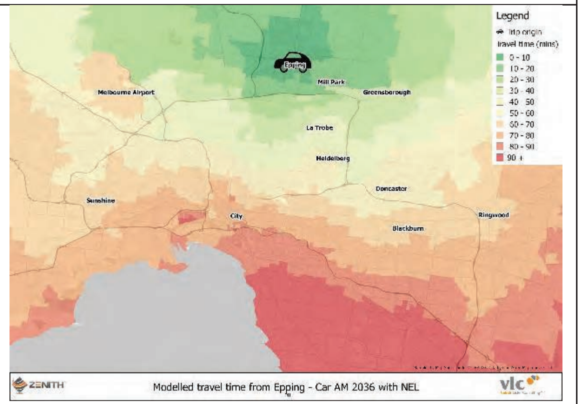
5.4 Travel times

Three indicative locations—Doncaster, Greensborough and Epping—have been chosen to assess changes in future network-wide travel times. These are shown in Figure 5.7 on the next page.

Travel times from Doncaster are expected to improve for trips crossing the river to the north, to destinations such as Epping and Greensborough. Smaller improvements are also anticipated for destinations in the west due to improved connectivity to the M80 Ring Road via North East Link.

From Greensborough and Epping, travel times are forecast to improve for trips to the eastern suburbs. This is as a result of the new link offering direct time savings for trips crossing the Yarra River.

Figure 5.7 - AM Peak travel time contours from Doncaster, Greensborough and Epping, 2036

<table>
<tr><th></th><th>From Doncaster</th><th>From Greensborough</th><th>From Epping</th></tr>
<tr><td>Base case (no project)</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>Project case</td><td>
</td><td>
</td><td>
</td></tr>
</table>

5.5 Levels of service

As travel demand on transport infrastructure increases, so too does the level of 'discomfort' experienced by travellers using that infrastructure.

In the case of traffic, discomfort can range from the inability to travel at a desired speed and difficulty manoeuvring, to severe congestion and delays. A level of service analysis provides a qualitative indication of where the transport network would fail to meet desired standards of service under estimated traffic speeds and volumes. By extension, it illustrates where behavioural changes are likely to impact on forecasts to some degree, if these levels of congestion or crowding result in a change in travel behaviour.

The ability of a road to maintain high levels of service under increasing traffic levels depends on its design standard and access controls, intersection operation and coordination, degree of separation of conflicting movements, as well as its local environment and relation to connecting roads. Higher standards of roads, intersections and network management are able to provide better performance under similar levels of congestion than those of a lower standard.

For this analysis the level of service measure was defined using the ratio of modelled speeds to free-flow speeds (representing uncongested conditions) as outlined in Table 5.2. Level of service category 1 represents uncongested free-flow conditions, while category 6 represents heavy congestion.

Table 5.2 - Level of service definitions

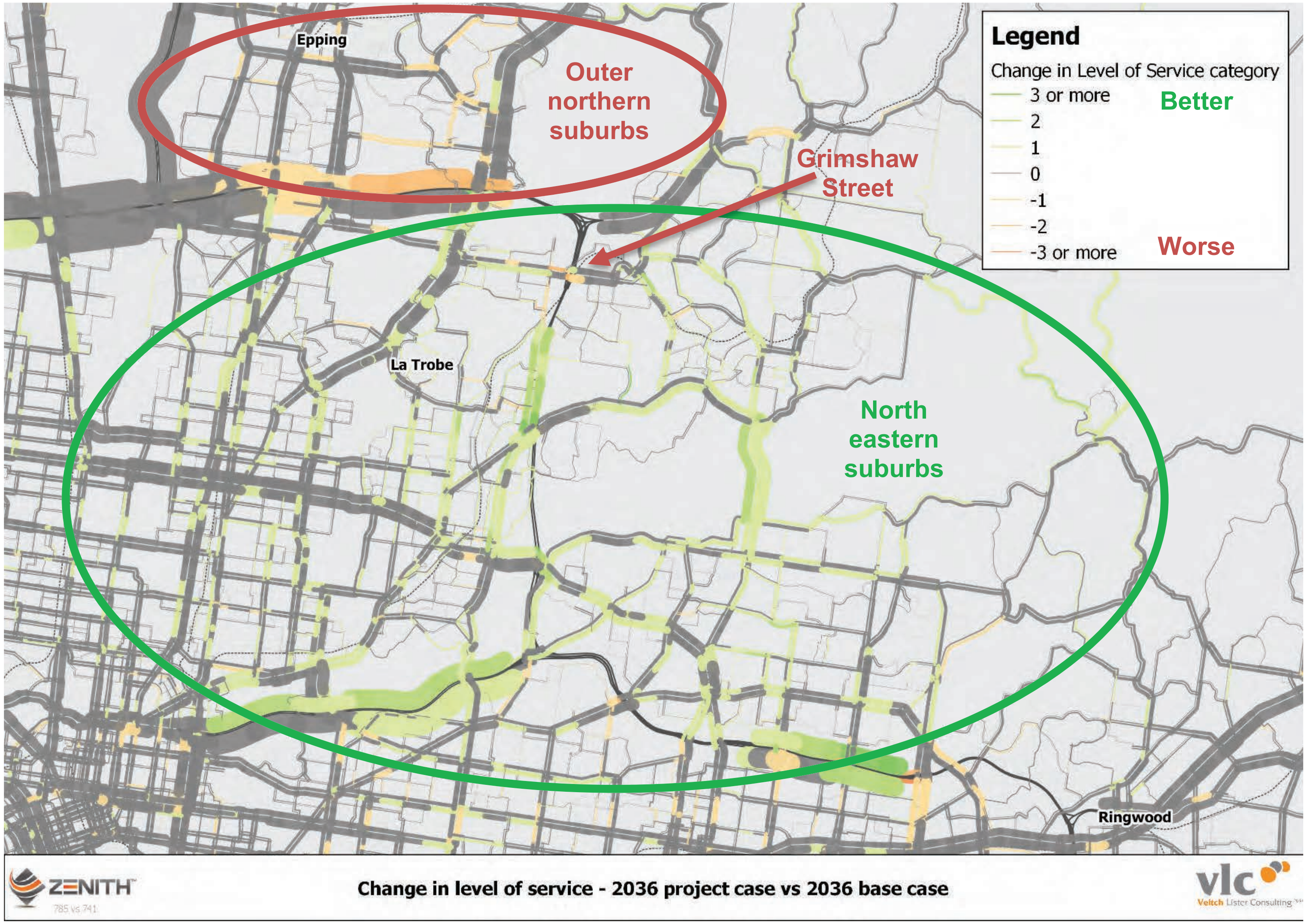
Level of service category	Percentage of free-flow speed
1	95% - 100%
2	85% - 95%
3	70% - 85%
4	50% - 70%
5	30% - 50%
6	< 30%

The expected change in the levels of service in 2036 with and without North East Link is shown in Figure 5.8. Road links where the level of service category is expected to change are displayed according to the extent of change, either positive or negative.

Figure 5.8 shows there are significant level of service improvements expected on roads across the north eastern suburbs, including the project corridor (such as Rosanna Road, Greensborough Road) and parallel routes (such as the Yarra River crossings).

In contrast, the levels of service are expected to deteriorate on roads in the outer northern suburbs and especially on Grimshaw Road. This is mainly due to the additional traffic on arterial roads that serve as feeder routes to North East Link.

Figure 5.8 - Change in Levels of Service as a result of North East Link



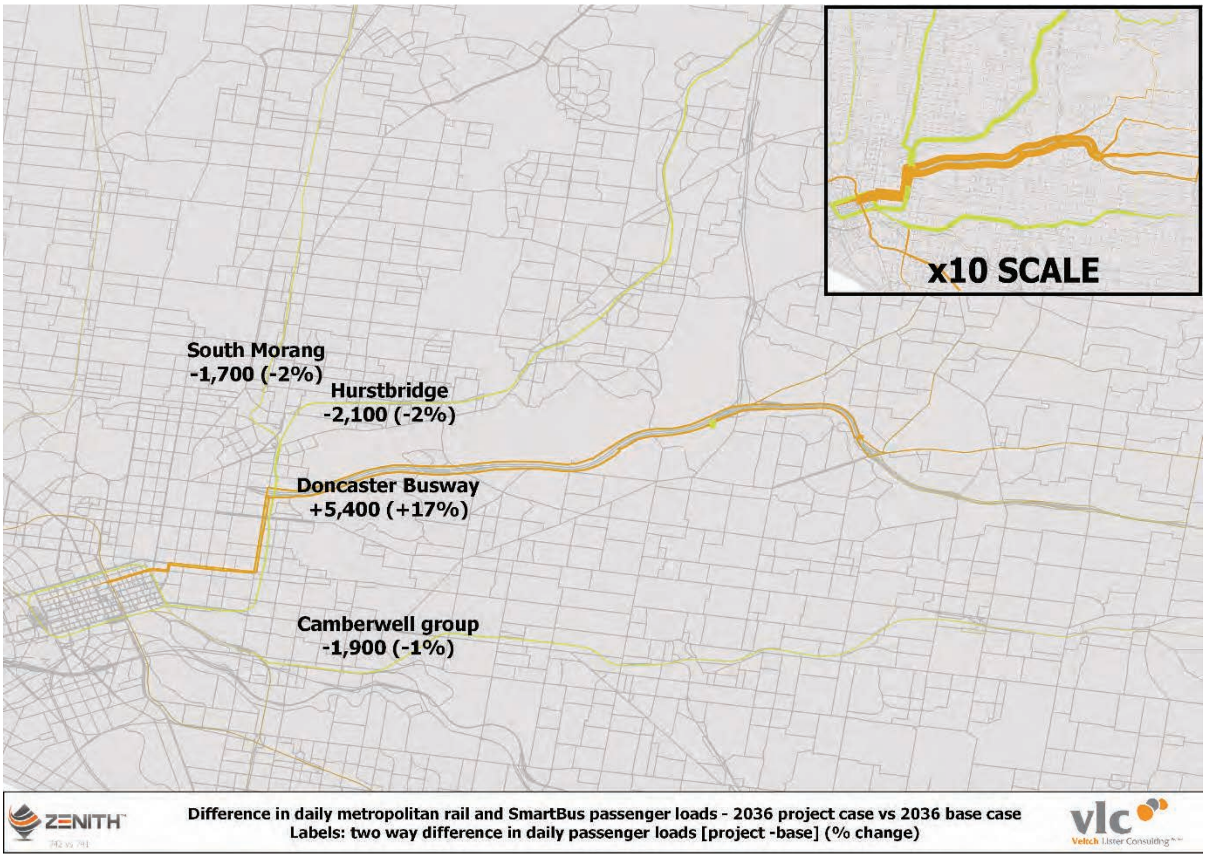
5.6 Public transport

Figure 5.9 depicts the expected changes in daily patronage demand on rail and SmartBus services using the Doncaster Busway in 2036, due to North East Link project[11].

The Doncaster Busway component of North East Link would improve travel speeds for the SmartBus routes along the Eastern Freeway west of Doncaster Road, and so attract higher patronage. In 2036, the daily passenger loads on these routes approaching the CBD is expected to increase approximately 17 per cent.

In contrast, rail patronage on services along the Camberwell, South Morang, and Hurstbridge corridors are expected to reduce slightly (-1 to -2 per cent), due to North East Link and the Doncaster Busway projects providing better travel conditions.

Figure 5.9 - Difference in daily metropolitan rail and Doncaster Busway passenger loads



Note the Doncaster Busway includes improved bus service levels which were not part of earlier forecasts for the business case, which resulted in higher daily passenger loads.

The car mode share has been charted for the 2036 project and no project scenarios and is shown in Figure 5.10. Plots for the AM peak and daily mode share are presented. Overall, there is no material change that can be attributed to North East Link.

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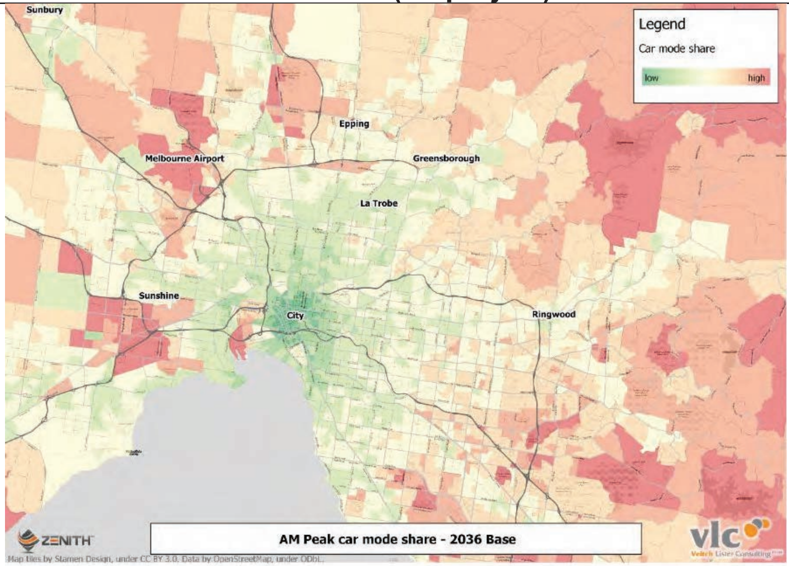
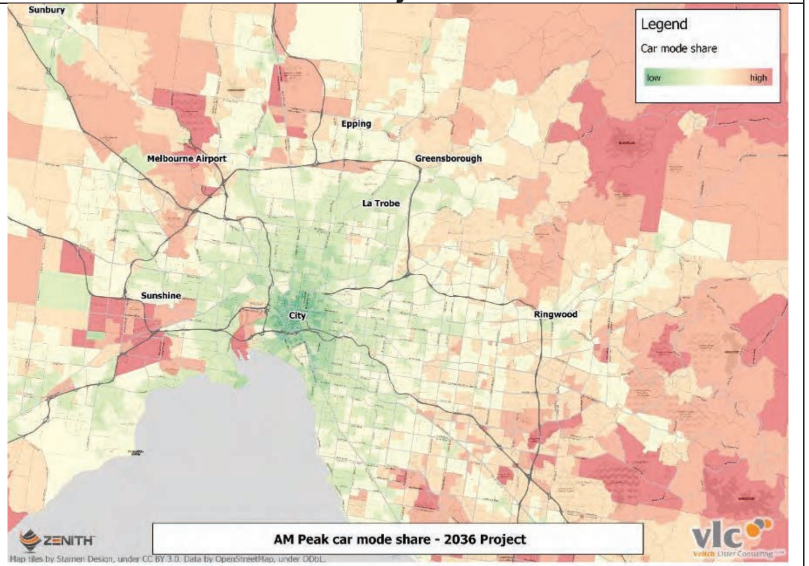
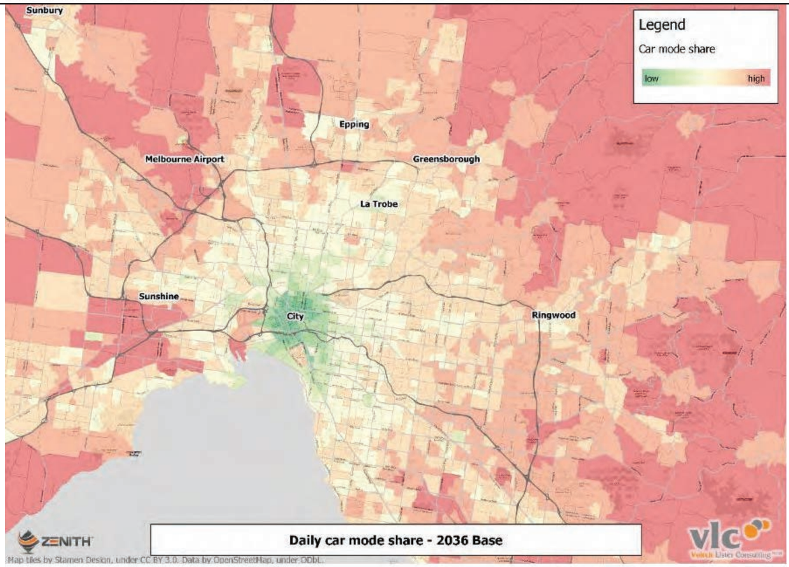
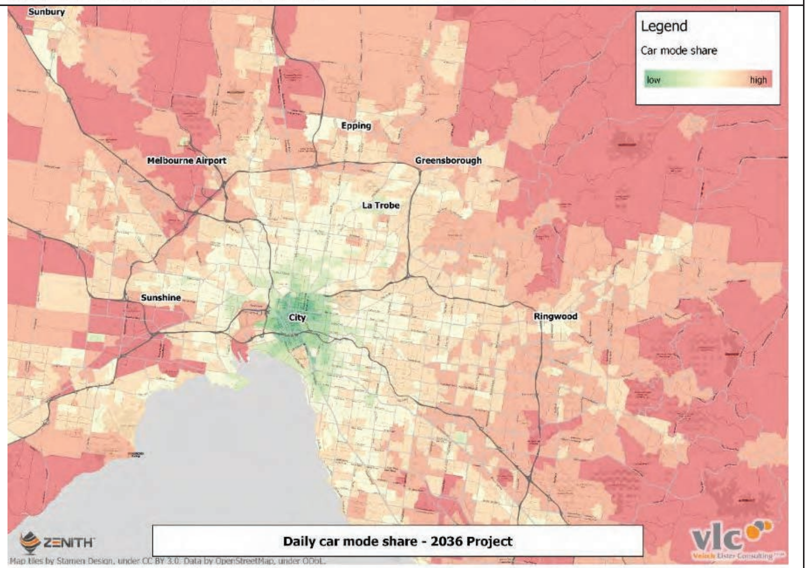
[11] Note: While the Zenith model has the capability to represent over-crowding on public transport, it has not been used for this project, and the public transport network is thus unconstrained.

Figure 5.10 - Daily and AM peak car mode share by trip origin, 2036

	Base case (no project)	Project
AM PEAK		
DAILY		

5.7 Forecast uncertainty and sensitivity tests

To ascertain the robustness of the model and to understand the impact of changed assumptions on the traffic volumes on North East Link, a number of sensitivity tests were undertaken, including among others, for different land uses, costs and value of time as well as planned infrastructure. The results are described below.

5.7.1 Sensitivity tests

Sensitivity tests were undertaken during the development of the business case and EES for North East Link. The results relating to the EES are described in this section.

As part of the EES, the potential risks and uncertainties associated with the demand forecasts were assessed through the following tests:

1) Land use tests
    i) High and low **land use growth** scenarios, where:
        - high growth scenario +7 per cent population and +8 per cent employment
        - Low growth scenario -7 per cent population and -8 per cent employment
    ii) A **project-specific land use** scenario, assuming persons or businesses who relocate to take advantage of the project, evaluated by a project-specific land use scenario.
2) Cost tests:
    i) 20 per cent increase/decrease in the **toll price** on North East Link
    ii) Reducing **commercial vehicles' willingness to pay** tolls by halving the toll diversion implied value of time for commercial vehicles
    iii) Extending the existing night time **truck curfews** in the north-east to 24-hours.
3) Infrastructure tests:
    i) Assessment of an alternative North East Link/Manningham Road **interchange layout**
    ii) **E6** freeway starting at the M80 Ring Road between Dalton Road and Plenty Road and terminating at the Hume Freeway north of Donnybrook Road
    iii) **Outer Metropolitan Ring** (OMR) road starting at the M80 Ring Road between Dalton Road and Plenty Road, terminating at the Princes Freeway West north of Little River Road.
4) Inclusion of **Alphington paper mill** and the **Gas and Fuel redevelopment** sites.

Table 5.3 overleaf shows the impact of each on the modelled North East Link daily two-way tunnel volumes.

Table 5.3 - Summary of results of EES sensitivity tests in 2036

Sensitivity test	NEL traffic volumes (2 way % diff)
High land use	5%
Low land use	-5%
Project -specific land use	Smaller than -1%
+20% toll price	-4%
-20% toll price	4%
CV reduced willingness to pay tolls	-2%*
North east truck curfews (24 hours)	Smaller than 1%
Alternative Manningham Road interchange	Smaller than -1%
E6	5%
OMR road	5%
Inclusion of redevelopments	Smaller than -1%

* Commercial vehicles only

The results indicate that a change in land uses and toll prices would have the largest impact on the eventual volumes on North East Link, with the construction of the planned E6 and Outer Metropolitan Ring Road also impacting the traffic volumes on North East Link.

However, at 5 per cent or less, these differences are not overly significant. Other changes in the assumptions only have a negligible impact on the forecasts.

Appendix A: Model limitations

The Zenith model has been calibrated using the VISTA household travel survey data, including VISTA07 and VISTA09. The model's behavioural relationships therefore reflect peoples' attitudes and preferences at the time the VISTA surveys were conducted. DEDJTR research into the VISTA surveys indicates that travel behaviour across Melbourne has not change significantly since these surveys[12].

However, some key model parameters, such as how people value their time and make trade-offs when deciding whether, where and how to travel, may change over time, while the model assumes these travel behaviour characteristics and preferences would remain constant.

There are also inherent uncertainties in forecasts driven by changes, either expected or unexpected, in demographic, social, technological and economic conditions.

The model limitations are discussed in more detail below with a focus on model assumptions that drive demand, impact of changed travel behaviour and new technologies, and model-specific limitations.

A.1 Model assumptions

The modelling that underpins the forecasts is based on a number of assumptions that if different in future, may have a significant impact on the ultimate traffic volumes on North East Link. Specifically, the impact of future demographics will have a marked impact on the ultimate outcome.

Government policies can also have a meaningful impact on future travel. For example, population growth in Australian cities is driven by interstate and international migration. Changes in state policy can change the demand for migration to other states. The Australian Government could change its policy on the volume and type of migrants accepted at short notice. The result can significantly change annual growth of population.

A.1.1 Land use and transport inputs for long-term forecasts

The modelling of a future scenario is dependent on the level of detail and accuracy of the demographic forecasts provided. This includes the future distribution of population and employment, as well as the socio-economic profile of the population. The locations of schools, higher education institutions and shopping centres, and the location and scale of other special travel generators such as ports and airports are also important inputs to the model.

The model is only as accurate as the demographic assumptions are correct. As the population and employment numbers are significant drivers of travel demand, any error in the demographic forecast would have a significant impact on the traffic forecasts for North East Link.

On the supply side, all transport modes of the entire transport network envisaged for the scenario need to be identified and defined separately.

It is important to recognise the model produces travel demand forecasts for a pre-defined land use and transport network structure that is specified exogenously. In the case of North East Link modelling, the forecasts are based on the inputs provided by TfV, on behalf of the Victorian Government. The TfV demographic and land use forecasts do not necessarily account for the impact of new transport infrastructure on accessibility and travel demand patterns. This may lead to understatements of travel demands in areas of the city with substantially improved accessibility.

[12] Department of Economic Development, Jobs, Transport and Resources. "*Travel in metropolitan Melbourne, VISTA Survey 2013*"

The interactions and interdependencies of changes in transport networks, accessibility and land use are complex and not always well-understood. As such the inherent uncertainty associated with modelled forecasts depends upon the skills of land use planners and urban economists as much as it does the transport modeller.

A.1.2 Policy and cost assumptions

There are numerous exogenous factors affecting travel demand forecasting which are difficult to predict or quantify.

Changes in government policy, such as parking fees or public transport fares, occur on a regular basis and would affect the modelled outcomes.

Other major cost assumptions, in particular changes in fuel costs and vehicle efficiency, can also prove difficult to foresee. Various factors impact the petrol price paid at the pump, including the Australian dollar exchange rate and perceptions of potential oil supply[13]. In both cases, a transport model is the ideal tool to test the sensitivity of future travel demand to these exogenous factors, mitigating the level of uncertainty around modelled forecasts.

In the case of the recent forecasting for North East Link, numerous policy changes were announced by the Victorian Government. For example, in January 2017, VicRoads modified the truck curfews in the north-east.

A.2 Changes in travel behaviour

Some key model parameters, such as how people value their time and make trade-offs when deciding whether, where and how to travel, may change over time. In the model these travel behaviour characteristics and preferences are assumed to remain constant. The model also makes no attempt to predict 'paradigm shifts' in travel behaviour that might occur in the future.

However, it is not only plausible, but likely that travel behaviour will change. For example, in response to issues such as concern for the environment, younger people driving less and older people driving more than previous generations, emerging technologies or improvements in fuel efficiency.

There are also inherent uncertainties in forecasts driven by changes, either expected or unexpected, in demographic, social, technological and economic conditions. Other uncertainties associated with the forecasting include:

- Changing community attitudes to different modes of transport
- Impact of disruptive technologies, including autonomous vehicles, demand responsive transport, mobility as a service and others.

Millard-Bell and Schipper[14] examined the relationship between motorised passenger kilometres and GDP growth, and concluded that kilometres travelled had slowed relative to GDP. The authors did not speculate whether this was likely a temporary plateau or might be indicative of a more permanent shift in travel behaviour, but this trend would represent a divergence from past trends observed in travel surveys used to calibrate the travel model.

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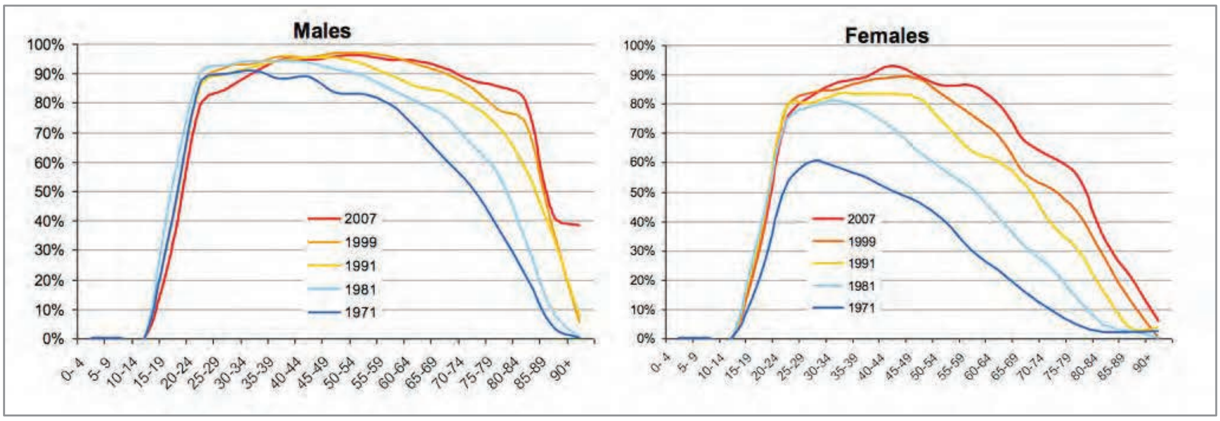
[13] Gargett, D. (2010). Petrol prices in Australia, *Australasian Transport Research Forum 2010 Proceedings*, 29 September - 1 October 2010, Canberra
[14] Millard-Ball, A. & Schipper, L. (2011). Are we reaching peak travel? Trends in passenger transport in eight industrialized countries. *Transport Reviews*, 31(3), 357-378

Similarly, analysis by Kuhnimhof[15] suggested that the younger population in many developed economies were driving less than previous generations. The authors found that in some countries (France, Japan and the United States) the net impact was an overall reduction in travel, while in others (Great Britain and Germany) the reduction in car use was offset by increased take-up of alternative modes such as cycling and public transport. In both cases, assumptions would need to be made as to whether such trends are likely to continue, and if so, how significant these trends might be.

An example of an emerging trend of this nature includes changes to licence-holding rates over time. Appendix Figure A.1 shows the rates of licence holders in Sydney by gender, for 1971 to 2007[16]. Of note is the significant increase in licence-holding for older people – particularly males over 60 - as well as the overall increase in licence-holding for females since 1971.

Appendix Figure A.1 - Licence-holding rates in Sydney SD, by gender and age, 1971 to 2007



A.3 New technologies

Much has been said and written about new technologies in the transport industry, including shared mobility, autonomous vehicles and zero emissions vehicles, and much uncertainty exists on the impact of these on travel behaviour and ultimately on the use of the transport infrastructure.

Recent research published by Infrastructure Victoria[17] suggests that '*Automated vehicles offer reduced congestion, faster travel times, safer roads, improved access to services and a stronger economy. If they realise their potential, automated vehicles could improve the efficiency of Victoria's road network by* ***up to*** *91% and boost economic growth by up to $15 billion in 2046'.*

However, there is currently no evidence on how the future automotive technology may impact future travel demand as this is dependent on, for example, the way the community adopts the new technology and whether autonomous vehicles will be predominately privately owned or a shared service. There is currently little consistent evidence to provide any guidance on how technology may drive travel demand.

[15] Kuhnimhof T, Buehler R, Wirtz M, Kalinowska D (2012). Travel trends among young adults in Germany: increasing multimodality and declining car use for men, *Journal of Transport Geography*, 24 (2012) 443–450
[16] Source: Raimond, Tim, and Frank Milthorpe. 2010. 'Why Are Young People Driving Less? Trends In Licence-Holding And Travel Behaviour.'. In *Australian Transport Research Forum*.

[17] Infrastructure Victoria, "*Advice on automates and zero emissions vehicles infrastructure*", October 2018

A.4 Model specific limitations

A.4.1 Average weekday traffic volumes

The Zenith model parameters are calibrated using VISTA house hold travel surveys collected for an average weekday during school term (AWDT). This excludes weekends, school holidays and public holidays. As a rule of thumb, VicRoads data indicates that AWDT are approximately 5 to 10 per cent higher than the average annual daily traffic (AADT - which is the annual traffic volumes divided by the number of days in the year). In comparing the base year model performance against observed traffic counts (though the model validation process), it is important to clearly define the modelled and observed traffic estimates.

A.4.2 Peak spreading and model time period

The daily demand (the number of trips) is determined by the land uses within the model. The total trips are subsequently divided into trip purpose, and these are then assigned to four specific time periods using factors derived from household travel surveys. The strategic model subsequently produces separate travel demand forecasts for the four time periods—AM peak, PM peak, inter-peak and the evening off-peak.

The origins and destinations of trips and the mode of choice for specific trips depend on the spatial distribution of land use and the availability and performance of the transport networks. Consequently, traffic congestion and associated delays impact choice of destination and mode of travel. However, the time period of travel is fixed in the model and does not respond to the level of service on the transport networks.

The model therefore does not account for possible peak spreading—trips being undertaken at different times to avoid excessive congestion. In reality, however, as congestion increases and cost-effective options for improving transport network capacity diminish, peak demand will extend to increasingly longer periods, both on the road and on public transport services.

Because the model cannot currently account for peak-spreading, it will generally overstate forecasts of peak travel demand and under-predict forecasts of inter-peak and off-peak travel demands.

A.4.3 Uncertainty in modelling intense traffic congestion

Strategic transport models are link-based models. In these models, travel speeds on road links (that is, sections of road between intersections) are a function of the traffic volume on the links and the capacity. On each link, travel speed reduces as traffic volume increases and this relationship is defined using a speed-flow curve.

However, strategic transport models generally do not directly account for queuing delays at intersections and do not represent travel in separate lanes for separate turning movements. Consequently, the model does not account for queueing back, where congested conditions prevent the smooth passage of vehicles from one link to another. Typically, in extremely congested networks, strategic transport models over-estimate traffic speeds and under-estimate traffic delays.

A.4.4 Unconstrained public transport network capacity

While the Zenith model has the capability to represent over-crowding on public transport and station parking constraints accessing public transport, it has not been used for this project. In effect, the public transport network is unconstrained. As a result, demand for public transport may be overstated during the peak periods.

A.4.5 Unconstrained parking capacity

The model includes parking charges, which are added to the perceived generalised cost of car travel to selected travel zones (including the CBD, inner suburbs and universities). The charge that is applied to individual zones is designed to not only reflect actual parking charges, but also any disincentive there may be for car travel resulting from a shortage of parking supply in a zone.

The component of the charge that represents capacity restraint is fairly arbitrary and is set to reflect the car parking demand/supply situation at the time the model was last validated. The model does not yet have a capability to balance parking demand and supply.

In the case of the Melbourne CBD, where the amount of parking in new developments is strictly controlled by the Melbourne City Council Planning Scheme, the parking demand/supply balance may change over time, making travel by car to the CBD more or less attractive. The model makes allowance for expected changes in CBD parking costs but assumes that the demand/supply balance does not change into the future.

A.4.6 Expected margins of uncertainty for strategic transport model forecasts

In 2011, the internationally-renowned toll road forecasting expert Dr Robert Bain published the results of a survey[18] he conducted amongst transport modelling professionals across numerous countries, which gauged their expectations surrounding the uncertainty of model forecasts. Respondents were asked to nominate their expected error range for model forecasts for both new and existing roads, for a next day, one-year, five-year and 20-year forecast horizon. The results of this survey are shown in Appendix Table A.1.

Appendix Table A.1 - Summary of survey results from transport modelling professionals

Table 1: Survey Results (n = 46)

Forecast Horizon	Likely Error Range	
	Existing Road	New Road
The next day	± 7.5%	n/a
One-year ahead	± 10%	± 15%
Five-years ahead	± 15%	± 25%
20-years ahead	± 32.5%	± 42.5%

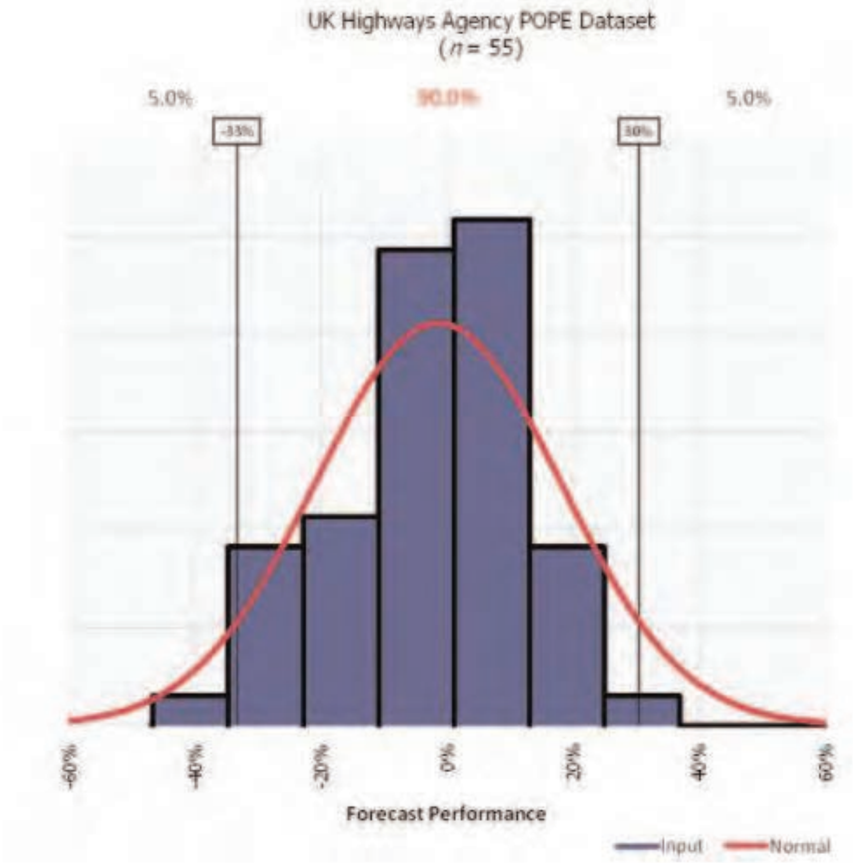
Notes: Respondents were not asked about 'next day' forecasts for new builds.
Percentages have been rounded.

The responses suggest that the industry's consensus is, that the forecast of a revenue or traffic volume in a five-year period, should be expected to be within approximately ±15% of the actual value, while a 20-year forecast was typically estimated to be within ±33%.

Bain compared this to a chart published by the UK Highways Agency in 2010, shown in Appendix Figure A.2 which compares modelled forecasts across 55 road projects compared with their actual, eventual traffic volumes. The 90 per cent confidence interval across the sample was found to be within -33 per cent and +30 per cent, and on average the forecast horizon was five years. This compared with a ±15 per cent expected error for an equivalent period from the survey responses shown in Appendix Table A.1.

[18] Dr Robert Bain, "The Wisdom of Crowds: A Survey of Forecasting Accuracy"

Appendix Figure A.2 - Variance in model forecast vs actual values



Source: UK Highways Agency, 2010

There are inherent uncertainties in forecasts because demographic, social, technological and economic conditions may change unexpectedly. For this reason, sensitivity testing of model inputs is often undertaken within the context of demand forecasting for an infrastructure project.

Describing the influence of a factor on a forecast is a matter of judgment. Realistically, for a 20-year forecast, any impact around 1 per cent could be considered to be negligible, particularly when shorter range forecasts have been shown to only reliably fall within approximately ±30 per cent of eventual actual values. In reality, even day to day, the travel demands on a given section of the network can fluctuate, with variations of around ±10 per cent commonly observed.

Appendix B: Local area model validation

B.1 Introduction

The primary focus of this appendix is the documentation of the performance of the Zenith 2016 base year model for the North East Link EES.

B.1.1 Background

The Victorian Government has prepared two transport modelling guidelines that specifically relate to traffic model validation, including:

1. The VicRoads *Transport Modelling Guidelines, Volume 2: Strategic Modelling, Version: Draft 3*" (April 2012) sets out the approach and criteria recommended by VicRoads for the validation of strategic transport models.

2. Transport for Victoria (TfV) and the Victorian Department of Economic Development, Jobs, Transport and Resources (DEDJTR) *Strategic Transport Model Elasticity Guidelines, (*December 2015) sets out 'dynamic validation' realism tests[19] and provides a range of approximate elasticity values.

B.1.2 Appendix structure

The balance of this appendix is structured as follows:

Section B.2: A summary of the observed traffic and public transport data used for the local area model validation

Section B.3: Presents demand model validation results

Section B.4: Compares the model's estimates of traffic volumes against a database of observed count data for the local area

Section B.5: Compares the model's estimates of public transport patronage against a database of observed public transport data for the local area

Section B.6: Provides a summary of the model elasticity results

Section B.7: Provides a summary of the model convergence and stability analysis.

[19] Sensitivity scenarios undertaken on the base case transport model

B.2 Data used for local area model validation

In this section, the data used for the validation of the 2016 model (and its sources) is discussed.

B.2.1 Modelled time periods

The model produces travel demand estimates for an average weekday during school term for the following four time periods:

- AM peak (7 am – 9 am)
- Inter peak (9 am – 4 pm)
- PM peak (4 pm – 6 pm)
- Evening off peak (6 pm – 7 am).

The modelled peak periods represent fixed time slices, although in the North East Link study area they do not necessarily match the busiest (or peak) two-hours.

Analysis of observed traffic counts in the North East Link study area across a typical day shows that the modelled AM and PM peaks are generally 7 per cent and 3 per cent lower than the busiest two-hours (based on 15-minute period data). This implies the peak periods in the study area as slightly off-set from the fixed modelled periods.

B.2.2 Road traffic data

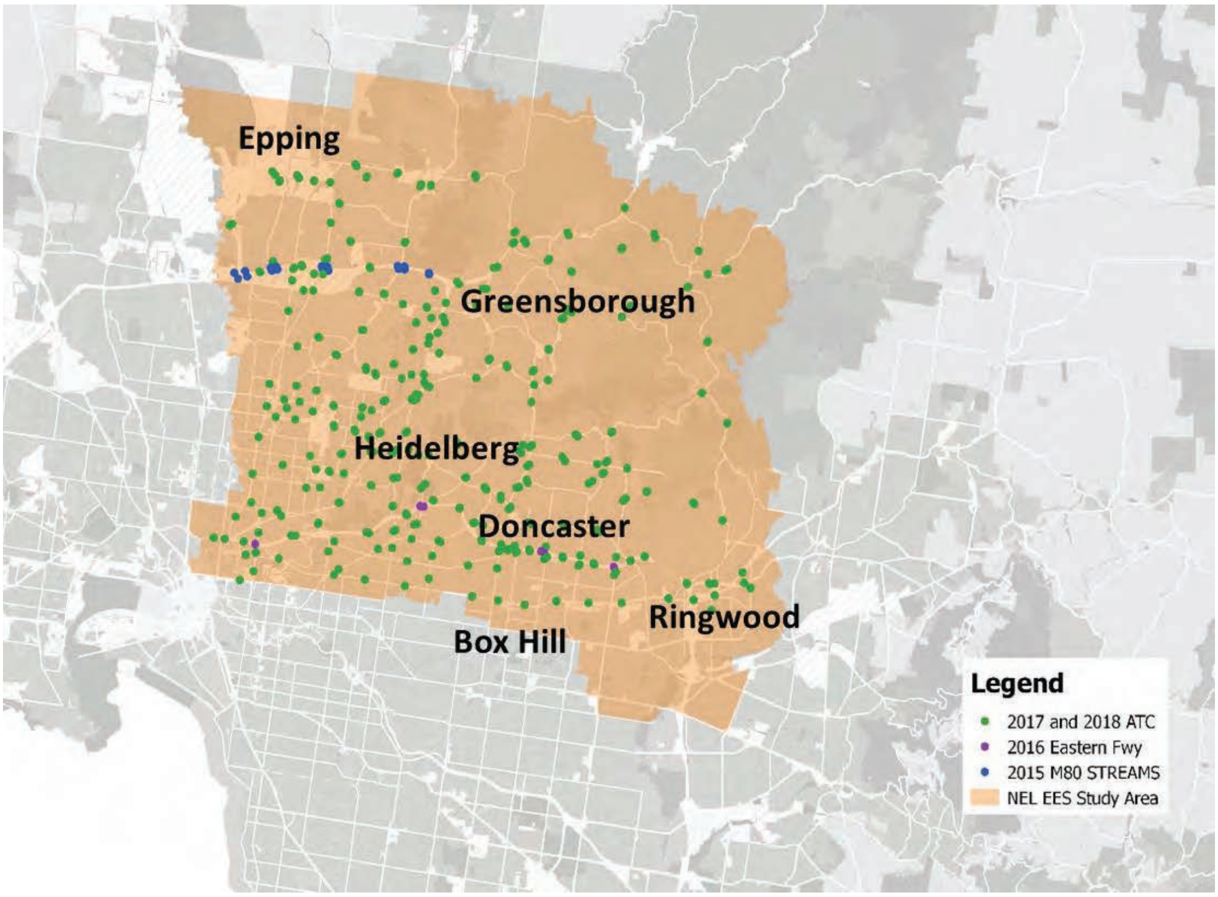
After the commencement of the transport modelling for North East Link, traffic counts and surveys were received from NELP for the purposes of the North East Link local area validation exercise. Additional traffic surveys were provided during the North East Link EES data collection process.

B.2.2.1 Local area individual traffic counts

A total of 485 traffic counts (all are defined as average weekday during school term and representing AM and PM peak periods), typically reflecting 2016 conditions in the vicinity of the proposed project were used for the validation of the model. They included the following surveys as shown in Appendix Figure B.1:

- 2017 and 2018 ATC counts for North East Link, northern roads upgrade and M80 upgrade projects
- 2016 VicRoads Eastern Freeway counts
- 2015 VicRoads Metropolitan Ring Road (M80) STREAMS volumes.

Appendix Figure B.1 - Study area total traffic count locations



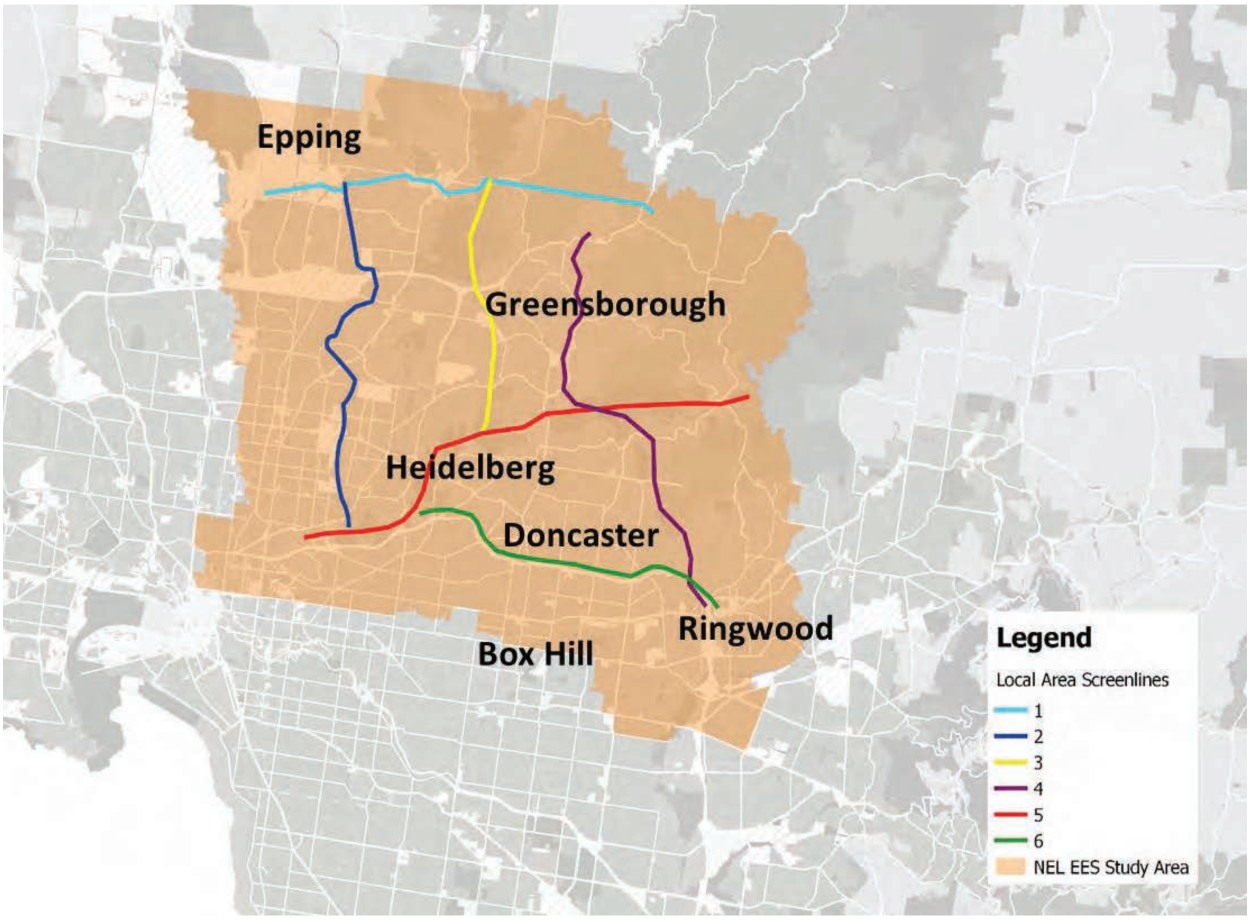
B.2.2.2 Local area screenline traffic counts

Counts along a total of six traffic screenlines were undertaken for North East Link. These screenlines included:

1. Cooper St/Kurrak Road crossings between Edgars Road and Heidelberg-Kinglake Road
2. Darebin Creek crossings between Childs Road and Heidelberg Road
3. Plenty River crossings between Kurrak Road and Main Road
4. Diamond Creek/Mullum Creek crossings between Main Street and Loughnan Road
5. Yarra River crossings between Chandler Highway and Kangaroo Ground-Warrandyte Road
6. Eastern Freeway/EastLink crossings between Bulleen Road and Ringwood Bypass.

The screenlines are shown in Appendix Figure B.2.

Appendix Figure B.2 - Local study area screenline traffic count



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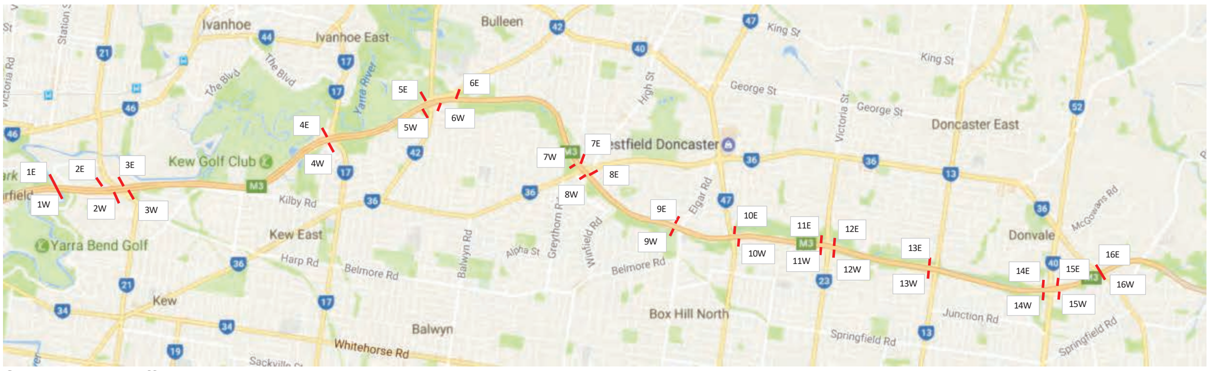
B.2.2.3 Origin-Destination surveys

Origin-Destination (OD) surveys were conducted along the Eastern Freeway in the AM and PM peak periods for North East Link. The included 30 survey locations are identified in Appendix Figure B.3 and included:

- Eastern Freeway, east of Springvale Road
- Springvale Road
- Surrey Road/Blackburn Road
- Middleborough Road/Wetherby Road
- Station Street/Tram Road
- Elgar Road
- Doncaster Road
- Bulleen Road
- Burke Road
- Chandler Highway
- Eastern Freeway, West of Chandler Highway.

The AM and PM peak period number plate capture rate was 95.8 per cent and 93.1 per cent respectively.

Appendix Figure B.3 - Eastern Freeway origin-destination survey locations



Source: Austraffic

B.2.2.4 Local area traffic travel time surveys

A total of 34 peak and 18 interpeak travel time surveys (all are defined as average weekday during school term) in the vicinity of the proposed project were undertaken and used for validation purposes. They are shown in Appendix Figure B.4 and have been sourced from:

- 2017 NELP travel time surveys
- 2017 Northern Roads Upgrade project travel time surveys.

Appendix Figure B.4 - Local study area travel time routes

B.2.2.5 Managed Motorway individual traffic counts

North East Link is expected to be operated as a managed motorway, with coordinated freeway ramp signals at interchanges. Therefore the 2016 model was validated to traffic counts along the Monash Freeway, which was upgraded with a freeway management system (FMS) in 2010 as part of the Monash-CityLink-West Gate Upgrade Project.

A total of 29 traffic counts, reflecting 2016 conditions along the Monash Freeway, between the South Gippsland Freeway and CityLink have been used for this purpose.

B.2.3 Toll roads

B.2.3.1 CityLink

The modelled CityLink toll gantry volumes were separately validated against 2016 gantry counts. **Note that this CityLink gantry data was provided by VicRoads for model validation purposes only. The data remains confidential and it should not be used for any other purposes without permission from VicRoads.**

CityLink net revenue was obtained from the 2016 and 2015 Transurban Annual Reports. Revenue due to services and fees (assumed to be 6.2 per cent of CityLink net revenue) were excluded to estimate CityLink toll revenue.

Appendix Table B.1 below depicts annual total revenue for the 2015/2016 financial year.

Appendix Table B.1 - Estimated CityLink toll revenue (FY2015/16)

Mode	2016 Observed Annual Toll Revenue net GST ($AUD2016)
Total	**$ 619,219,512**

B.2.3.2 EastLink

The 2016 model was further validated at an EastLink gantry level. **This EastLink gantry data was provided by VicRoads for model validation purposes during the transport modelling. The data remains confidential and it should not be used for any other purposes without permission from VicRoads.**

There is no recent EastLink toll revenue data available.

B.2.4 Public transport patronage data

B.2.4.1 North East Link – local area rail data

For trains passing through the North East Link study area, the estimated average weekday AM peak inbound CBD cordon train passenger loads, as well as weekday station entries at metropolitan stations (within the study area) for 2016 have been provided by TfV.

B.2.4.2 North East Link – local area bus data

For buses on the Eastern freeway, including the Doncaster area rapid transit buses, the average weekday patronage data for 2016 were provided by TfV.

B.3 Local area validation of demand models

Travel demand models are built-in algorithms that model aggregated travel behaviour at a strategic level. These include components that capture travel behaviour such as the decision to make a trip, choice of destination and choice of travel mode for different trip purposes.

VISTA is a household travel survey undertaken by Victorian Government that includes details of household travel behaviour. The built-in trip algorithms in the Zenith model, such as the trip generation model, trip distribution model and mode choice model have been validated against the VISTA07/09 recorded travel patterns. The details of the algorithms being used and their parameters, as well the calibration and validation to VISTA07/09 data can be found in the Zenith model recalibration working papers and are therefore not discussed in this report.

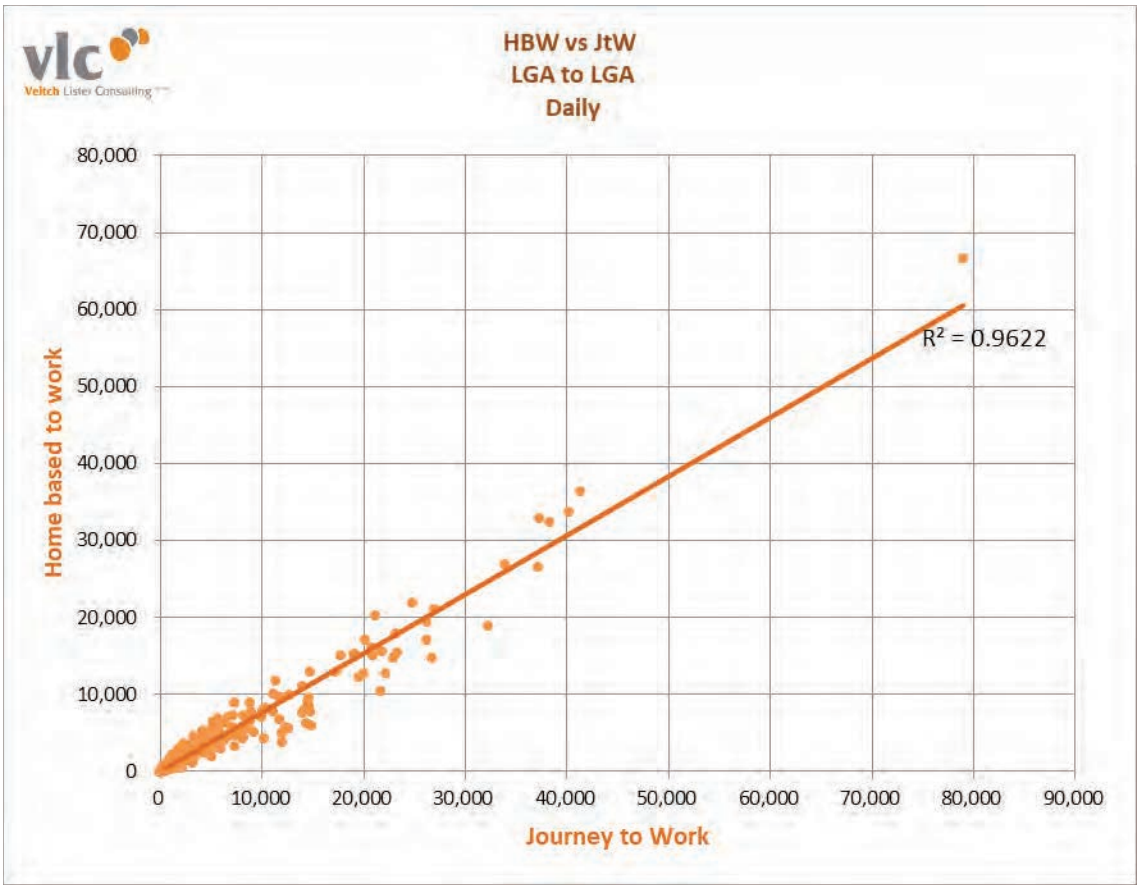
B.3.1 Journey to work validation

Appendix Figure B.5 compares 2016 modelled home-based work trips (at an LGA to LGA level) against observed data from the 2016 ABS Journey to Work (JtW) survey. It should be noted that the model classifies home-based work trips as direct home-to-work trips only, (that is, trips that involve a stopover along the way, such as the shops, or dropping children off at school, are not classified as such), while the ABS survey includes all commuter trips regardless of stopovers. Therefore, it can be expected that the number of modelled Home Based Work (HBW) trips would be less than the JtW trips and thus have a gradient less than one.

The R-squared value of 0.96 however, indicates that – proportionally – the model is allocating a scale of commuter trips between each LGA pair which correlates well to the ABS survey.

The ABS JtW survey has been included in this report as it is an independent data source which was not used in the generation of the model calibration parameters. Full validation of the demand model for each modelled trip purpose against VISTA can be found in the Zenith recalibration technical notes for Destination Choice and Mode Choice.

Appendix Figure B.5 - Modelled vs observed ABS Journey to Work (LGA to LGA)



B.4 Local area validation of traffic assignment

In this section, the traffic assignment validation results are presented to demonstrate the performance of the model in the North East Link study area.

Modelled traffic volumes will be validated against observed traffic counts by time of day.

As recommended in the VicRoads transport model guidelines[20], the Zenith model of Melbourne does not use matrix estimation or k-factors.

A detailed listing of modelled and observed individual count comparisons can be found in Appendix Table B.35 of Appendix B1: Validation of traffic flows.

B.4.1 North East Link corridor traffic validation

B.4.1.1 Traffic volumes - individual traffic counts

Appendix Table B.2 and Appendix Table B.3 show the modelled validation results against the individual local area traffic counts in terms of the %RMSE statistic. The %RMSE for traffic counts is approximately 14 per cent across the day, 27 per cent in the AM peak and 24 per cent in the PM peak and is well below the VicRoads criteria of a maximum %RMSE of 30 per cent.

Appendix Table B.2 - Validation to individual counts – peak periods (%RMSE)

Volume bins	AM	PM
0 - 999	67.0	62.4
1000 - 1999	37.2	30.2
2,000 - 4,999	22.7	22.6
5,000 - 9,999	13.1	15.2
10,000 +	15.2	11.0
ALL	**26.7**	**23.8**

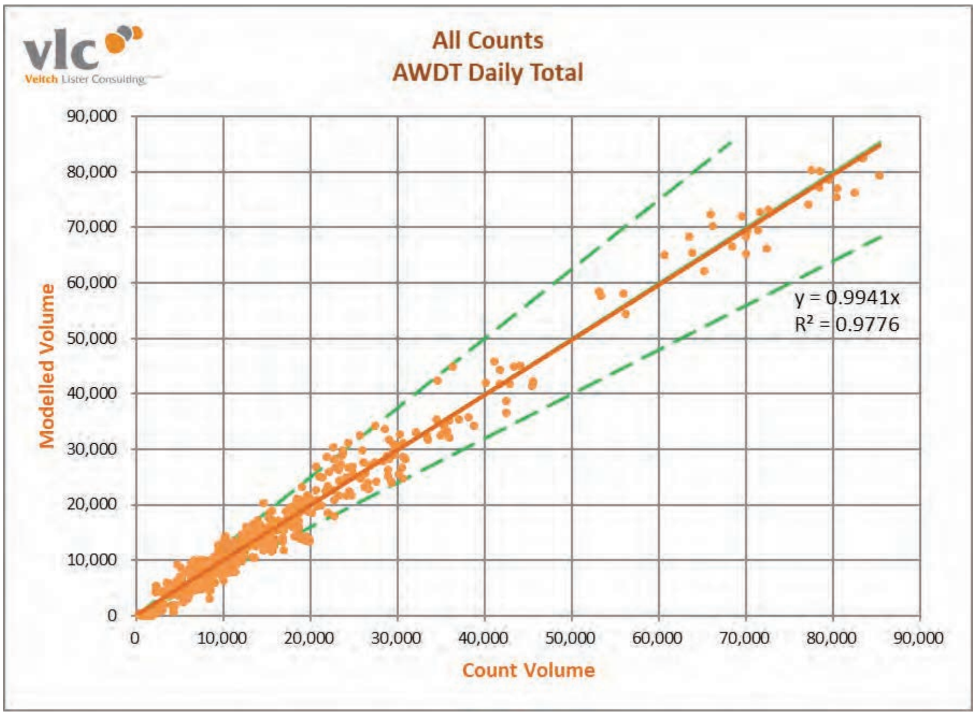
Appendix Table B.3 - Validation to individual counts - daily (%RMSE)

Volume bins	Daily
0 - 4,999	56.6
5,000 - 9,999	23.5
10,000 - 24,999	15.1
25,000 - 49,999	10.3
50,000 +	5.2
ALL	**13.7**

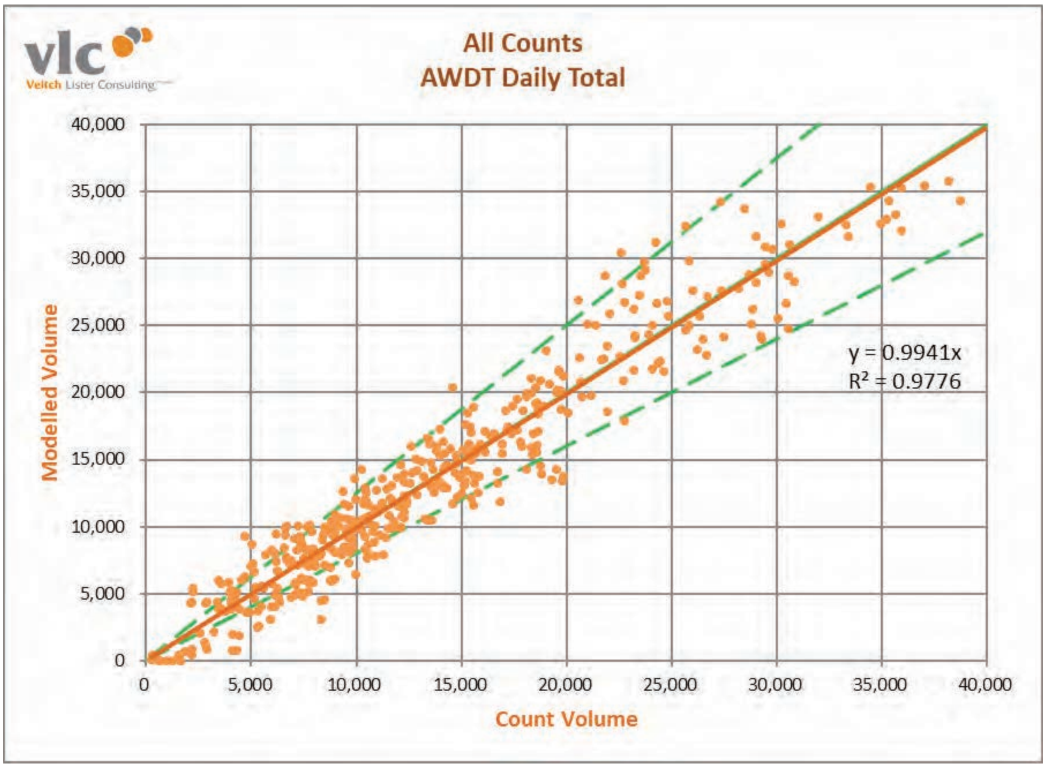
The scatter plots of daily, AM peak and PM peak one-way modelled volumes as compared with traffic counts in the local area are shown in Appendix Figure B.6 to Appendix Figure B.11. Each plot is followed by an accompanying plot which zooms in on smaller values. The R-squares and gradients are all close to 1 and meet the VicRoads criteria.

[20] "*Transport Modelling Guidelines, Volume 2: Strategic Modelling, Version: Draft 3*", 26 April 2012

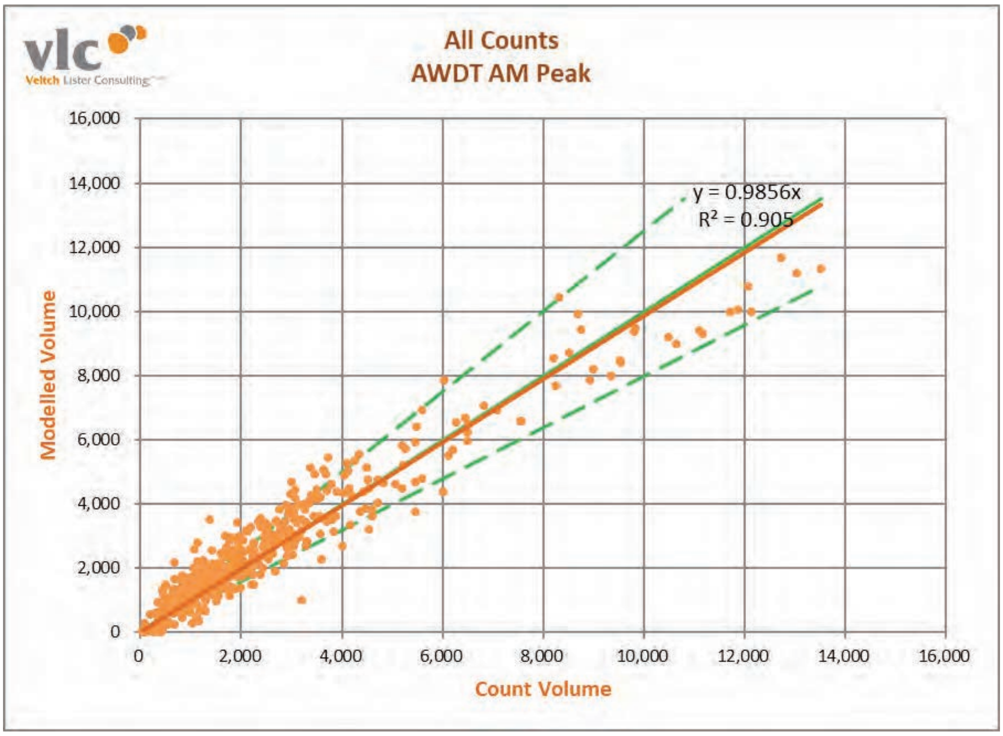
Appendix Figure B.6 - Local area daily individual counts scatter chart (observed vs 2016 modelled)



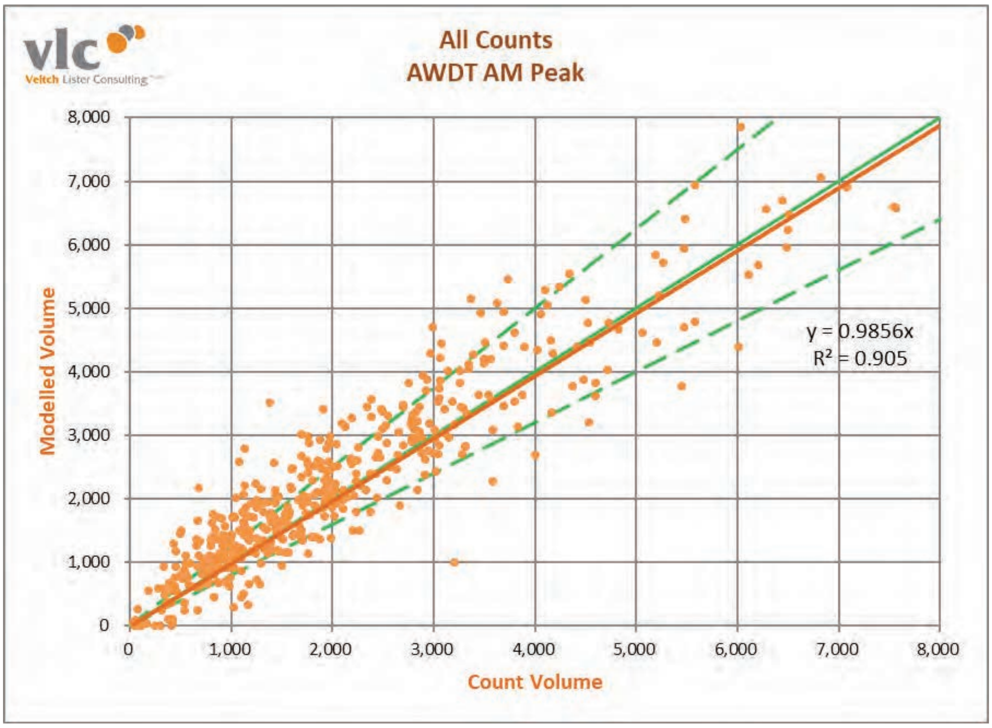
Appendix Figure B.7 - Local area daily individual counts scatter chart (zoomed in, zero to 40,000)



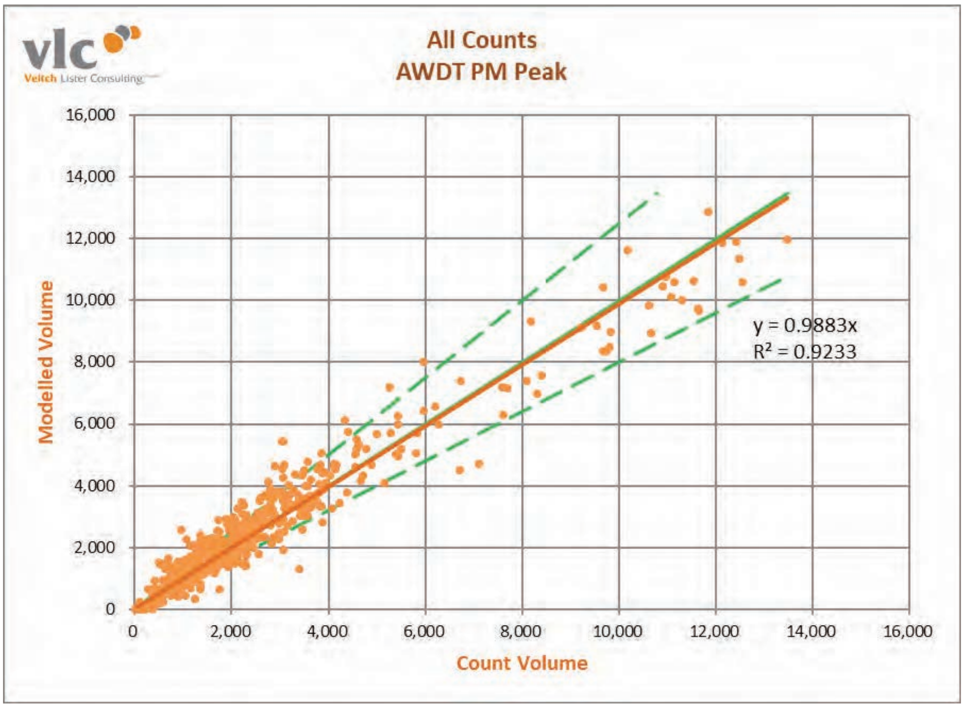
Appendix Figure B.8 - Local area AM peak individual counts scatter chart (observed Vs 2016 modelled)



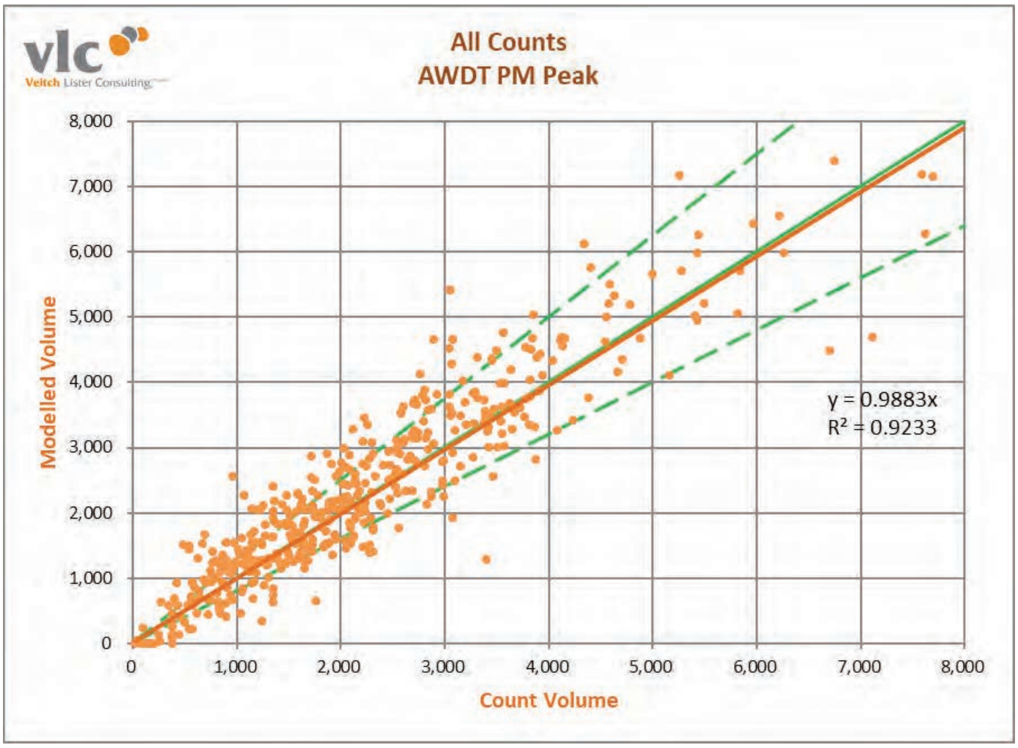
Appendix Figure B.9 - Local area AM peak individual counts scatter chart (zoomed in, zero to 8,000)



Appendix Figure B.10 - Local area PM peak individual counts scatter chart (Observed Vs 2016 Modelled)



Appendix Figure B.11 - Local area PM peak individual counts scatter chart (zoomed in, zero to 8,000)



B.4.1.2 Traffic volumes summary

A summary of count validation results measured against the acceptance targets specified by VicRoads is shown in Appendix Table B.4. The 2016 model achieves the VicRoads targets for all criteria shown below, including R-squared, gradient and %RMSE.

Appendix Table B.4 - Local area count validation results – total traffic

Statistics	VicRoads Targets	AWDT AM	AWDT PM	AWDT Total
R-square	>0.9	0.905	0.923	0.978
Gradient	Between 0.9 and 1.1	0.986	0.988	0.994
% RMSE	<30	26.7	23.8	13.7
All	as above	✓	✓	✓

The modelled traffic volumes in the study area are 1.4 per cent and 1.2 per cent lower than the observed individual counts in the AM and PM peaks respectively as the gradient is just below 1.0 in each time period. The daily traffic volumes are 0.6 per cent lower. These results point to a small underestimation of traffic volumes in the study area and thus a small underestimate of congestion in the peak periods.

B.4.1.3 Screenline analysis

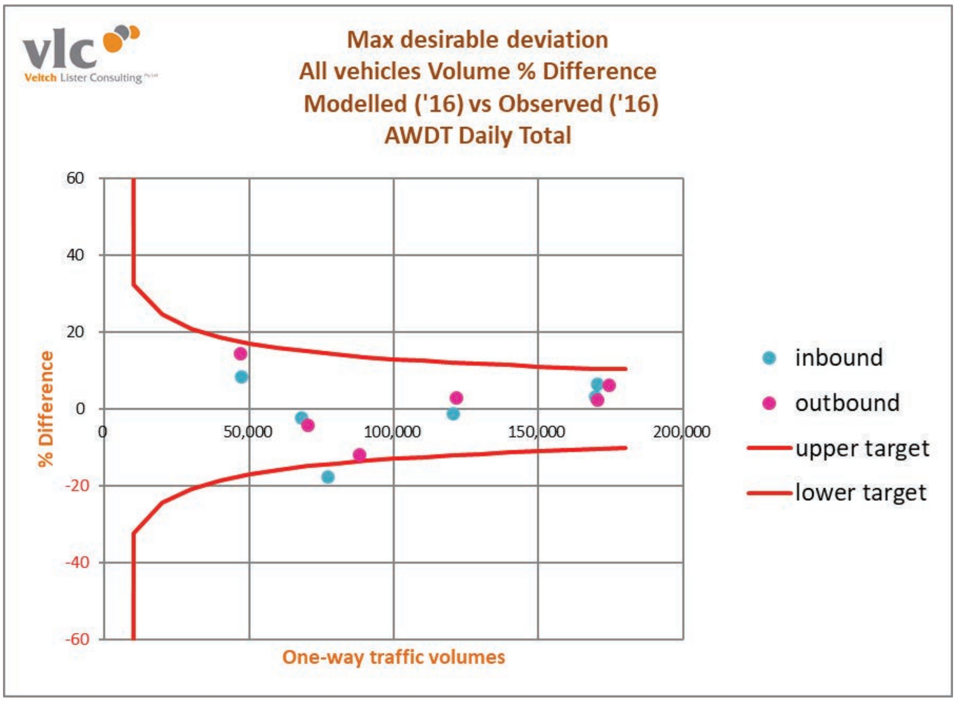
A comparison of observed and modelled screenline totals was assessed against the maximum desirable deviation derived from NCHRP255 (VicRoads, 2012), for each time period. Appendix Figure B.12, Appendix Figure B.13 and Appendix Figure B.14 show the results of the screenline totals across the day, the AM peak and the PM peak. In summary:

- The project traffic screenlines are within the bounds of the curves across the day, with the exception of southbound Cooper St/Kurrak Road crossings between Edgars Road and Heidelberg-Kinglake Road (screenline 1).
- The model is within the bounds for the AM peak with the exception of the Darebin Creek crossings (screenline 2) in both directions and southbound Eastern Freeway/Eastlink crossings (screenline 6).
- The model is also within the bounds for the PM peak with the exception of the southbound Cooper St/Kurrak Road crossings (screenline 1).

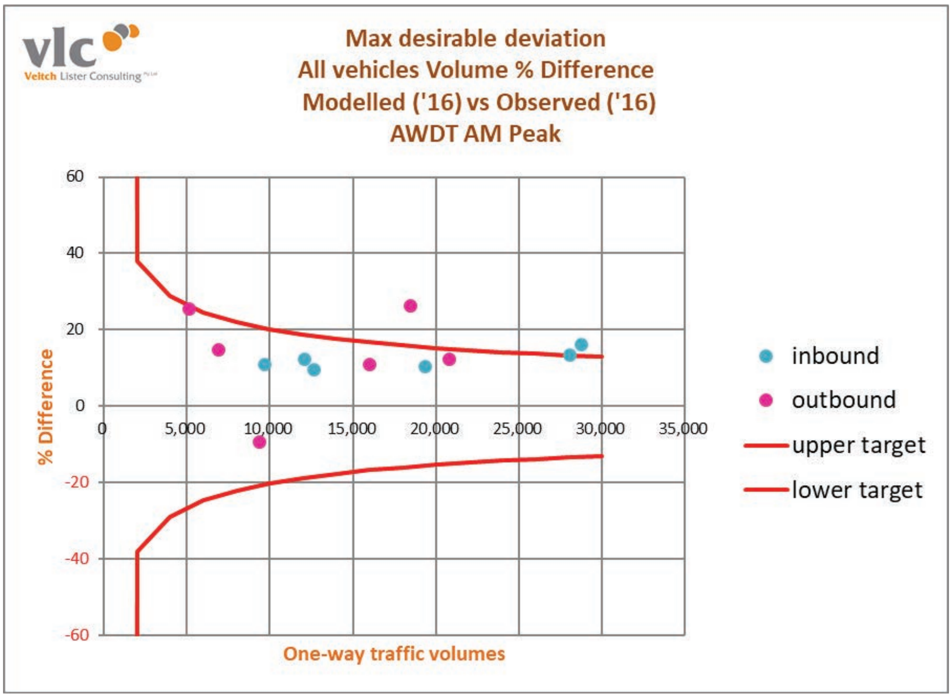
Based on the project traffic screenlines the modelled volumes are on average 13 per cent and 7 per cent higher in the AM and PM peaks, while daily volumes are 2 per cent higher. In this case, pointing to an overestimate of congestion in the peak periods.

Across the day, the model performs well when measured against individual traffic counts and traffic screenlines. Even when the variation in definition of peak period traffic is considered (the fixed modelled time periods are on average 7 per cent and 3 per cent lower than the actual two-hour morning and evening peaks as mentioned in Section B.2.1), it is harder to explain why in both peak periods, the model appears to underestimate traffic volumes compared with individual traffic counts (discussed in Section B.4.1.2), while over estimating traffic volumes when compared with traffic screenlines.

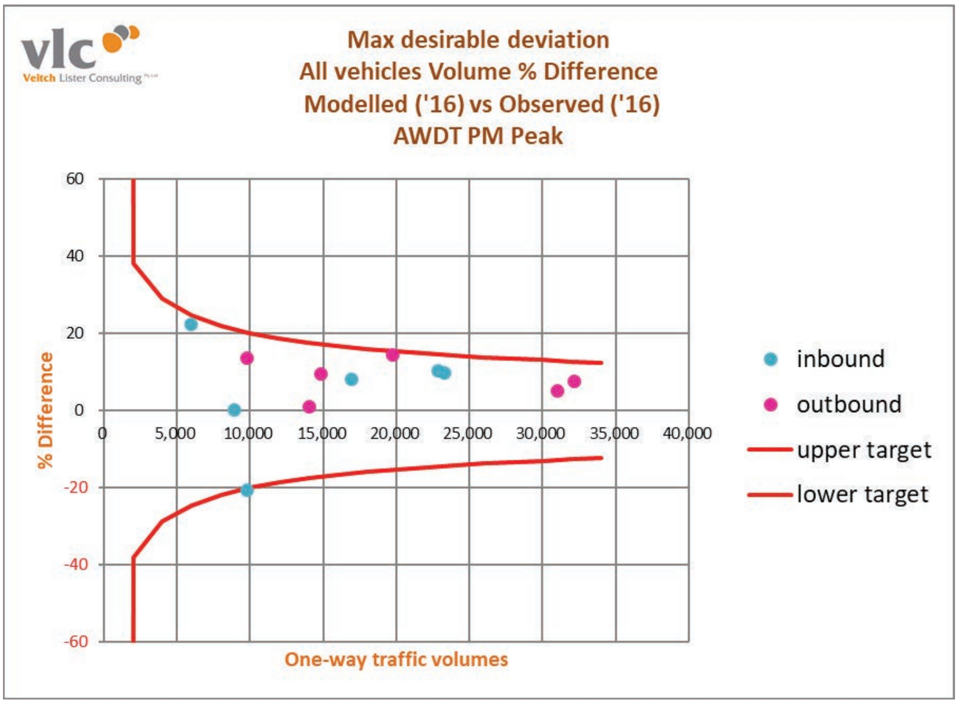
Appendix Figure B.12 - Daily screenline maximum desirable deviation comparison



Appendix Figure B.13 - AM peak screenline maximum desirable deviation comparison



Appendix Figure B.14 - PM peak screenline maximum desirable deviation comparison



B.4.1.4 Summary

The validation shows that across the day, the model performs well when measured against individual traffic counts and traffic screenlines.

B.4.1.5 Greensborough Road, Rosanna Road, Bulleen Road corridor analysis

Appendix Table B.5 shows the average weekday two-way traffic volumes along the North East Link corridor, including Greensborough, Rosanna and Bulleen Roads, while Appendix Table B.6 and Appendix Table B.7 show the AM and PM peak two-way results.

Across the day and in each peak period, the model is typically within 5 to 10 per cent of the traffic counts along the project corridor.

Appendix Table B.5 - Daily corridor observed and modelled traffic volumes (two-way, AWDT)

Road	Location	Count	Model	Difference	% Difference
Bulleen Road	Thompsons Road And Manningham Road	44,400	40,300	- 4,100	-9%
Banksia St	At Yarra River	74,700	69,500	- 5,100	-7%
Rosanna Rd	Brown Street And Reid Street	45,200	47,500	2,300	5%
Lower Plenty Road	Rosanna Rd and Greensborough Rd	66,700	64,100	- 2,600	-4%
Greensborough Rd	Erskine Road and Blamey Road	57,700	57,000	- 700	-1%
Greensborough Rd	South Of Watsonia Road	61,400	57,000	- 4,400	-7%
Greensborough Highway	Between Grimshaw Street And M80 Interchange	72,300	69,700	- 2,600	-4%
TOTAL		**422,400**	**405,200**	**- 17,200**	**-4%**

Appendix Table B.6 - AM peak corridor observed and modelled traffic volumes (two-way, AWDT)

Road	Location	Count	Model	Difference	% Difference
Bulleen Road	Thompsons Road And Manningham Road	5,600	5,300	- 400	-7%
Banksia St	At Yarra River	10,400	11,000	600	6%
Rosanna Rd	Brown Street And Reid Street	4,800	5,400	600	13%
Lower Plenty Road	Rosanna Rd and Greensborough Rd	9,100	8,300	- 800	-8%
Greensborough Rd	Erskine Road and Blamey Road	7,200	7,600	400	6%
Greensborough Rd	South Of Watsonia Road	7,700	7,700	-	0%
Greensborough Highway	Between Grimshaw Street And M80 Interchange	9,000	9,000	-	0%
Total		**53,800**	**54,300**	**500**	**1%**

Appendix Table B.7 - PM peak corridor observed and modelled traffic volumes (two-way, AWDT)

Road	Location	Count	Model	Difference	% Difference
Bulleen Road	Thompsons Road And Manningham Road	5,900	5,100	- 800	-13%
Banksia St	At Yarra River	10,900	11,500	600	6%
Rosanna Rd	Brown Street And Reid Street	6,100	5,800	- 200	-4%
Lower Plenty Road	Rosanna Rd and Greensborough Rd	9,500	9,000	- 500	-5%
Greensborough Rd	Erskine Road and Blamey Road	7,500	8,200	600	8%
Greensborough Rd	South Of Watsonia Road	8,200	8,300	100	2%
Greensborough Highway	Between Grimshaw Street And M80 Interchange	10,100	9,400	- 700	-7%
TOTAL		**58,200**	**57,300**	**- 900**	**-1%**

Appendix Table B.8 shows the average weekday two-way commercial vehicle volumes along the North East Link corridor. In general, the model slightly overestimates the daily commercial vehicles along the project corridor. The biggest difference occurs on Manningham Road at the Yarra River crossing, where the model is 33 per cent high. However, commercial vehicle traffic counts appear to vary a lot at this site ranging from 8,600 commercial vehicles per day in April 2017 and 6,200 commercial vehicles per day in February 2018.

Appendix Table B.8 - Daily corridor observed and modelled commercial vehicle volumes (two-way, AWDT)

Road	Location	Count	Model	Difference	% Difference
Bulleen Road	Thompsons Road And Manningham Road	5,200	5,800	600	11%
Banksia St	At Yarra River	6,200	8,300	2,100	33%
Rosanna Rd	Brown Street And Reid Street	3,300	3,500	200	6%
Lower Plenty Road	Rosanna Rd and Greensborough Rd	3,700	4,200	400	12%
Greensborough Rd	Erskine Road and Blamey Road	3,900	4,000	100	3%
TOTAL		**22,400**	**25,700**	**3,400**	**15%**

B.4.1.6 Eastern Freeway validation

Appendix Table B.9 compares the modelled and observed average weekday mid-block traffic volumes along the Eastern Freeway, between Springvale Road and Hoddle Street. The model typically falls within 5 per cent of observed daily traffic volumes for each mid-block section of the Eastern Freeway.

Appendix Table B.9 - Eastern Freeway observed and modelled traffic volumes (AWDT)

Count Location	Direction	Observed	2016 Modelled	Difference	% Difference
Springvale Rd to Blackburn Rd	EB	70,000	68,200	-1,700	-2%
Blackburn Rd to Middleborough Rd	EB	78,500	80,100	1,700	2%
Middleborough Rd to Tram Rd	EB	83,500	82,500	-1,000	-1%
Tram Rd to Elgar Rd	EB	70,100	69,200	-900	-1%
Elgar Rd to Doncaster Rd	EB	79,500	78,600	-900	-1%
Doncaster Rd to Bulleen Rd	EB	78,400	77,300	-1,100	-1%
Bulleen Rd to Burke Rd	EB	66,100	70,200	4,100	6%
Burke Rd to Chandler Hwy	EB	77,500	80,300	2,800	4%
Chandler Hwy to Hoddle St	EB	71,600	72,700	1,100	2%
Eastbound Total	**EB**	**675,100**	**679,100**	**4,100**	**1%**
Springvale Rd to Blackburn Rd	WB	70,000	65,300	-4,800	-7%
Blackburn Rd to Middleborough Rd	WB	80,500	77,000	-3,500	-4%
Middleborough Rd to Tram Rd	WB	85,300	79,400	-5,900	-7%
Tram Rd to Elgar Rd	WB	72,300	66,200	-6,100	-8%
Elgar Rd to Doncaster Rd	WB	82,500	76,200	-6,300	-8%
Doncaster Rd to Bulleen Rd	WB	80,300	75,400	-5,000	-6%
Bulleen Rd to Burke Rd	WB	68,300	66,700	-1,700	-2%
Burke Rd to Chandler Hwy	WB	77,100	74,100	-3,000	-4%
Chandler Hwy to Hoddle St	WB	65,100	62,100	-3,000	-5%
Westbound Total	**WB**	**681,600**	**642,300**	**-39,300**	**-6%**

B.4.1.7 Yarra River screenline analysis

Appendix Table B.10 below shows the average weekday two-way traffic volumes crossing the Yarra River screenline. The model slightly overestimates daily traffic crossing the Yarra River at all river crossings except for Manningham Road, where is it 7 per cent lower than the traffic count. Overall, the daily traffic volumes crossing the Yarra River are only 1 per cent higher that the observed traffic counts.

Appendix Table B.10 - Yarra River crossing observed and modelled traffic volumes (two-way, AWDT) – screenline

Location	Count	Model	Difference	% Difference
Chandler Hwy	45,600	46,800	1,200	3%
Burke Rd Bridge	40,400	41,400	1,000	3%
Manningham Road	74,700	69,500	-5,100	-7%
Fitzsimons Lane	62,200	65,800	3,500	6%
Kangaroo Ground-Warrandyte Rd	19,000	20,600	1,600	9%
Total	**241,800**	**244,100**	**2,200**	**1%**

* note that this data was used for calibration purposes

Appendix Table B.11 shows the average weekday two-way commercial vehicle volumes crossing the Yarra River screenline. In general, the model overestimates the daily commercial vehicles crossing the screenline, with the biggest difference observed at Manningham Road. However, as noted in Section B.4.1.5, commercial vehicle traffic counts appear to vary significantly at this site.

Appendix Table B.11 - Yarra River crossing observed and modelled commercial vehicle volumes (two-way, AWDT) – screenline

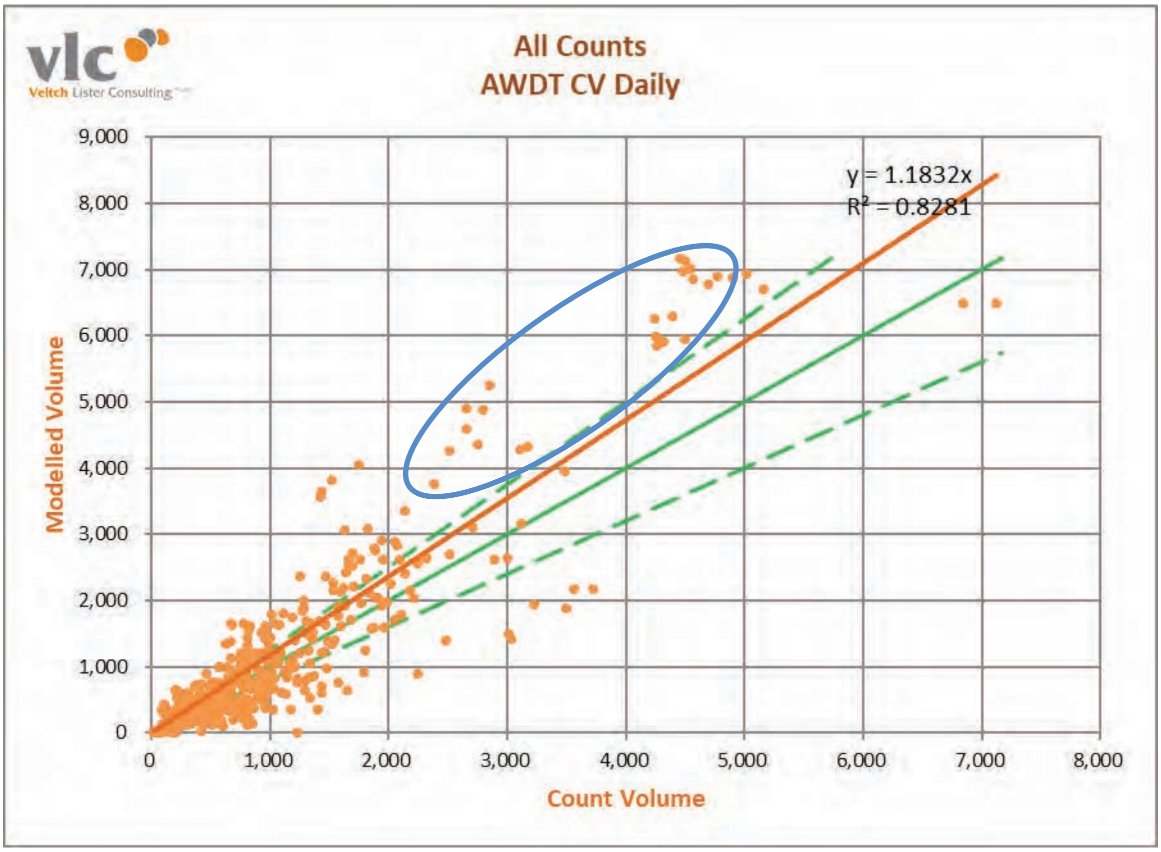
Location	Count	Model	Difference	% Difference
Chandler Hwy	3,800	4,400	600	15%
Burke Rd Bridge	2,200	1,900	-300	-14%
Manningham Road	6,200	8,300	2,100	33%
Fitzsimons Lane	4,000	3,700	-300	-9%
Kangaroo Ground-Warrandyte Rd	1,100	1,700	600	56%
Total	**17,400**	**20,000**	**2,600**	**15%**

B.4.1.8 Commercial vehicle volumes - individual traffic counts

In the Zenith model, commercial vehicles include both light commercial vehicles (LCVs) and heavy commercial vehicles (HCVs) which are each modelled separately. In reference to the Austroads Vehicle Classification System, the model defines Class 3 vehicles as LCVs, and Classes 4 to 12 as HCVs (with both definitions excluding buses and trams).

The scatter plots of daily one-way modelled commercial vehicle traffic volumes as compared with traffic counts in the local area are shown in Appendix Figure B.15.

Appendix Figure B.15 - Local area scatter chart – individual counts of daily commercial vehicle (observed vs 2016 modelled)



Across the study area, the model is approximately 18 per cent high relative to commercial vehicle observed data. This is due to an overestimation of commercial vehicle traffic on the Eastern Freeway and M80 Ring Road, as illustrated by the cluster circled in blue.

B.4.2 Origin-Destination comparison

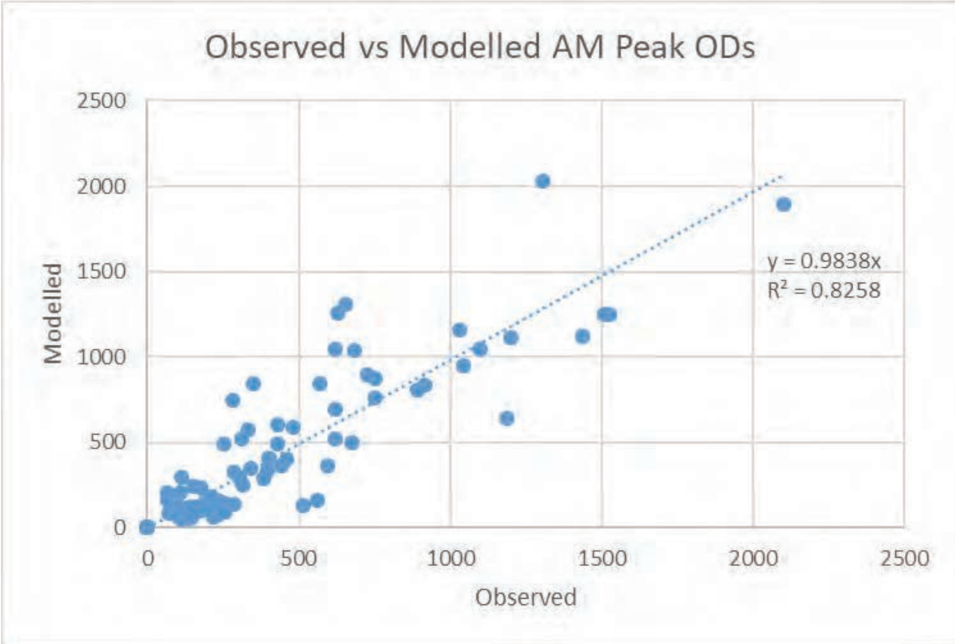
Origin-Destination (OD) data was collected for the Eastern Freeway in the AM and PM peaks. The scatter plots of observed vs modelled OD pairs are shown in Appendix Figure B.16 and Appendix Figure B.17.

Appendix Figure B.18 shows the destination of traffic on the Eastern Freeway in the peak periods, comparing the observed OD survey data to the modelled results from two sites, including:

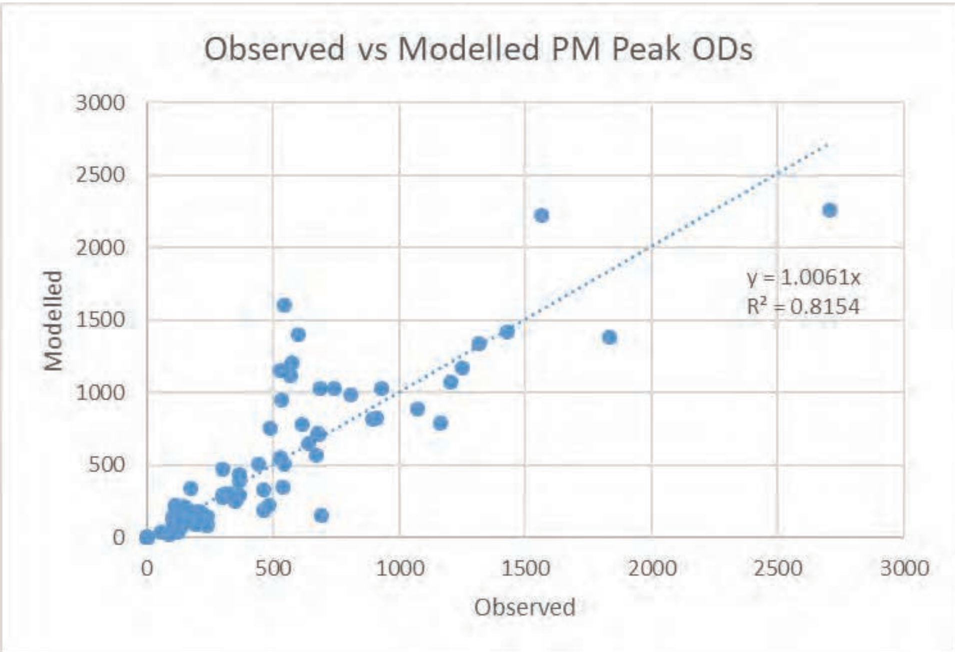
1. From east of Springvale Road in the AM peak (7 am to 9 am)
2. From west of Chandler Highway in the PM peak (4 pm to 6 pm).

VicRoads does not provide guidance for the validation of strategic transport models with OD survey data. However, with an R-squared value of 0.83 and 0.82 in the AM and PM peaks, and a good representation of the destination of traffic on the Eastern Freeway, it can be concluded that the model appears to perform reasonably well against this data. A detailed listing of modelled and observed individual ODs can be found in Appendix B5: Origin Destination validation.

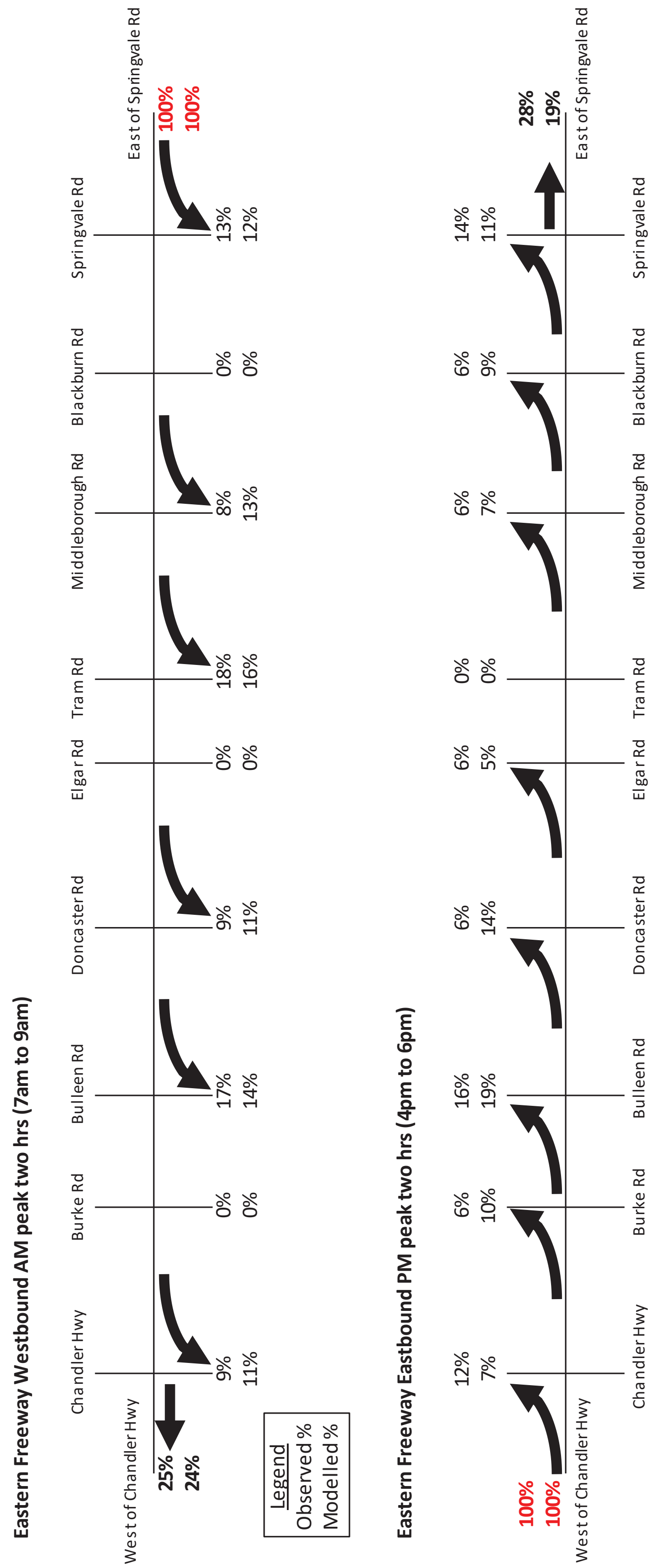
Appendix Figure B.16 - Observed vs modelled Eastern Freeway AM peak Origin-Destination pairs



Appendix Figure B.17 - Observed vs modelled Eastern Freeway PM peak Origin-Destination pairs



Appendix Figure B.18 - Observed vs modelled destination of traffic on the Eastern Freeway in the AM peak (westbound) and PM peak (eastbound)



B.4.3 Travel times

B.4.3.1 Local area traffic travel time surveys

Appendix Table B.12 compares the modelled and observed cumulative travel times along the 34 survey routes in the study area. The results show the model has slower average speeds in all three time periods, especially in the AM peak.

Appendix Table B.12 - Study area average speed comparisons

	Average Observed Speed (km/h)	Average Modelled Speed (km/h)
AM Peak	45	38
Inter Peak	55	52
PM Peak	42	40

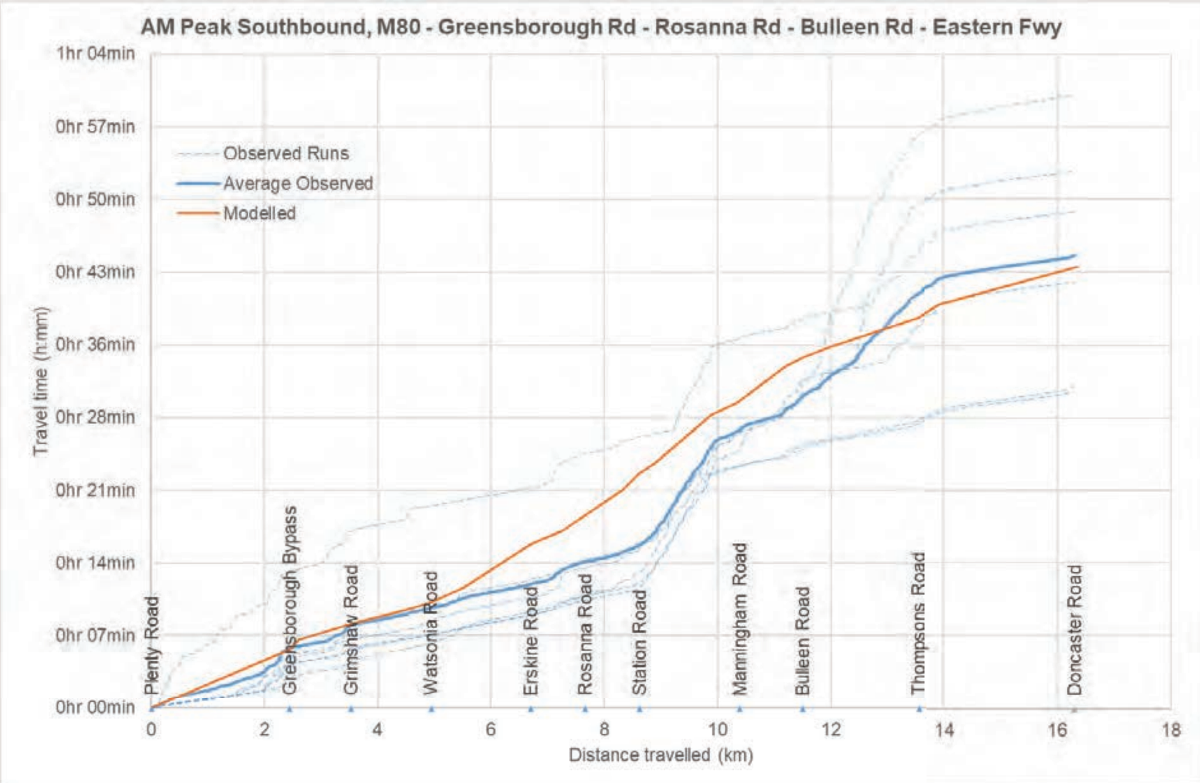
An extensive set of modelled and observed cumulative travel time validation results for six important routes are presented in Appendix B3: Travel time validation.

B.4.3.2 Greensborough Road, Rosanna Road, Bulleen Road corridor analysis

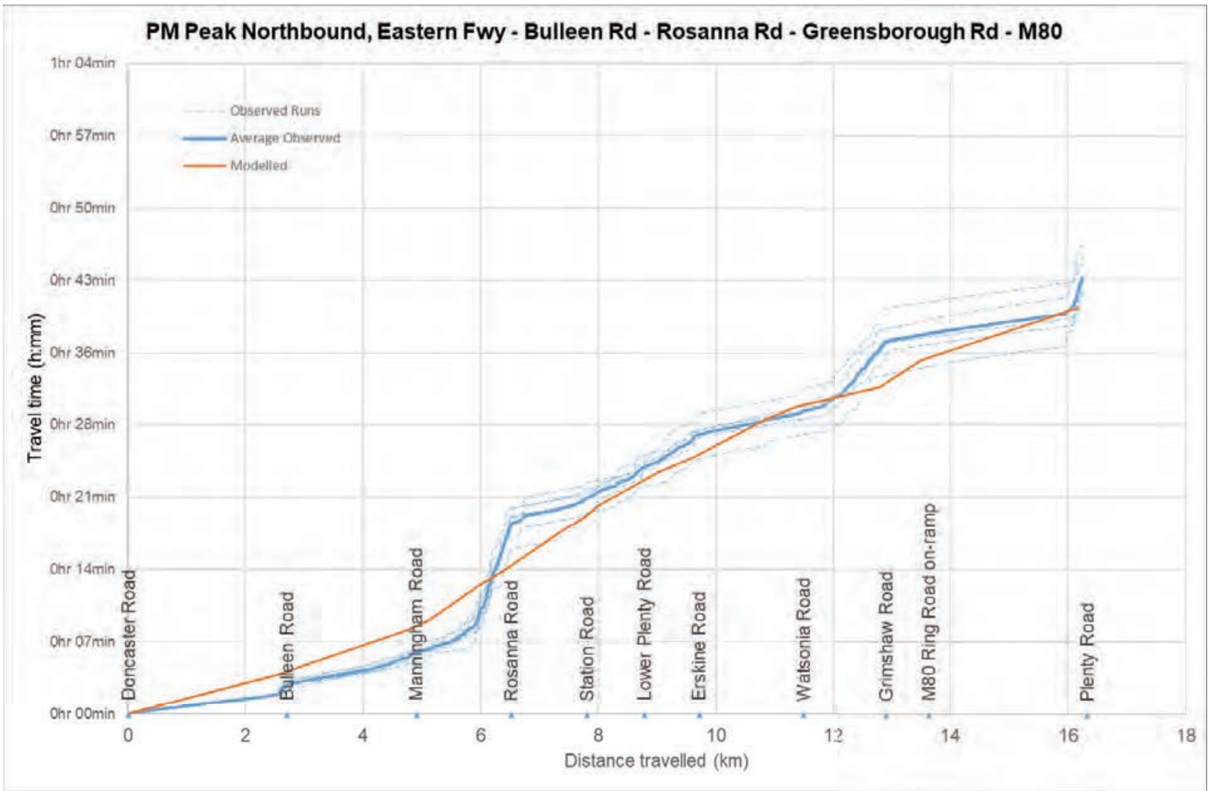
The Bulleen Road/Banksia Street/Rosanna Road/Greensborough Highway corridor is a key route amongst the travel time routes used in model validation.

Appendix Figure B.19 shows the southbound cumulative travel time results for the AM peak, and Appendix Figure B.20 shows the northbound cumulative travel time results for the PM peak. Overall, the model validates well along this corridor. The model is slightly faster than the average observed travel time in the peak direction. The observed travel times include significant intersection delays near the intersection of Banksia Street and Rosanna Road, which are difficult to replicate in a strategic model.

Appendix Figure B.19 - Rosanna Road Corridor AM peak southbound travel time comparison



Appendix Figure B.20 - Rosanna Road Corridor PM peak northbound travel time comparison



A series of cumulative time-distance plots (by direction and time period) throughout the study area is shown in Appendix B3: Travel time validation.

B.4.4 Managed motorway validation

B.4.4.1 Traffic volumes - individual traffic counts

North East Link is expected to be operated as a managed motorway, with coordinated freeway ramp signals at interchanges. Therefore the 2016 model was validated to traffic counts along the Monash Freeway, which was upgraded in 2010 with a freeway management system (FMS) as part of the Monash-CityLink-West Gate Upgrade Project. Appendix Table B.13 provides an overview of 29 traffic counts along the Monash Freeway, between the South Gippsland Freeway and CityLink, in comparison to modelled traffic volumes.

Appendix Table B.13 - Overview of individual counts along the Monash Freeway

Summary	AM	PM	Total
Number of counts	29	29	29
Total count volume	348,678	361,983	2,671,971
Total modelled volume	354,811	383,198	2,577,162
Difference	6,133	21,215	- 94,809
Difference (%)	1.8%	5.9%	-3.6%

Appendix Table B.14 shows the modelled validation results for the Monash Freeway against the individual traffic counts in terms of the %RMSE statistic. The %RMSE for traffic counts is approximately 9% across the day, 19 per cent in the AM and PM peaks and is well below the VicRoads criteria of a maximum %RMSE of 30 per cent.

Appendix Table B.14 - Monash Freeway validation to individual counts (%RMSE)

Daily

Volume bins	Daily
0 - 4,999	-
5,000 - 9,999	-
10,000 - 24,999	-
25,000 - 49,999	-
50,000 +	8.7
ALL	**8.7**

Peak period

Volume bins	AM	PM
0 - 999	-	-
1000 - 1999	-	-
2,000 - 4,999	-	-
5,000 - 9,999	5.1	-
10,000 +	19.5	19.1
ALL	**19.1**	**19.0**

Appendix Table B.36, Appendix Table B.37 and Appendix Table B.38 in Appendix B2: Managed Motorway validation of traffic flows summarise the observed and modelled volumes along the Monash Freeway for the daily, AM peak and PM peak periods respectively.

Overall the model preforms well along the Monash Freeway with most sections within expected tolerances.

Redacted - commercial-in-confidence

Redacted - commercial-in-confidence

Redacted - commercial-in-confidence

Redacted - commercial-in-confidence

Redacted - commercial-in-confidence

Redacted - commercial-in-confidence

B.4.5.2 CityLink toll revenue estimation

The annual modelled CityLink revenues were compared with the annual estimates derived from Transurban annual reports.

Appendix Table B.18 uses expansion factors sourced from the 2012 Linking Melbourne Authority report 'Traffic Annualisation & Ramp-Up Factors', that recommends an annualisation factor for all traffic of 330 (approximately: 340 for cars, 285 for LCV and 265 for HCV).

Using these factors for all traffic and an alternative approach using the factors by vehicle class, the 2016 modelled CityLink revenue estimates are within 3 to 5 per cent of the observed equivalent.

Appendix Table B.18 - CityLink annual revenue estimate (modelled vs observed)

Mode	2016 Modelled Ave. Weekday Revenue net GST ($AUD2016)	Expansion Factors	2016 Modelled Annual Revenue net GST ($AUD2016)	2016 Observed Annual Revenue net GST ($AUD2016)	Difference	% Difference
All Traffic	$ 1,820,283	330	**$ 600,693,347**	**$ 619,219,512**	**$(18,526,166)**	**-3%**
Car	$ 1,387,275	340	$ 471,673,670			
LCV	$ 111,922	285	$ 31,897,905			
HCV	$ 321,085	265	$ 85,087,497			
Total			**$ 588,659,072**	**$ 619,219,512**	**$(30,560,440)**	**-5%**

Redacted - commercial-in-confidence

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B.5 Local area validation of public transport assignment

In this section, the validation of modelled public transport forecasts is discussed with respect to the data provided by TfV that is available for 2016 in the North East Link corridor.

B.5.1 North East Link corridor rail validation

B.5.1.1 Rail passenger loads at the CBD cordon

Modelled AM peak inbound rail line passenger loads for the Clifton Hill group have been compared with 2016 TfV estimates at a cordon surrounding the CBD.

Appendix Table B.22 shows that the Clifton Hill group passenger loads at the CBD rail cordon are very comparable to the estimates, with the Hurstbridge rail line and the South Morang rail line being within 10 per cent of the observed passenger counts.

Appendix Table B.22 - Passenger loads at CBD cordon by line (AM peak) – Clifton Hill group

Line groups	Observed	Model	Difference	% Difference
South Morang	10,000	9,068	-932	-9%
Hurstbridge	10,600	11,563	963	9%
TOTAL - Clifton Hill	**20,600**	**20,630**	**30**	**0%**

B.5.1.2 Rail station entries

AM peak rail station entries by line segment for stations in the North East Link study area are shown in Appendix Table B.23. Overall, the modelled AM peak station entries are within 12 per cent of TfV estimates.

Appendix Table B.23 - Rail station entries by line segment – AM peak

Line segment	Observed	Model	Difference	% Difference
Jolimont-Clifton Hill	2,800	2,800	-	0%
Rushall-South Morang	11,200	12,700	1,500	14%
Diamond Creek-Hurstbridge	700	1,600	900	137%
Montmorency-Eltham	1,600	2,600	1,000	59%
Westgarth-Greensborough	10,200	9,900	- 300	-3%
Total	**26,500**	**29,700**	**3,200**	**12%**

Daily rail station entries by line segment for stations in the North East Link study area are shown in Appendix Table B.24 below. The 2016 model generally overpredicts the daily rail station entries, particularly on the inner-city railway stations between Jolimont and Clifton Hill. Overall the model is 24 per cent above observed daily station entries. This suggests that the model may be overpredicting rail trips in the off-peak periods.

Appendix Table B.24 - Railway station entries by line segment – daily

Line segment	Observed	Model	Difference	% Difference
Jolimont-Clifton Hill	11,200	17,500	6,300	57%
Rushall-South Morang	25,600	32,100	6,500	25%
Diamond Creek-Hurstbridge	1,800	2,500	700	36%
Montmorency-Eltham	3,800	4,900	1,100	28%
Westgarth-Greensborough	23,600	24,500	900	4%
Total	**66,000**	**81,500**	**15,500**	**24%**

The model performs well when measured against AM peak inbound rail line passenger loads at the CBD cordon, although it is hard to explain why the model appears to underestimate passenger loads on the South Morang line (9 per cent low) in the AM peak, but overestimate station entries on the same line across the day (Rushall to South Morang is 25 per cent high).

B.5.2 Bus boardings

Modelled 2016 bus boardings by route for the Eastern Freeway bus services are compared against observed 2016 bus patronage in Appendix Table B.25. These include the Doncaster Area Rapid Transit (DART) SmartBus services (bus routes 905, 906, 907 and 908) and a number of other bus services (bus routes 302, 303, 304, 305, 309, 318 and 684). The SmartBus services are within 10 per cent of observed patronage estimates, while the bus boardings for all Eastern Freeway bus services are within 1 per cent of observed patronage estimates.

Appendix Table B.25 - Eastern Freeway bus services, boardings by route – daily

Route number	Route Name	Observed	Modelled 2016	Difference	% Difference
905	City to The Pines (via Templestowe)	3,700	4,900	1,200	33%
906	City to Warrandyte	4,900	5,000	100	1%
907	City to Mitcham	6,300	6,900	700	11%
908	City to the Pines (via King st)	2,600	2,300	-300	-12%
	DART TOTAL	**17,400**	**19,100**	**1,700**	**10%**
302	Box Hill to City (Queen Street)	2,800	1,900	-900	-33%
303	North Ringwood to City (Queen Street)	300	300	0	0%
304	Doncaster SC to City	1,700	1,200	-600	-33%
305	The Pines SC to City (Spencer/Lonsdale Sts)	1,800	1,500	-300	-19%
309	The Pines to City (Queen Street)	700	1,000	200	32%
318	Deep Creek to City	300	400	100	18%
684	Melbourne to Eildon	100	200	100	103%
	Non-Dart Total	**7,800**	**6,400**	**-1,400**	**-18%**
	Eastern Freeway Buses - Total	**25,200**	**25,500**	**300**	**1%**

B.6 Summary of direct elasticity results

The ranges referred to in the elasticity guidelines have been determined by TfV, without consideration of the findings of local data. For this reason, the modelled results were compared with elasticity ranges from both international estimates, as well as TfV's estimates.

B.6.1 Direct elasticity results – international elasticity ranges

Table A1[21] of the TfV guidance summarises international guidelines for elasticity ranges, which have been sourced from the UK's WebTAG (2014) and NZ (Wallis 2004).

The following tables summarise the modelled elasticities of demand for transport against these international ranges, indicating that the modelled results are within the direct measure elasticity ranges provided for most attributes.

Appendix Table B.26 presents the direct measure elasticities for private car travel, while Appendix Table B.27 presents the direct measure elasticities for public transport travel.

Appendix Table B.26 - Direct measure elasticities of demand for car travel – international guidelines

Attribute	Change	Direct measure	Source	Lower range	Upper range	Modelled
Increase in fuel cost	+10%	Daily car km travelled	WebTAG 2014	-0.25	-0.35	-0.33
			RAND	-0.10	-0.50	
Increase CBD and inner parking costs	+10%	Commuting (HBW) car trips to CBD and Inner	Wallis NZTA 2004	-0.10	-0.60	-0.46
Increase in car in-vehicle time	+10%	Car trips	WebTAG 2014	-0.00	-2.00	-0.14
			Wallis NZTA 2004	-0.15	-0.80	

Appendix Table B.26 shows that the transport model responds correctly and is within international ranges for changes in fuel prices and car parking prices. While the model falls within the WebTAG (2014) guidelines for in-vehicle time, it falls just outside the NZTA (2004) range.

Appendix Table B.27 shows that the transport model responds correctly to changes in public transport fares, changes in service levels and in-vehicle time. However, while the modelled results fall within the required range for changes in public transport fares and in-vehicle time, they fall outside the given ranges for changes in service levels. This could be at the lower end of the direct elasticity ranges for changes in public transport fares and service levels due to the coverage of the model, which includes areas poorly serviced by public transport such as regional areas.

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[21] Table A1: "*National and Overseas Elasticity Range Guidelines*" UK's WebTAG (2014) and NZ (Wallis 2004)

Appendix Table B.27 - Direct measure elasticities of demand for public transport travel – international guidelines

Attribute	Change	Direct measure	Source	Lower range	Upper range	Modelled
Increase in public transport fare	+10%	Public transport trips	WebTAG 2014	-0.20	-0.90	-0.20
			NGTSM 2006	-0.20	-0.60	
Increase in public transport service levels	+10%	Public transport trips	NGTSM 2006	+0.20	+0.50	+0.16
Increase in public transport in-vehicle time	+10%	Public transport trips	NGTSM 2006	-0.10	-0.70	-0.48

B.6.2 Direct elasticity results - TfV elasticity ranges

The following tables summarise the modelled elasticities of demand for transport against a set of ranges published by TfV in its *Strategic Transport Model Elasticity Guidelines*. Appendix Table B.28 presents the direct measure elasticities for private car travel, while Appendix Table B.29 presents the direct measure elasticities for public transport travel.

Appendix Table B.28 - Direct measure elasticities of demand for car travel – TfV guidelines

Attribute	Change	Direct measure	Lower range	Upper range	Modelled
Increase in fuel cost	+10%	Daily car km travelled	-0.15	-0.30	-0.33
Increase CBD and Inner parking costs	+10%	Commuting (HBW) Car Trips to CBD and Inner	-0.10	-0.40	-0.46
Increase CBD and inner parking costs	+10%	Commuting (HBW) car trips to CBD and Inner	-0.20	-0.80	-0.14

Note: local data is not used to determine ranges

Appendix Table B.28 shows that the transport model responds correctly to a change in fuel prices, car parking prices and in-vehicle time. However, they all fall outside each of the TfV ranges.

Appendix Table B.29 shows that the transport model responds correctly to changes in public transport fares, service levels and in-vehicle time. While the measures fall within the ranges for changes in public transport fares and in-vehicle time, changes in service levels fall outside the given ranges. All direct and cross-elasticity results are provided in Appendix B4: Assessment of realism.

Appendix Table B.29 - Direct measure elasticities of demand for public transport travel – TfV guidelines

Attribute	Change	Direct measure	Lower range	Upper range	Modelled
Increase in public transport fare	+10%	Public transport trips	-0.20	-0.60	-0.20
Increase in Public Transport Service Levels	+10%	Public Transport Trips	+0.20	+0.60	+0.16
Increase in public transport service levels	+10%	Public transport trips	-0.10	-0.50	-0.48

Note: local data is not used to determine ranges

B.7 Model convergence

Convergence refers to iterative methods reaching an equilibrium state, at which more iterations will only result in slight change of modelling results and that changes are within acceptance limits defined by a user. The convergent feedback process can relate to either the convergence of a complete four-step demand model or within a traffic assignment model.

For North East Link, the model was iterated through the four-step process (that is, between assignment, mode choice and distribution), while the highway assignment was iterated 50 times and the public transport assignment was iterated ten times both using a volume averaging technique.

In this section, the convergence of both the assignment model and the four-step demand model process are examined.

B.7.1 Assignment convergence

The RGAP values of the penultimate and final traffic assignment iteration for each time period are listed in Appendix Table B.30. VicRoads has defined the RGAP Target for traffic assignment convergence, although there is no guidance for public transport assignment convergence. The criteria are met for each time period.

Appendix Table B.30 - Assignment convergence results (RGAP)

Time period	RGAP traffic target	Total traffic RGAP (final iteration)	Total traffic RGAP (penultimate iteration)	PT RGAP (final iteration)
AM	< 0.01	0.00773 ✓	0.00793 ✓	0.00207 ✓
MD	< 0.01	0.00118 ✓	0.00118 ✓	0.00016 ✓
PM	< 0.01	0.00660 ✓	0.00654 ✓	-0.00335 ✓
OP	< 0.01	0.00044 ✓	0.00042 ✓	0.00042 ✓

The average absolute difference (AAD) values of the penultimate and final traffic assignment iteration for each time period are listed in Appendix Table B.31. VicRoads has defined the AAD target for traffic assignment convergence at less than 1 veh/hr, and this is met for each modelled time period.

Appendix Table B.31 - Assignment convergence results (AAD)

Time period	AAD traffic target	Traffic AAD (final iteration)	Traffic AAD (penultimate iteration)
AM	< 1	0.872 ✓	0.939 ✓
MD	< 1	0.227 ✓	0.233 ✓
PM	< 1	0.794 ✓	0.812 ✓
OP	< 1	0.084 ✓	0.080 ✓

The relative average absolute difference (RAAD) values of the penultimate and final traffic assignment iteration for each time period are listed in Appendix Table B.32. VicRoads has defined the RAAD Target for traffic assignment convergence at less than 1 per cent, and this is met for each modelled time period.

Appendix Table B.32 - Assignment convergence results (RAAD)

Time period	RAAD traffic target	Traffic RAAD (final iteration)	Traffic RAAD (penultimate iteration)
AM	< 1%	0.215% ✓	0.223% ✓
MD	< 1%	0.085% ✓	0.093% ✓
PM	< 1%	0.203% ✓	0.207% ✓
OP	< 1%	0.046% ✓	0.052% ✓

The 'PDiff' statistic (percentage of links with a volume change of less than 5 per cent between given iterations) of the last traffic assignment iteration for each time period are listed in Appendix Table B.33. VicRoads has defined the PDiff Target for traffic assignment convergence as requiring more than 95 per cent of links to have a change in volume of less than 5 per cent, and this is met for each modelled time period.

Appendix Table B.33 - Assignment convergence results (PDiff)

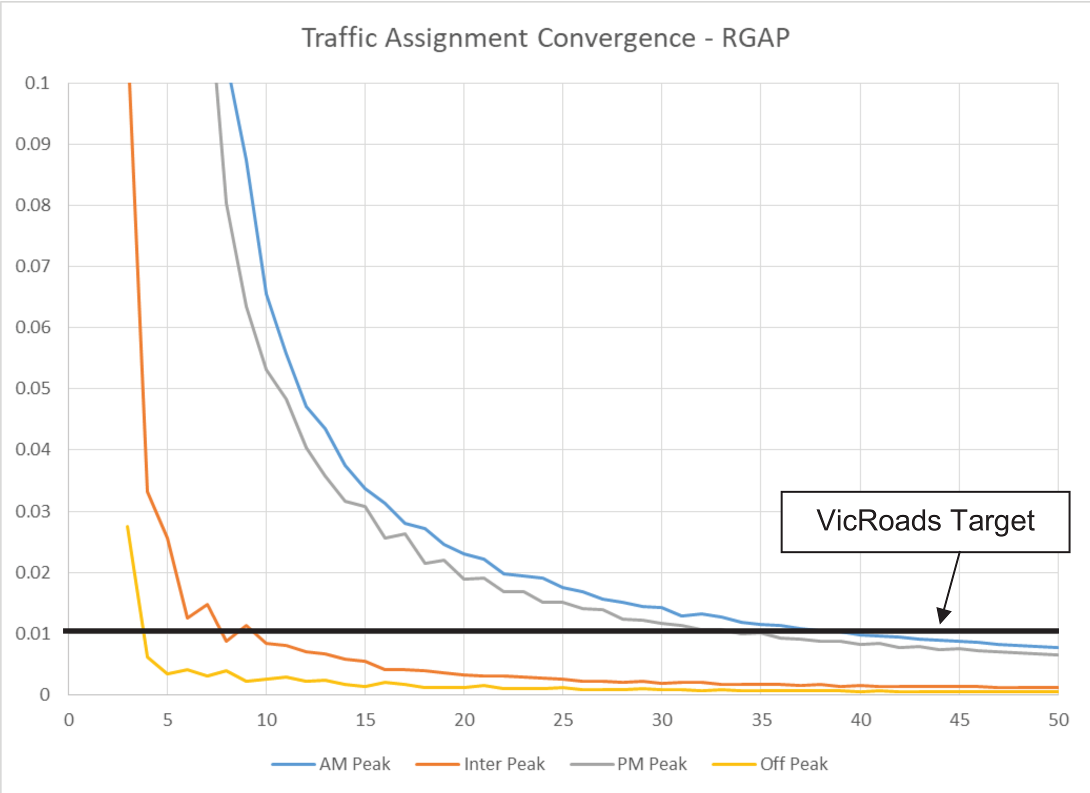
Time period	PDiff traffic target	Total traffic PDiff (final iteration)	Total traffic PDiff (penultimate iteration)
AM	> 95%	99.841% ✓	99.823% ✓
MD	> 95%	99.927% ✓	99.904% ✓
PM	> 95%	99.833% ✓	99.852% ✓
OP	> 95%	99.985% ✓	99.921% ✓

B.7.2 Assignment stability

Appendix Figure B.27 below depicts the RGAP value for each of the 50 highway assignment iterations for the 2016 model. The VicRoads target of 0.01 is achieved for all four modelled time periods, in summary, the VicRoads target is achieved:

- By iteration 40 for the AM peak
- By iteration 10 for the inter peak
- By iteration 34 for the PM peak
- By iteration 4 for the evening off peak.

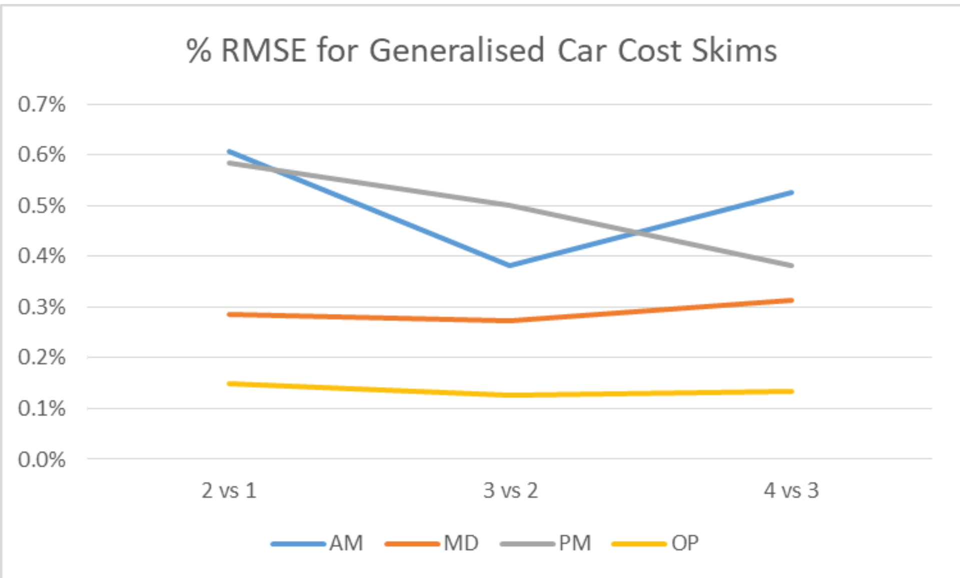
Appendix Figure B.27 - Traffic assignment convergence (RGAP)



B.7.3 Demand model convergence and stability

Appendix Figure B.28 charts the %RMSE for car generalised cost skims across the demand iterations, for each of the four modelled time periods. Note there are no specific demand convergence targets required by VicRoads guidance.

Appendix Figure B.28 - Demand model convergence (%RMSE, car cost skims)



The demand cycle convergence results for each iteration are displayed in Appendix Table B.34 and include the %RMSE for the change in AM peak car cost skims (as seen in Appendix Figure B.28), as well as the %RMSE for change in daily link volumes and change in maximum daily GEH.

Appendix Table B.34 - Demand model convergence results

Demand iteration	%RMSE for car cost skims (AM peak)	%RMSE for daily link loads	Max. GEH for daily link loads
2 vs 1	0.61	0.59	0.90
3 vs 2	0.38	0.38	1.05
4 vs 3	0.53	0.44	1.57

Appendix B1: Validation of traffic flows

Appendix Table B.35 - All local area traffic counts vs modelled volumes (total traffic by time period and daily commercial vehicles)

Count ID	Road Name	Count Location	Year	Dir'n	AM count	AM Model	Inter peak count	Inter peak Model	PM count	PM Model	Evening Off Peak count	Evening Off Peak Model	Daily count	Daily Model	Daily CV count	Daily CV Model
429	Albert St	Between Murray St And Bell St	2018	N	1,765	2,541	7,395	8,680	3,095	3,266	5,835	5,201	18,090	19,689	1,303	1,698
430	Albert St	Between Murray St And Bell St	2018	S	2,958	3,197	7,276	8,589	2,281	2,840	5,575	5,348	18,090	19,974	1,187	1,749
431	Albert St	Between Plenty Rd And Murray Rd	2018	N	1,600	2,153	7,995	8,716	3,821	3,786	6,335	5,496	19,751	20,151	1,521	1,348
432	Albert St	Between Plenty Rd And Murray Rd	2018	S	3,539	3,634	7,787	8,818	2,333	2,554	5,844	4,993	19,503	19,999	1,490	1,380
587	Alexandra Pde	Between Nicholson St and Brunswick St	2018	E	4,828	4,666	16,618	17,944	5,439	6,264	17,163	16,169	44,048	45,042	1,887	2,761
588	Alexandra Pde	Between Nicholson St and Brunswick St	2018	W	6,209	5,680	16,765	17,356	4,109	4,649	15,763	14,183	42,846	41,869	1,757	2,613
589	Alexandra Pde	Between Queens Pde & Hoddle St	2018	E	4,602	3,823	14,622	14,166	4,882	4,676	14,078	13,154	38,184	35,819	1,641	2,417
590	Alexandra Pde	Between Queens Pde & Hoddle St	2018	W	3,463	4,927	14,279	14,409	3,535	3,984	13,194	11,997	34,471	35,317	1,465	2,365
585	Alexandra Pde	Between Rathdown St and Nicholson St	2018	E	4,169	3,354	13,805	13,068	4,138	4,554	13,553	12,327	35,665	33,303	1,705	2,216
586	Alexandra Pde	Between Rathdown St and Nicholson St	2018	W	5,199	4,470	14,053	13,267	3,280	3,371	13,410	10,979	35,942	32,086	1,599	2,130
108	Allendale Rd	At Diamond Creek	2017	E	168	40	589	-	381	264	446	93	1,584	397	115	116
109	Allendale Rd	At Diamond Creek	2017	W	362	335	539	-	261	34	414	89	1,575	458	111	105
433	Anderson St	Between James St And Porter St	2018	N	727	1,051	3,065	3,906	965	2,568	2,486	1,643	7,243	9,168	627	464
434	Anderson St	Between James St And Porter St	2018	S	1,690	2,350	3,076	3,518	755	948	2,506	267	8,028	7,083	653	343
293	Andersons Creek Road	North Of Reynolds Road	2017	N	434	1,304	1,883	3,529	1,071	2,263	1,317	2,158	4,704	9,253	339	284
294	Andersons Creek Road	North Of Reynolds Road	2017	S	1,293	2,155	2,019	3,320	631	1,306	1,097	1,928	5,041	8,709	468	265
295	Andersons Creek Road	South of Reynolds Road	2017	N	522	742	2,093	3,071	968	1,545	1,383	1,705	4,966	7,063	275	160
296	Andersons Creek Road	South of Reynolds Road	2017	S	1,171	1,501	2,182	2,861	637	815	1,160	1,446	5,150	6,624	272	158
435	Balwyn Rd	Between Belmore Rd And Whitehorse Rd	2018	N	1,836	1,404	4,677	4,532	1,361	1,877	2,538	2,802	10,412	10,615	530	445
436	Balwyn Rd	Between Belmore Rd And Whitehorse Rd	2018	S	1,112	1,804	4,273	4,550	1,860	1,528	2,965	2,643	10,210	10,525	513	449
437	Balwyn Rd	Between Doncaster Rd And Belmore Rd	2018	N	875	1,024	3,440	3,368	1,494	1,408	2,289	2,106	8,099	7,905	698	255
438	Balwyn Rd	Between Doncaster Rd And Belmore Rd	2018	S	1,608	1,410	3,592	3,391	1,119	1,096	1,971	2,021	8,290	7,918	789	264
439	Banksia St	At Yarra River	2018	E	5,224	5,204	15,950	13,372	6,264	5,983	11,279	9,736	38,716	34,295	3,490	3,953
440	Banksia St	At Yarra River	2018	W	5,189	5,840	14,648	13,982	4,589	5,507	11,532	9,922	35,958	35,251	2,749	4,370
195	Banksia St	Between Mount St And Hawdon St	2017	E	3,017	2,943	9,871	8,534	3,289	3,845	7,051	6,382	23,228	21,704	2,137	2,410
196	Banksia St	Between Mount St And Hawdon St	2017	W	4,598	3,624	11,089	9,456	3,410	3,243	7,560	6,436	26,657	22,758	1,874	2,802
68	Bell St	At Darebin Creek	2017	E	3,256	4,014	10,590	11,214	3,829	4,506	7,096	7,116	24,770	26,850	2,322	2,632
69	Bell St	At Darebin Creek	2017	W	3,902	4,387	11,159	11,506	3,641	4,194	7,322	7,519	26,024	27,607	1,941	2,908

Count ID	Road Name	Count Location	Year	Dir'n	AM count	AM Model	Inter peak count	Inter peak Model	PM count	PM Model	Evening Off Peak count	Evening Off Peak Model	Daily count	Daily Model	Daily CV count	Daily CV Model
581	Bell St	Between High St and Plenty Rd	2018	E	3,627	5,075	11,728	14,332	3,564	4,769	9,538	9,551	28,457	33,727	1,428	3,569
582	Bell St	Between High St and Plenty Rd	2018	W	3,508	4,459	11,136	14,645	3,058	5,422	9,618	9,741	27,320	34,267	1,439	3,641
441	Bell St	Between Plenty Rd And Albert St	2018	E	2,995	4,700	10,068	12,313	3,041	4,521	7,629	7,645	23,733	29,179	2,134	3,358
422	Bell Street	Between Oriel Road And Waterdale Road	2017	E	3,062	4,217	10,018	10,580	3,456	4,363	6,662	7,080	23,198	26,241	1,953	2,614
428	Bell Street	Between Oriel Road And Waterdale Road	2017	W	3,497	4,205	9,991	11,173	3,314	4,377	6,668	7,499	23,469	27,254	2,056	2,899
423	Bell Street	Between Upper Heidelberg Road and Waterdale Road	2017	E	4,181	4,295	11,671	11,578	3,818	4,040	7,727	7,661	27,398	27,573	2,073	2,841
298	Bell Street (West Bound)	Between Upper Heidelberg Road And Waterdale Road	2017	W	4,368	3,771	11,830	11,772	3,887	4,390	8,111	7,830	28,195	27,763	2,709	3,098
631	Belmore Rd	Between Burke Rd & Balwyn Rd	2018	E	1,321	1,348	3,949	3,368	2,046	2,226	2,475	1,808	9,791	8,750	238	379
632	Belmore Rd	Between Burke Rd & Balwyn Rd	2018	W	1,934	2,172	3,514	3,316	1,111	1,391	2,099	1,623	8,658	8,502	216	379
443	Belmore Rd	Between Union Rd And Winfield Rd	2018	N	662	607	2,991	2,138	1,681	1,264	1,831	945	7,165	4,954	205	149
444	Belmore Rd	Between Union Rd And Winfield Rd	2018	S	1,460	1,190	2,563	2,052	823	638	1,461	856	6,308	4,736	138	133
126	Blackburn Rd	North of Eastern Fwy	2017	N	1,045	1,258	5,002	4,399	2,244	2,708	3,992	2,699	12,282	11,065	570	383
127	Blackburn Rd	North of Eastern Fwy	2017	S	2,248	2,607	5,303	4,393	1,498	1,365	3,223	2,317	12,272	10,683	790	395
299	Blackburn Road	Between Reynolds Road And Andersons Creek Road	2017	N	990	759	4,448	2,494	1,943	1,667	2,587	1,519	9,968	6,439	833	204
300	Blackburn Road	Between Reynolds Road And Andersons Creek Road	2017	S	1,552	1,611	4,217	2,376	1,260	898	1,979	1,173	9,008	6,058	775	205
62	Bolton St	Between Bridge St And Main Rd	2017	N	1,340	1,257	4,194	4,316	1,928	2,186	3,174	2,472	10,636	10,231	761	523
63	Bolton St	Between Bridge St And Main Rd	2017	S	1,120	2,078	5,026	4,305	1,641	1,468	3,108	2,215	10,894	10,067	585	546
66	Bridge St	At Diamond Creek	2017	E	1,022	1,071	4,621	3,400	1,646	1,568	2,416	2,318	9,705	8,358	591	190
67	Bridge St	At Diamond Creek	2017	W	1,192	1,495	4,321	3,368	1,420	1,230	2,217	1,960	9,151	8,053	697	196
445	Bridge St	Between Manningham St And Templestowe Rd	2018	E	747	938	2,841	2,102	1,458	1,233	2,023	1,473	7,069	5,746	353	404
446	Bridge St	Between Manningham St And Templestowe Rd	2018	W	1,086	1,221	2,649	2,000	704	928	1,819	1,240	6,257	5,389	307	404
447	Broadway	Between High St And Bolderwood Pde	2018	E	1,694	1,371	4,662	4,068	1,638	1,327	3,411	2,416	11,405	9,181	1,231	4
301	Bulleen Road	Between Doncaster Road And Eastern Freeway	2017	N	984	1,019	3,057	3,503	1,632	1,565	1,958	2,205	7,631	8,292	295	329
302	Bulleen Road	Between Doncaster Road And Eastern Freeway	2017	S	1,447	1,480	3,171	3,850	911	1,276	1,815	2,630	7,344	9,235	414	371
303	Bulleen Road	Between Thompsons Road And Manningham Road	2017	N	2,837	2,147	10,097	8,756	3,814	3,345	7,904	7,355	24,652	21,604	3,118	3,166
304	Bulleen Road	Between Thompsons Road And Manningham Road	2017	S	2,806	3,110	8,266	7,523	2,093	1,774	6,595	6,327	19,759	18,734	2,094	2,611
625	Burke Rd	Between High St & Harp Rd	2018	N	1,821	2,066	6,038	6,349	2,081	2,656	5,336	4,404	15,276	15,476	532	755

Count ID	Road Name	Count Location	Year	Dir'n	AM count	AM Model	Inter peak count	Inter peak Model	PM count	PM Model	Evening Off Peak count	Evening Off Peak Model	Daily count	Daily Model	Daily CV count	Daily CV Model
626	Burke Rd	Between High St & Harp Rd	2018	S	2,185	2,636	5,918	6,646	1,885	2,170	5,351	4,714	15,339	16,165	509	767
155	Burke Rd Bridge	At Yarra River	2017	N	2,700	2,850	7,615	8,477	3,043	3,632	6,262	6,705	19,620	21,664	1,211	1,000
156	Burke Rd Bridge	At Yarra River	2017	S	3,581	3,089	7,943	7,804	2,711	2,807	6,518	6,026	20,752	19,726	1,012	918
305	Burke Road	Between Doncaster Road And Eastern Freeway	2017	N	1,960	2,596	5,732	5,986	2,027	2,984	4,476	3,899	14,195	15,464	1,036	821
306	Burke Road	Between Doncaster Road And Eastern Freeway	2017	S	2,991	2,724	6,035	6,156	2,138	2,594	4,731	4,679	15,894	16,152	696	801
86	Bush Bvd	North of Plenty Rd	2017	N	835	823	3,254	2,512	1,061	838	2,362	1,805	7,511	5,978	499	270
87	Bush Bvd	North of Plenty Rd	2017	S	444	766	2,739	2,610	812	776	1,997	1,581	5,992	5,733	396	238
54	Chandler Hwy	At Yarra River	2017	N	3,060	3,581	9,972	10,255	3,573	3,985	7,329	6,552	23,934	24,373	2,181	2,158
55	Chandler Hwy	At Yarra River	2017	S	3,051	3,738	9,533	9,352	2,842	3,574	6,260	5,740	21,686	22,405	1,616	2,196
449	Chapman St	Between Ellesmere Pde And Thomson Dr	2018	E	697	617	3,062	2,983	1,876	2,049	1,840	1,652	7,475	7,301	564	232
450	Chapman St	Between Ellesmere Pde And Thomson Dr	2018	W	1,719	2,055	3,243	2,906	942	736	1,836	1,369	7,741	7,065	507	237
451	Cherry St	Between Waiora Rd And Wungan St	2018	E	381	116	1,641	193	1,240	335	1,049	114	4,310	757	206	10
452	Cherry St	Between Waiora Rd And Wungan St	2018	W	1,167	341	1,545	185	440	131	946	111	4,098	767	171	12
84	Childs Rd	At Darebin Creek	2017	E	1,016	1,712	6,019	5,714	3,510	3,017	4,671	3,710	15,216	14,153	363	519
85	Childs Rd	At Darebin Creek	2017	W	2,820	2,928	5,656	5,737	1,502	1,856	4,738	3,501	14,716	14,023	600	534
88	Civic Dr	At Railway Underpass	2017	N	1,249	731	3,925	3,689	2,240	2,452	3,160	1,767	10,573	8,639	-	-
89	Civic Dr	At Railway Underpass	2017	S	1,963	2,255	3,620	3,728	1,303	1,015	2,532	1,519	9,418	8,516	388	329
307	Cooper Street	Between Edgars Road And High Street	2017	W	3,501	4,142	10,700	10,504	3,376	3,379	8,742	7,668	26,320	25,693	2,214	2,047
308	Cooper Street	Between Edgars Road And High Street	2017	E	2,785	2,958	12,068	10,342	3,923	4,436	7,053	7,267	25,829	25,003	1,776	1,963
424	Cooper Street	Between Hume Fwy And Edgars Road	2017	E	2,969	4,299	10,303	12,421	3,047	5,426	6,263	8,285	22,583	30,431	2,890	2,629
309	Cooper Street (West Bound)	Between Hume Fwy And Edgars Road	2017	W	3,371	5,152	9,582	12,626	3,082	4,667	8,230	8,735	24,265	31,180	2,519	2,695
621	Cotham Rd	Between Glenferrie Rd & Burke Rd	2018	E	933	1,252	3,242	2,770	1,713	2,547	2,416	1,457	8,304	8,026	115	320
622	Cotham Rd	Between Glenferrie Rd & Burke Rd	2018	W	1,749	2,606	3,083	2,743	857	1,187	1,981	926	7,670	7,462	111	302
627	Cotham Rd	Between HighSt & Glenferrie Rd	2018	E	807	1,620	2,690	3,413	1,276	1,656	1,923	1,014	6,696	7,702	104	437
628	Cotham Rd	Between HighSt & Glenferrie Rd	2018	W	1,483	1,666	3,043	3,501	1,011	1,451	1,965	828	7,502	7,446	101	358
453	Dalton Rd	Between Childs Rd And McKimmies Rd	2018	N	1,845	2,109	7,349	6,618	3,571	3,032	5,807	4,321	18,572	16,080	1,326	832
454	Dalton Rd	Between Childs Rd And McKimmies Rd	2018	S	3,315	2,826	6,952	6,381	2,028	2,233	6,037	4,461	18,332	15,901	1,150	830
455	Dalton Rd	Between Keon Pde And Settlement Rd	2018	N	2,048	2,522	7,849	7,505	3,200	3,700	5,573	4,641	18,669	18,367	1,338	1,453

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456	Dalton Rd	Between Keon Pde And Settlement Rd	2018	S	3,873	3,637	9,212	6,995	3,147	2,713	6,505	4,546	22,737	17,891	2,483	1,406
457	Dalton Rd	Between Settlement Rd And M80	2018	N	2,539	2,291	12,998	10,442	5,813	5,064	9,216	6,971	30,565	24,769	2,999	2,640
458	Dalton Rd	Between Settlement Rd And M80	2018	S	5,066	4,617	10,743	9,961	3,093	2,498	7,604	6,900	26,506	23,976	2,251	2,569
175	Dalton Rd	South of Cooper St	2017	N	1,550	1,810	4,920	4,945	2,091	2,178	3,811	3,357	12,372	12,290	630	602
220	Daltons Rd	North of Western Ring Rd	2017	N	2,042	2,855	9,536	10,260	4,555	5,008	7,921	6,888	24,054	25,012	811	1,433
221	Daltons Rd	North of Western Ring Rd	2017	S	4,724	4,775	9,843	9,889	2,843	2,974	8,246	7,033	25,656	24,672	-	-
56	Darebin Rd	At Darebin Creek	2017	E	1,427	1,629	4,446	4,437	2,183	2,335	2,935	2,673	10,991	11,074	907	581
57	Darebin Rd	At Darebin Creek	2017	W	1,756	2,408	3,886	4,857	1,399	1,823	2,362	2,635	9,403	11,723	671	628
459	Darebin Rd	Between High St And Station St	2018	E	1,081	1,181	3,018	2,309	1,064	1,396	1,975	966	7,138	5,853	410	347
460	Darebin Rd	Between High St And Station St	2018	W	1,115	1,510	3,143	2,439	1,287	1,204	2,061	898	7,606	6,052	431	342
583	Darebin Rd	Between Station St and Grange Rd	2018	E	2,002	1,994	5,875	5,796	2,056	2,041	4,203	4,427	14,136	14,259	814	1,325
584	Darebin Rd	Between Station St and Grange Rd	2018	W	1,757	2,014	5,577	5,876	2,007	2,042	4,307	4,343	13,648	14,275	746	1,137
310	Diamond Creek Road	Between Civic Drive And Yan Yean Road	2017	E	1,762	2,976	9,465	12,285	5,283	5,712	7,200	8,802	23,710	29,774	1,877	1,600
311	Diamond Creek Road	Between Civic Drive And Yan Yean Road	2017	W	4,245	5,347	9,487	12,308	2,582	3,519	7,204	7,589	23,518	28,763	1,960	1,586
312	Diamond Creek Road	Between St Helena Road And Greensborough Bypass	2017	N	1,985	1,376	5,717	6,314	2,527	2,414	3,688	3,344	13,918	13,447	1,072	1,057
313	Diamond Creek Road	Between St Helena Road And Greensborough Bypass	2017	S	2,230	2,269	6,090	7,080	1,956	1,592	3,251	3,880	13,527	14,821	1,001	1,173
314	Diamond Creek Road	Between Yan Yean Road And Ryans Road	2017	E	1,349	1,295	7,627	5,731	3,871	2,812	5,233	4,393	18,080	14,231	1,125	908
315	Diamond Creek Road	Between Yan Yean Road And Ryans Road	2017	W	4,005	2,699	7,651	5,702	2,283	1,508	5,904	3,874	19,843	13,784	1,788	910
629	Doncaster Rd	btw Balwyn Rd & Bulleen Rd	2018	E	998	1,362	3,906	3,740	2,152	2,440	2,616	2,063	9,672	9,605	253	419
630	Doncaster Rd	btw Balwyn Rd & Bulleen Rd	2018	W	1,927	2,299	3,630	3,483	1,078	1,371	2,172	1,148	8,807	8,301	227	366
259	Doncaster Rd	Btw Middleborough Rd and Station St	2017	W	2,652	3,048	7,215	7,006	2,058	2,258	3,731	3,177	15,656	15,489	735	514
260	Doncaster Rd	Btw Middleborough Rd and Station St	2017	E	1,253	1,985	7,448	6,736	3,210	3,357	4,191	3,479	16,102	15,557	569	520
118	Doncaster Rd	East of Eastern Fwy	2017	E	1,128	1,783	5,029	4,661	1,950	2,069	2,882	2,655	10,989	11,168	426	487
119	Doncaster Rd	East of Eastern Fwy	2017	W	1,924	1,971	4,996	4,490	1,577	1,703	3,055	2,644	11,551	10,808	566	471
316	Doncaster Road	Between Balwyn Road And Eastern Freeway	2017	E	1,322	1,799	5,009	5,332	2,571	2,906	2,786	3,066	11,689	13,103	565	509
317	Doncaster Road	Between Balwyn Road And Eastern Freeway	2017	W	3,319	2,823	7,250	4,999	2,312	1,779	3,967	2,236	16,848	11,837	868	465
318	Doncaster Road	Between Blackburn Road And Springvale Road	2017	W	2,532	2,885	6,617	6,706	2,213	3,095	3,706	3,086	15,068	15,772	719	474
319	Doncaster Road	Between Blackburn Road And Springvale Road	2017	E	1,771	2,875	6,992	6,226	2,534	3,118	3,457	3,072	14,755	15,292	951	465

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320	Doncaster Road	Between Blackburn Road And Wetherby Road	2017	E	1,141	1,866	6,868	5,415	2,727	2,762	3,559	2,888	14,296	12,931	802	451
321	Doncaster Road	Between Blackburn Road And Wetherby Road	2017	W	2,425	2,657	6,204	5,765	1,748	1,939	3,247	2,635	13,625	12,996	729	446
461	Drysdale St	Between Greensborough Rd And Borlase St	2018	E	48	5	211	-	139	4	192	-	590	9	50	1
462	Drysdale St	Between Greensborough Rd And Borlase St	2018	W	53	92	104	7	24	4	86	-	266	103	21	7
137	Dublin Rd	At Railway Crossing	2017	N	551	1,108	2,165	2,538	832	1,217	1,149	1,417	4,697	6,280	297	243
138	Dublin Rd	At Railway Crossing	2017	S	801	1,353	2,287	2,871	766	1,231	1,236	1,773	5,090	7,228	309	256
76	Dunne St	At Darebin Creek	2017	E	827	456	2,196	892	830	562	1,464	549	5,317	2,459	447	131
77	Dunne St	At Darebin Creek	2017	W	612	632	2,200	984	1,036	454	1,497	506	5,345	2,577	342	142
463	Earl St	Between Princess St And Willsmere Rd	2018	N	818	1,764	3,152	3,907	687	1,660	1,939	2,556	6,596	9,887	303	565
464	Earl St	Between Princess St And Willsmere Rd	2018	S	1,558	1,890	3,275	3,931	1,198	2,052	2,481	2,079	8,511	9,952	509	590
394	Eastern Freeway	btwn Blackburn Rd to Middleborough Rd	2017	W	13,029	11,194	31,657	32,233	11,090	10,110	24,735	23,448	80,511	76,985	4,569	6,851
395	Eastern Freeway	btwn Blackburn Rd to Middleborough Rd	2017	E	9,823	9,485	32,054	32,340	12,428	11,917	24,150	26,369	78,455	80,111	4,769	6,894
404	Eastern Freeway	btwn Bulleen Rd to Burke Rd	2017	W	12,063	10,794	26,200	28,626	8,406	7,562	21,678	19,675	68,347	66,657	2,655	4,601
405	Eastern Freeway	btwn Bulleen Rd to Burke Rd	2017	E	7,078	6,913	25,796	28,137	10,177	11,637	23,080	23,560	66,131	70,247	2,658	4,899
406	Eastern Freeway	btwn Burke Rd to Chandler Hwy	2017	W	12,726	11,671	30,007	31,827	9,668	8,355	24,727	22,270	77,128	74,123	2,793	4,891
407	Eastern Freeway	btwn Burke Rd to Chandler Hwy	2017	E	8,238	7,675	30,781	32,180	11,852	12,865	26,632	27,614	77,503	80,335	2,849	5,251
408	Eastern Freeway	btwn Chandler Hwy to Hoddle St	2017	W	9,799	9,370	25,237	26,619	8,308	6,988	21,778	19,101	65,122	62,077	2,385	3,771
409	Eastern Freeway	btwn Chandler Hwy to Hoddle St	2017	E	7,570	6,572	26,496	29,053	12,126	11,869	25,373	25,185	71,565	72,679	2,515	4,265
402	Eastern Freeway	btwn Doncaster Rd to Bulleen Rd	2017	N	11,879	10,069	31,699	31,794	10,662	8,928	26,107	24,600	80,347	75,392	4,462	7,173
403	Eastern Freeway	btwn Doncaster Rd to Bulleen Rd	2017	S	9,521	8,483	31,262	31,205	10,963	10,779	26,631	26,801	78,377	77,268	4,481	6,979
400	Eastern Freeway	btwn Elgar Rd to Doncaster Rd	2017	W	12,136	9,987	32,213	32,135	11,637	9,735	26,489	24,300	82,475	76,157	4,500	7,131
401	Eastern Freeway	btwn Elgar Rd to Doncaster Rd	2017	E	10,478	9,214	31,992	32,202	11,536	10,633	25,466	26,539	79,472	78,588	4,541	7,019
396	Eastern Freeway	btwn Middleborough Rd to Tram Rd	2017	W	13,522	11,350	34,019	33,353	11,660	9,674	26,106	25,036	85,307	79,413	4,690	6,779
397	Eastern Freeway	btwn Middleborough Rd to Tram Rd	2017	E	10,650	9,011	33,176	33,434	13,478	11,975	26,208	28,060	83,512	82,480	4,901	6,874
392	Eastern Freeway	btwn Springvale Rd to Blackburn Rd	2017	W	11,112	9,415	27,336	27,027	9,821	8,987	21,773	19,826	70,042	65,255	4,237	6,256
393	Eastern Freeway	btwn Springvale Rd to Blackburn Rd	2017	E	9,552	8,400	28,347	27,310	11,291	10,003	20,776	22,508	69,966	68,221	4,398	6,304
398	Eastern Freeway	btwn Tram Rd to Elgar Rd	2017	W	11,169	9,311	28,084	27,634	9,744	8,347	23,318	20,920	72,315	66,212	4,259	5,859
399	Eastern Freeway	btwn Tram Rd to Elgar Rd	2017	E	8,925	7,854	28,078	27,803	10,611	9,830	22,488	23,731	70,102	69,218	4,313	5,905
9430	Eastern Fwy	Bulleen Road West Inbound	2016	W	9,004	8,192	21,720	23,313	7,622	6,281	17,791	16,543	56,137	54,330	-	-
9406	Eastern Fwy	under Bulleen Rd	2016	E	6,492	5,963	22,344	23,354	9,220	9,106	17,832	19,653	55,887	58,076	-	-

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9401	Eastern Fwy	West of Hoddle Street OB	2016	E	6,495	6,230	23,669	27,570	10,903	10,442	22,331	23,982	63,398	68,224	-	-
9424	Eastern Fwy	west of Middleborough Rd IB	2016	W	11,724	9,989	28,016	29,098	9,817	8,501	21,763	21,884	71,320	69,473	-	-
9411	Eastern Fwy	west of Middleborough Rd OB	2016	E	9,341	7,987	29,621	29,623	12,546	10,587	21,044	24,883	72,552	73,081	-	-
9421	Eastern Fwy	west of Springvale Rd	2016	W	6,816	7,056	16,210	16,882	5,969	6,440	11,140	11,648	40,135	42,027	-	-
222	Edgard Rd	North of Western Ring Rd	2017	N	1,400	1,707	7,106	6,055	3,780	3,747	6,280	4,062	18,566	15,570	1,252	1,207
223	Edgard Rd	North of Western Ring Rd	2017	S	3,189	3,535	7,060	6,027	2,095	1,847	6,016	3,984	18,360	15,392	1,456	1,224
90	Edgars Rd	South of Cooper St	2017	N	1,204	1,173	3,628	2,257	1,064	1,354	2,856	1,207	8,752	5,991	562	720
91	Edgars Rd	South of Cooper St	2017	S	854	1,404	3,873	2,189	1,647	1,150	2,470	1,158	8,845	5,901	535	739
465	Elder St	Between Papua St And Longmuir Rd	2018	E	374	369	1,583	1,694	1,049	782	1,239	1,172	4,245	4,017	249	106
466	Elder St	Between Papua St And Longmuir Rd	2018	W	864	688	1,323	1,632	376	466	1,047	1,080	3,609	3,866	211	106
467	Elgar Rd	Between Belmore Rd And Whitehorse Rd	2018	N	2,204	1,502	6,832	6,691	2,049	2,697	4,488	4,900	15,574	15,790	774	1,658
468	Elgar Rd	Between Belmore Rd And Whitehorse Rd	2018	S	1,852	2,599	6,558	6,677	2,562	1,769	4,396	4,019	15,368	15,063	928	1,520
120	Elgar Rd	North of Eastern Fwy	2017	N	1,122	1,634	4,791	4,422	2,078	2,427	2,799	2,397	10,789	10,880	429	576
121	Elgar Rd	North of Eastern Fwy	2017	S	1,972	2,272	4,000	4,158	1,275	1,825	2,321	2,278	9,567	10,534	408	562
322	Elgar Road	Between Belmore Road And Eastern Freeway	2017	N	1,865	2,102	7,951	8,607	3,550	3,626	4,969	5,627	18,335	19,961	1,014	1,791
323	Elgar Road	Between Belmore Road And Eastern Freeway	2017	S	3,295	3,423	7,320	8,242	2,043	2,440	4,760	4,936	17,419	19,041	835	1,620
469	Eltham-Yarra Glen Rd	Between Kangaroo Ground-St Andrews Rd And Henley Rd	2018	E	331	587	1,260	1,646	575	934	744	1,190	2,910	4,358	295	423
470	Eltham-Yarra Glen Rd	Between Kangaroo Ground-St Andrews Rd And Henley Rd	2018	W	453	928	1,110	1,649	437	591	818	1,117	2,818	4,285	541	417
197	Eltham-Yarra Glen Rd	North of Donaldson Rd	2017	N	562	803	2,146	2,911	1,589	2,288	1,643	2,263	5,939	8,266	526	693
198	Eltham-Yarra Glen Rd	North of Donaldson Rd	2017	S	1,240	2,239	2,104	2,918	738	940	1,586	1,792	5,668	7,889	588	632
104	Eltham-Yarra Glen Rd	North of Henley Rd	2017	N	279	587	966	1,646	418	934	539	1,190	2,202	4,358	236	423
105	Eltham-Yarra Glen Rd	North of Henley Rd	2017	S	339	928	854	1,649	342	591	588	1,117	2,122	4,285	259	417
471	Erskine Rd	Between Ferguseon St And Argyle St	2018	E	374	364	1,649	1,965	1,108	1,294	1,077	1,118	4,209	4,740	132	169
472	Erskine Rd	Between Ferguseon St And Argyle St	2018	W	660	1,261	1,412	1,880	452	413	841	836	3,366	4,391	165	159
473	Fitzsimons Lane	At Yarra River	2018	N	4,023	4,338	12,326	12,931	6,216	6,553	9,446	9,317	32,011	33,140	2,101	1,781
474	Fitzsimons Lane	At Yarra River	2018	S	5,478	6,411	12,182	13,217	3,846	4,682	8,704	8,314	30,210	32,625	1,940	1,915
326	Foote Street	West Of Fitzsimons Lane	2017	E	1,021	918	4,210	2,214	2,370	2,153	2,814	3,027	10,414	8,313	869	375
327	Foote Street	West Of Fitzsimons Lane	2017	W	1,987	2,106	3,521	2,775	1,087	1,192	2,302	3,282	8,896	9,355	642	494

Count ID	Road Name	Count Location	Year	Dir'n	AM count	AM Model	Inter peak count	Inter peak Model	PM count	PM Model	Evening Off Peak count	Evening Off Peak Model	Daily count	Daily Model	Daily CV count	Daily CV Model
475	Grange Rd	Between Darebin Rd And Heidelberg Rd	2018	N	1,320	1,933	5,682	5,727	2,035	2,099	4,492	3,273	13,528	13,032	1,206	1,409
476	Grange Rd	Between Darebin Rd And Heidelberg Rd	2018	S	682	2,175	4,463	5,828	1,351	2,036	3,406	3,526	9,902	13,565	957	1,621
328	Greensborough Bypass	Between M80 Interchange And Diamond Creek Rd	2017	N	2,482	3,421	10,342	13,156	5,434	5,985	7,436	9,845	25,693	32,408	1,256	2,377
329	Greensborough Bypass	Between M80 Interchange And Diamond Creek Rd	2017	S	5,272	5,727	9,825	12,418	2,788	3,805	7,950	7,910	25,835	29,860	2,018	2,248
477	Greensborough Highway	Between Grimshaw St And M80	2018	N	4,479	3,872	14,059	14,165	5,405	5,025	13,078	12,341	37,021	35,403	3,724	2,178
478	Greensborough Highway	Between Grimshaw St And M80	2018	S	4,504	5,130	14,148	13,961	4,710	4,344	11,952	10,899	35,314	34,334	3,560	2,174
637	Greensborough Rd	at Simpsons Barracks	2018	N	3,016	3,082	10,973	11,530	4,158	4,671	10,528	9,515	28,675	28,797	1,916	2,041
638	Greensborough Rd	at Simpsons Barracks	2018	S	4,153	4,499	11,566	11,313	3,389	3,492	9,921	8,883	29,029	28,186	1,989	1,972
479	Greensborough Rd	Between Santon St And Teresa St	2018	N	299	3	521	-	208	3	240	-	1,268	6	53	-
480	Greensborough Rd	Between Santon St And Teresa St	2018	S	103	1	316	-	89	4	135	-	644	5	20	-
481	Greensborough Rd	South Of Watsonia Rd	2018	N	3,328	3,342	12,104	11,426	4,549	4,624	10,583	9,322	30,564	28,713	3,231	1,949
482	Greensborough Rd	South Of Watsonia Rd	2018	S	4,417	4,396	12,359	11,368	3,630	3,685	10,413	8,809	30,820	28,258	3,496	1,883
483	Greenwood Dr	Between Gresswell Park Dr And Ladd St	2018	E	537	240	1,093	303	531	577	661	109	2,822	1,229	153	41
484	Greenwood Dr	Between Gresswell Park Dr And Ladd St	2018	W	441	627	1,048	343	575	225	690	152	2,754	1,346	136	62
80	Grimshaw St	Between Plenty Rd And Watsonia Rd	2017	E	1,912	1,869	5,764	5,432	2,082	2,892	3,552	3,033	13,310	13,226	914	574
81	Grimshaw St	Between Plenty Rd And Watsonia Rd	2017	W	1,947	2,786	5,382	5,682	1,632	2,117	3,318	2,776	12,279	13,361	545	636
487	Grimshaw St	Between Plenty Rd And Watsonia Rd	2018	E	2,100	2,039	6,014	5,801	2,295	3,072	3,797	3,555	14,206	14,466	1,227	770
488	Grimshaw St	Between Plenty Rd And Watsonia Rd	2018	W	1,874	2,927	5,260	6,131	1,585	2,305	3,372	3,234	12,091	14,597	800	813
52	Heidelberg Rd	At Darebin Creek	2017	N	1,038	1,704	4,508	5,634	2,645	2,817	3,765	3,536	11,955	13,691	409	635
53	Heidelberg Rd	At Darebin Creek	2017	S	2,887	2,961	4,946	6,189	1,513	1,954	3,522	3,053	12,869	14,157	777	671
491	Heidelberg Rd	Between Hoddle St And Station St	2018	E	1,584	2,184	6,360	7,092	3,502	4,487	6,191	3,436	17,638	17,198	1,213	1,016
492	Heidelberg Rd	Between Hoddle St And Station St	2018	W	4,060	4,910	7,435	8,781	2,406	2,736	5,668	3,777	19,569	20,205	1,328	1,246
489	Heidelberg-Kinglake Rd	Between Kangaroo Ground-Wattle Glen Rd And Wilson Rd	2018	N	541	372	2,821	1,796	1,654	1,250	2,072	1,433	7,089	4,851	858	133

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490	Heidelberg-Kinglake Rd	Between Kangaroo Ground-Wattle Glen Rd And Wilson Rd	2018	S	1,399	1,191	2,715	1,850	843	461	1,946	1,183	6,903	4,685	814	132
60	Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	2017	N	467	546	2,298	2,186	1,023	1,378	1,407	1,400	5,196	5,510	543	232
61	Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	2017	S	1,188	1,386	2,424	2,255	590	621	1,353	1,184	5,555	5,446	-	-
619	High St	Between Cotham Rd & Parkhill Rd	2018	E	1,100	1,070	4,125	3,690	2,391	2,118	3,220	1,989	10,836	8,868	127	356
620	High St	Between Cotham Rd & Parkhill Rd	2018	W	2,438	2,022	4,273	3,621	1,190	1,089	2,645	1,375	10,546	8,107	149	303
623	High St	Between Harp Rd & Burke Rd	2018	E	693	1,330	2,672	3,322	1,358	2,187	1,821	1,621	6,544	8,461	86	356
624	High St	Between Harp Rd & Burke Rd	2018	W	1,982	2,061	3,010	3,314	861	1,364	1,767	1,515	7,620	8,253	107	319
493	High St	Between Keon Pde And Broadway	2018	N	2,373	2,403	8,148	8,424	3,553	3,220	7,105	5,769	21,179	19,817	1,594	1,608
494	High St	Between Keon Pde And Broadway	2018	S	3,113	3,037	7,106	8,246	2,532	2,673	5,863	5,271	18,614	19,227	1,854	1,570
495	High St	Between Mahoneys Rd And Settlement Rd	2018	N	1,529	1,769	6,088	5,402	2,730	3,240	5,262	2,796	15,610	13,206	1,480	977
496	High St	Between Mahoneys Rd And Settlement Rd	2018	S	2,787	3,254	5,827	5,234	1,903	1,906	4,634	2,631	15,151	13,025	1,171	953
497	High St	Between Westgarth St And Queens Pde	2018	N	1,470	1,594	6,791	6,559	2,710	3,261	6,826	4,910	17,797	16,323	852	1,080
498	High St	Between Westgarth St And Queens Pde	2018	S	2,543	3,318	6,086	5,655	1,884	1,525	6,212	3,620	16,725	14,117	898	939
224	High St	North of Settlement Rd	2017	N	1,383	1,729	6,200	5,618	2,715	3,723	4,865	3,071	15,162	14,141	736	765
225	High St	North of Settlement Rd	2017	S	2,749	3,829	5,831	5,415	1,811	1,792	4,657	2,923	15,048	13,959	663	740
177	High St	South of Cooper St	2017	N	1,761	1,146	8,555	6,214	3,060	3,494	5,394	3,708	18,769	14,562	961	643
178	High St	South of Cooper St	2017	S	3,107	3,406	8,764	6,143	2,094	1,535	5,550	3,190	19,515	14,274	1,104	604
331	High Street	Between Doncaster Road And Manningham Road	2017	N	918	1,266	4,148	4,502	2,256	3,358	3,065	2,923	10,387	12,049	501	381
332	High Street	Between Doncaster Road And Manningham Road	2017	S	2,194	3,279	4,226	4,869	1,237	1,515	2,319	2,362	9,976	12,025	376	434
593	Hoddle St	Between Eastern Fwy and Johnston St	2018	N	3,346	4,116	15,988	18,265	5,974	8,022	17,958	14,388	43,266	44,790	1,690	2,708
594	Hoddle St	Between Eastern Fwy and Johnston St	2018	S	6,033	7,862	16,240	16,754	5,161	4,104	15,019	10,038	42,453	38,758	1,695	2,528
499	Hoddle St	Between Heidelberg Rd And Eastern Fwy	2018	N	2,108	2,140	8,106	7,378	3,538	3,399	8,181	5,696	21,932	18,613	996	1,317
500	Hoddle St	Between Heidelberg Rd And Eastern Fwy	2018	S	1,383	3,517	7,107	8,319	2,612	3,125	7,211	6,107	18,314	21,068	1,360	1,413
595	Hoddle St	Between Johnston St and Victoria St	2018	N	3,564	4,203	15,726	16,949	5,258	7,178	17,119	13,407	41,667	41,737	1,668	2,612
596	Hoddle St	Between Johnston St and Victoria St	2018	S	6,508	6,469	16,241	16,239	4,665	4,157	15,090	9,783	42,504	36,648	1,665	2,535
416	Hume Freeway	btwn M80 Ring Rd and Cooper St	2017	N	5,455	3,776	17,413	17,294	7,587	7,198	15,096	13,849	45,551	42,117	7,121	6,491
417	Hume Freeway	btwn M80 Ring Rd and Cooper St	2017	S	6,445	6,705	17,673	16,941	6,702	4,497	14,612	13,183	45,432	41,325	6,847	6,494

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151	Jika St	Between Rosanna Rd & Banksia St	2017	N	1,016	928	3,603	2,680	958	1,106	2,916	2,436	8,494	7,149	422	747
152	Jika St	Between Rosanna Rd & Banksia St	2017	S	2,379	1,802	5,946	4,400	2,041	1,580	4,199	3,909	14,566	11,690	898	1,213
591	Johnston St	Between Wellington St and Hoddle St	2018	E	661	1,368	2,978	4,075	1,349	2,414	2,684	2,084	7,672	9,941	284	596
592	Johnston St	Between Wellington St and Hoddle St	2018	W	1,798	2,301	2,981	4,033	673	1,530	2,459	1,788	7,911	9,653	252	562
505	Kangaroo Ground-St Andrews Rd	Between Kangaroo Ground-Wattle Glen Rd And Dawson Rd	2018	N	180	561	856	1,969	537	1,491	656	1,383	2,228	5,403	543	423
506	Kangaroo Ground-St Andrews Rd	Between Kangaroo Ground-Wattle Glen Rd And Dawson Rd	2018	S	501	1,448	880	1,932	269	637	599	1,154	2,248	5,171	319	373
183	Kangaroo Ground-Warrandyte Rd	At Yarra River	2017	N	1,018	1,155	3,476	3,794	2,313	2,911	3,004	2,643	9,810	10,503	468	900
184	Kangaroo Ground-Warrandyte Rd	At Yarra River	2017	S	1,968	2,881	3,482	3,603	1,255	1,278	2,442	2,331	9,146	10,094	649	844
96	Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	2017	N	389	631	1,404	1,823	1,096	1,418	1,158	1,388	4,047	5,260	311	604
97	Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	2017	S	810	1,353	1,441	1,760	566	712	1,150	1,210	3,967	5,034	247	558
503	Kangaroo Ground-Wattle Glen Rd	Between Heidelberg-Kinglake Rd And Kangaroo Ground-St Andrews Rd	2018	E	762	656	1,852	1,288	750	668	1,381	965	4,745	3,577	286	534
504	Kangaroo Ground-Wattle Glen Rd	Between Heidelberg-Kinglake Rd And Kangaroo Ground-St Andrews Rd	2018	W	587	640	1,741	1,272	1,156	680	1,444	975	4,927	3,568	900	538
333	Karingal Drive	East Of St Helena Road	2017	S	1,672	1,571	5,060	4,442	1,837	1,486	3,223	2,893	11,792	10,392	809	424
334	Karingal Drive	East Of St Helena Road	2017	N	1,791	1,406	4,644	4,365	2,128	1,644	3,173	2,464	11,735	9,880	833	400
507	Keon Pde	Between High St And Dalton Rd	2018	E	1,008	1,442	4,126	3,436	1,655	1,876	2,205	1,344	8,995	8,098	1,293	652
508	Keon Pde	Between High St And Dalton Rd	2018	W	1,433	2,058	3,581	3,188	1,152	1,273	2,076	1,326	8,243	7,845	965	607
339	King Street	East of Williamsons Road	2017	E	984	627	2,911	2,945	1,347	1,626	1,958	1,954	7,200	7,151	530	273
340	King Street	East of Williamsons Road	2017	W	1,126	1,437	2,622	2,836	858	582	1,609	1,843	6,214	6,698	466	297
335	Kingsbury Drive	East of Waterdale Road	2017	W	1,513	1,364	3,456	1,904	835	495	1,652	1,011	7,457	4,775	531	138
336	Kingsbury Drive	East of Waterdale Road	2017	E	1,104	452	3,394	1,777	1,919	1,356	2,060	1,002	8,477	4,587	605	105
337	Kingsbury Drive	West of Waterdale Road	2017	W	1,830	1,892	6,886	5,979	2,207	2,017	4,009	3,814	14,932	13,702	1,095	1,200
338	Kingsbury Drive	West of Waterdale Road	2017	E	2,663	1,904	6,423	6,002	2,168	2,067	4,401	3,717	15,655	13,691	1,024	1,158
228	Kurrak Rd	West of Armstrong Rd	2017	W	1,085	1,511	2,877	3,533	1,382	1,381	1,989	2,162	7,334	8,587	698	337
229	Kurrak Rd	West of Armstrong Rd	2017	E	1,257	1,249	2,827	3,455	1,227	1,555	1,877	1,993	7,188	8,251	482	324

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509	Livingstone St	Between Oriel Rd And Waterdale Rd	2018	E	1,252	1,377	2,981	3,949	1,163	1,722	1,657	2,023	7,053	9,071	360	456
510	Livingstone St	Between Oriel Rd And Waterdale Rd	2018	W	876	1,718	2,669	4,017	1,051	1,623	1,605	2,079	6,201	9,438	240	492
167	Loughnan Rd	East Of Eastern Fwy	2017	E	408	366	2,170	1,456	1,546	1,259	1,859	944	5,982	4,025	302	115
168	Loughnan Rd	East Of Eastern Fwy	2017	W	1,711	1,357	2,253	1,486	614	470	1,577	690	6,154	4,002	299	126
50	Lower Heidelberg Rd	Near Ivanhoe Park	2017	E	1,102	869	2,437	1,866	1,120	1,166	1,469	969	6,128	4,871	229	252
51	Lower Heidelberg Rd	Near Ivanhoe Park	2017	W	865	960	2,318	2,081	729	446	1,253	1,127	5,165	4,615	226	274
341	Lower Heidelberg Road	Between Burke Road And Banksia Street	2017	N	2,335	2,148	7,573	7,294	2,606	3,082	6,106	6,188	18,620	18,712	1,436	712
342	Lower Heidelberg Road	Between Burke Road And Banksia Street	2017	S	1,977	2,990	7,292	7,316	2,163	2,265	5,667	6,106	17,099	18,677	904	756
159	Lower Plenty Rd	Between Turnham Ave And Rosanna Rd	2017	E	802	990	3,624	4,316	2,021	2,447	2,464	2,571	8,911	10,325	489	429
160	Lower Plenty Rd	Between Turnham Ave And Rosanna Rd	2017	W	2,432	2,403	3,997	4,206	948	1,163	2,441	2,143	9,817	9,915	340	413
419	Lower Plenty Rd	btwn Rosanna Rd and Greensborough Rd	2017	W	6,112	5,528	13,342	12,796	3,647	3,291	10,308	10,017	33,409	31,631	1,893	2,037
343	Lower Plenty Road	Between Greensborough Road And Para Road	2017	E	1,432	1,935	6,077	6,789	3,457	4,340	4,219	4,544	15,185	17,608	983	745
344	Lower Plenty Road	Between Greensborough Road And Para Road	2017	W	3,693	4,414	6,269	6,716	1,615	2,134	3,909	3,796	15,486	17,060	676	727
418	Lower Plenty Road	btwn Rosanna Rd and Greensborough Rd	2017	E	2,942	2,766	12,946	12,914	5,840	5,704	11,558	11,102	33,286	32,486	1,837	2,124
410	M80	btwn Dalton Rd to Edgars Rd	2017	W	8,695	9,936	23,463	26,807	8,192	9,333	20,290	19,022	60,640	65,097	4,251	5,989
411	M80	btwn Dalton Rd to Edgars Rd	2017	E	8,215	8,559	25,773	27,243	11,146	10,586	18,727	19,103	63,861	65,490	4,506	5,954
412	M80	btwn Edgars Rd to Hume Fwy	2017	W	8,312	10,427	26,040	29,823	9,666	10,412	21,842	21,652	65,860	72,315	5,015	6,946
413	M80	btwn Edgars Rd to Hume Fwy	2017	E	8,753	9,441	27,342	29,711	12,484	11,360	20,959	21,475	69,538	71,986	5,158	6,708
8135	M80	Dalton Rd Offramp	2015	W	1,698	1,510	-	-	1,154	1,276	-	-	9,900	9,902	-	-
8136	M80	Dalton Rd Offramp	2015	E	2,642	2,699	-	-	3,077	2,918	-	-	18,400	16,979	-	-
8134	M80	Dalton Rd Onramp	2015	E	943	1,077	-	-	1,731	1,520	-	-	9,600	9,900	-	-
8137	M80	Dalton Rd Onramp	2015	W	2,453	2,726	-	-	2,692	3,207	-	-	17,200	17,433	-	-
248	M80	Darebin Creek	2017	W	8,514	8,720	20,278	23,861	6,742	7,402	17,762	17,583	53,296	57,566	3,107	4,285
249	M80	Darebin Creek	2017	E	5,585	6,937	22,451	24,406	9,552	9,188	15,437	17,880	53,025	58,412	3,177	4,330
8144	M80	East of Plenty Rd	2015	W	7,547	6,595	-	-	5,000	5,660	-	-	41,700	44,331	-	-
8145	M80	East of Plenty Rd	2015	E	4,340	5,547	-	-	7,692	7,160	-	-	41,100	45,810	-	-
8129	M80	Edgars Rd Offramp	2015	W	943	926	-	-	962	661	-	-	7,200	5,089	-	-
8130	M80	Edgars Rd Offramp	2015	E	943	1,577	-	-	2,115	1,607	-	-	12,000	11,554	-	-
8128	M80	Edgars Rd Onramp	2015	E	943	696	-	-	1,346	833	-	-	7,400	5,058	-	-
8131	M80	Edgars Rd Onramp	2015	W	1,698	1,417	-	-	2,308	1,740	-	-	12,300	12,306	-	-

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8124	M80	Hume to M80 EB	2015	E	1,698	2,677	-	-	3,077	1,928	-	-	16,100	17,134	-	-
8127	M80	Hume to M80 WB	2015	W	4,717	4,028	-	-	3,462	2,569	-	-	27,500	24,192	-	-
8126	M80	M80 EB to Hume NB	2015	E	3,585	2,276	-	-	4,038	4,336	-	-	28,800	25,153	-	-
8125	M80	M80 WB to Hume NB	2015	W	2,264	1,500	-	-	3,269	2,861	-	-	17,400	16,964	-	-
8141	M80	Plenty Rd Offramp	2015	W	943	1,260	-	-	1,731	1,410	-	-	11,100	9,347	-	-
8142	M80	Plenty Rd Offramp	2015	E	2,453	2,975	-	-	4,231	3,429	-	-	21,800	22,538	-	-
8140	M80	Plenty Rd Onramp	2015	E	1,132	1,584	-	-	2,308	1,402	-	-	12,100	9,936	-	-
8143	M80	Plenty Rd Onramp	2015	W	2,830	3,386	-	-	2,692	3,152	-	-	20,600	22,582	-	-
511	Macorna St	Between Byrne Cres And Hakea St	2018	N	109	-	608	-	374	-	552	-	1,643	-	62	-
512	Macorna St	Between Byrne Cres And Hakea St	2018	S	408	-	593	-	176	-	450	-	1,627	-	93	-
112	Main Hurstbridge Rd	At Diamond Creek	2017	E	1,111	1,216	5,541	4,875	2,235	2,171	3,491	3,673	12,379	11,934	1,231	814
113	Main Hurstbridge Rd	At Diamond Creek	2017	W	2,007	2,098	5,179	4,902	1,628	1,306	3,596	3,379	12,410	11,684	656	812
347	Main Hurstbridge Rd	Between Ryans Rd And Kangaroo Ground-Wattle Glen Rd	2017	W	1,423	1,672	3,246	3,273	1,164	946	2,065	2,290	7,898	8,181	956	647
348	Main Hurstbridge Rd	Between Ryans Rd And Kangaroo Ground-Wattle Glen Rd	2017	E	715	809	3,435	3,321	1,613	1,704	2,156	2,541	7,919	8,375	943	637
185	Main Rd	At Diamond Creek	2017	N	1,025	1,214	5,694	4,961	2,869	2,324	4,094	4,083	13,682	12,581	731	754
186	Main Rd	At Diamond Creek	2017	S	2,034	2,236	5,511	4,937	1,663	1,469	3,649	3,752	12,858	12,394	674	761
601	Main Rd	Between Fitzsimons La & Bolton St	2018	E	3,075	4,437	9,624	9,184	3,273	3,841	6,558	5,225	22,530	22,688	931	1,213
602	Main Rd	Between Fitzsimons La & Bolton St	2018	W	2,927	3,704	7,589	8,875	2,889	4,657	5,598	5,886	19,003	23,121	824	1,084
94	Main Rd	East Of Ingrams Rd	2017	E	598	625	1,594	2,025	889	1,152	1,015	1,402	4,097	5,204	364	191
95	Main Rd	East Of Ingrams Rd	2017	W	817	1,097	1,806	2,117	651	706	1,020	1,122	4,294	5,042	421	186
147	Main Rd At Plenty River	At Plenty River	2017	E	1,396	1,782	5,801	4,882	3,062	3,507	3,747	2,918	14,006	13,089	-	-
148	Main Rd At Plenty River	At Plenty River	2017	W	3,268	3,449	5,501	4,671	1,737	2,050	3,651	2,712	14,158	12,883	462	507
349	Main Road	Between Para Road And Bolton Street	2017	E	1,598	2,470	5,875	6,937	2,605	3,623	3,889	4,232	13,967	17,262	1,577	767
350	Main Road	Between Para Road And Bolton Street	2017	W	3,048	3,533	6,088	6,800	2,218	2,752	4,029	4,329	15,383	17,414	843	664
351	Main Road	Between Wattletree Road And Bridge Street	2017	N	1,046	1,131	5,311	5,963	2,302	2,314	3,644	4,554	12,304	13,961	572	311
352	Main Road	Between Wattletree Road And Bridge Street	2017	S	2,273	2,208	5,461	5,840	1,567	1,526	3,271	3,682	12,572	13,256	825	343
353	Main Road	East of Wattletree Road	2017	E	1,177	1,354	4,421	5,275	2,228	2,072	3,150	3,997	10,976	12,698	631	355
354	Main Road	East of Wattletree Road	2017	W	2,210	2,052	4,658	5,319	1,550	1,566	3,189	3,217	11,607	12,154	962	379
513	Main St	Between Para Rd And St Helena Rd	2018	N	3,201	1,004	6,766	4,959	1,873	2,904	3,703	2,766	15,544	11,634	1,441	605
514	Main St	Between Para Rd And St Helena Rd	2018	S	1,138	2,787	6,530	5,411	3,399	1,297	4,419	2,602	15,486	12,096	990	726

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355	Manningham Road	Between High Street And Williamsons Road	2017	W	2,386	3,299	7,251	6,312	2,891	3,058	4,390	2,835	16,917	15,504	677	951
356	Manningham Road	Between High Street And Williamsons Road	2017	E	2,778	3,180	8,298	5,123	3,392	3,563	4,319	2,075	18,787	13,941	937	934
357	Manningham Road	Between Thompsons Road And High Street	2017	E	2,694	3,482	7,656	6,072	3,380	3,724	4,140	2,735	17,870	16,012	1,183	1,110
358	Manningham Road	Between Thompsons Road And High Street	2017	W	2,342	3,456	6,852	6,750	2,870	3,602	4,496	3,103	16,560	16,910	784	1,068
611	Maroondah Hwy	Between Mitcham Rd & Eastlink	2018	E	2,854	3,072	12,701	9,842	5,429	4,960	8,307	6,159	29,291	24,033	1,061	1,191
612	Maroondah Hwy	Between Mitcham Rd & Eastlink	2018	W	5,470	4,700	11,458	10,044	3,722	3,617	8,614	5,851	29,264	24,213	961	1,206
615	Maroondah Hwy	Between Mt Dandenong Rd & Dublin Rd	2018	N	2,790	2,931	12,208	10,868	5,495	5,209	8,389	7,262	28,882	26,269	1,285	1,881
616	Maroondah Hwy	Between Mt Dandenong Rd & Dublin Rd	2018	S	5,584	4,794	11,183	10,757	3,417	3,319	9,885	6,655	30,069	25,524	1,276	1,853
515	Maroondah Hwy	Between Ringwood St And Warrandyte Rd	2018	E	1,076	2,584	6,681	9,619	2,701	3,682	4,134	4,470	14,591	20,357	733	927
516	Maroondah Hwy	Between Ringwood St And Warrandyte Rd	2018	W	2,866	3,447	6,137	8,870	1,719	2,875	4,571	3,318	15,292	18,510	1,371	860
244	Maroondah Hwy	East of Eastern Freeway	2017	E	1,691	3,020	8,457	7,622	2,929	3,818	4,528	2,746	17,605	17,206	575	995
245	Maroondah Hwy	East of Eastern Freeway	2017	W	3,264	3,830	8,601	8,259	2,813	3,737	5,370	2,651	20,048	18,477	756	1,215
230	McDonalds Rd	West of Pindari Ave	2017	W	1,740	1,783	4,000	4,033	1,140	1,454	2,836	2,645	9,717	9,915	481	532
231	McDonalds Rd	West of Pindari Ave	2017	E	921	1,282	3,992	4,109	1,882	1,872	2,690	2,555	9,484	9,818	460	510
82	Mckimmies Rd	At Darebin Creek	2017	E	576	765	2,978	2,142	2,054	1,466	2,340	1,475	7,948	5,848	258	501
83	Mckimmies Rd	At Darebin Creek	2017	W	1,822	1,393	2,883	2,174	861	934	2,211	1,266	7,778	5,768	309	507
517	Merri Pde	Between St Georges Rd And Westgarth St	2018	E	678	1,099	3,357	3,569	998	1,257	3,341	3,067	8,374	8,992	528	589
518	Merri Pde	Between St Georges Rd And Westgarth St	2018	W	1,227	1,181	4,254	3,851	1,291	1,206	4,004	3,393	10,776	9,631	506	684
124	Middleborough Rd	North of Eastern Fwy	2017	N	2,022	2,162	5,958	6,628	2,221	3,460	3,918	4,095	14,118	16,345	770	1,105
125	Middleborough Rd	North of Eastern Fwy	2017	S	1,916	3,413	5,691	6,514	2,133	2,505	4,074	3,571	13,814	16,004	582	1,002
359	Middleborough Road	Between Whitehorse Road And Eastern Freeway	2017	N	2,102	1,840	7,034	6,765	2,984	2,487	4,801	5,111	16,921	16,202	931	824
360	Middleborough Road	Between Whitehorse Road And Eastern Freeway	2017	S	2,637	2,460	6,752	6,625	2,235	2,025	4,454	4,691	16,078	15,801	945	772
128	Mitcham Rd At Eastern Fwy	At Eastern Fwy	2017	S	1,818	2,514	5,525	6,382	2,549	2,928	3,925	3,828	13,817	15,652	600	407
166	Mitcham Rd At Eastern Fwy	At Eastern Fwy	2017	N	2,257	2,816	4,969	6,144	1,984	2,631	3,611	3,466	12,821	15,057	532	400
519	Mt Dandenong Rd	Maroondah Hwy And Dublin Rd	2018	E	1,978	2,444	8,426	8,669	3,910	3,877	5,519	6,242	19,833	21,231	1,282	1,513

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520	Mt Dandenong Rd	Maroondah Hwy And Dublin Rd	2018	W	3,444	3,629	8,070	8,496	2,466	2,938	5,204	5,550	19,185	20,613	959	1,511
521	Murray Rd	Between High St And Plenty Rd	2018	E	813	1,397	3,038	4,109	902	1,540	1,880	2,293	6,633	9,340	565	650
522	Murray Rd	Between High St And Plenty Rd	2018	W	935	1,416	3,301	4,086	1,186	1,541	1,899	2,195	7,321	9,239	578	642
523	Murray Rd	Between Plenty Rd And Albert St	2018	E	793	1,111	2,888	3,270	865	1,285	1,646	1,709	6,191	7,375	583	597
524	Murray Rd	Between Plenty Rd And Albert St	2018	W	801	1,268	3,029	3,231	1,113	1,208	1,752	1,825	6,695	7,532	492	586
157	Murray Rd At Darebin Creek	At Darebin Creek	2017	W	1,614	2,483	6,059	4,425	1,894	2,133	2,613	1,737	12,179	10,778	879	736
158	Murray Rd At Darebin Creek	At Darebin Creek	2017	E	1,365	1,956	6,173	4,272	2,463	2,512	3,280	1,839	13,281	10,579	810	733
525	Nell Street	Between Longmuir Rd And Greta Street	2018	E	86	-	285	-	134	4	142	-	647	4	21	2
526	Nell Street	Between Longmuir Rd And Greta Street	2018	W	249	2	395	-	142	-	181	-	967	2	78	-
361	Oriel Road	Between Bell Street And Darebin Road	2017	N	962	946	3,317	1,817	1,613	1,390	1,819	958	7,710	5,112	401	270
362	Oriel Road	Between Bell Street And Darebin Road	2017	S	1,490	1,406	2,956	2,165	1,063	1,216	1,608	890	7,116	5,677	450	274
64	Para Rd	Between Rattray Rd And Main Rd	2017	N	1,470	1,169	3,918	4,358	1,891	1,539	2,882	2,958	10,161	10,024	784	351
65	Para Rd	Between Rattray Rd And Main Rd	2017	S	1,479	1,496	3,484	4,332	1,225	1,264	2,595	2,626	8,783	9,717	500	446
129	Park Rd	East of Eastern Fwy	2017	N	1,021	302	1,555	1,451	489	1,518	965	1,190	4,029	4,462	171	95
130	Park Rd	East of Eastern Fwy	2017	S	504	1,506	1,450	1,478	898	403	1,212	874	4,064	4,261	233	96
256	Park Rd	West Of Knees Rd	2017	E	426	109	1,356	584	686	985	744	452	3,212	2,130	125	50
257	Park Rd	West Of Knees Rd	2017	W	553	995	1,064	587	379	131	584	303	2,579	2,015	106	49
199	Pindari Ave	At Railway Bypass	2017	N	409	664	1,272	1,356	598	864	1,167	943	3,446	3,827	88	123
200	Pindari Ave	At Railway Bypass	2017	S	701	958	1,346	1,349	577	582	1,139	771	3,763	3,660	141	125
74	Plenty Rd	At Darebin Creek	2017	E	1,894	2,574	7,973	8,434	2,764	4,129	6,135	5,764	18,765	20,901	667	1,651
75	Plenty Rd	At Darebin Creek	2017	W	2,893	3,954	7,369	8,236	2,670	2,828	5,593	5,325	18,524	20,344	678	1,639
577	Plenty Rd	Between Albert St and Murray Rd	2018	N	911	1,698	4,044	6,088	1,787	2,273	3,492	4,191	10,234	14,250	210	640
578	Plenty Rd	Between Albert St and Murray Rd	2018	S	1,949	2,283	4,164	5,875	1,382	1,841	3,738	3,582	11,233	13,581	228	617
78	Plenty Rd	Between Main Dr And Greenwood Dr	2017	N	2,862	3,041	13,642	13,119	4,338	6,129	9,761	8,761	30,603	31,050	1,812	2,332
79	Plenty Rd	Between Main Dr And Greenwood Dr	2017	S	5,469	5,935	12,292	12,998	3,157	3,489	8,551	7,124	29,468	29,547	1,532	2,268
201	Plenty Rd	Between McDonalds Rd And Bush Bvd	2017	S	3,572	3,556	8,834	8,570	2,473	2,224	7,809	6,530	22,689	20,879	774	1,066
202	Plenty Rd	Between McDonalds Rd And Bush Bvd	2017	N	1,770	1,739	7,742	8,613	3,048	3,817	7,048	7,401	19,608	21,570	1,342	1,061
579	Plenty Rd	Between Murray St and Bell St	2018	N	914	1,427	4,328	4,816	2,089	1,850	3,774	3,346	11,105	11,439	217	537
580	Plenty Rd	Between Murray St and Bell St	2018	S	1,999	1,859	3,888	4,605	1,160	1,522	3,534	2,781	10,581	10,766	214	521
232	Plenty Rd	North of Mckimmies	2017	N	2,495	3,112	11,456	12,557	4,578	5,207	10,501	10,757	29,030	31,633	-	-

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233	Plenty Rd	North of Mckimmies	2017	S	4,123	5,052	11,689	12,503	3,070	3,550	10,571	9,791	29,454	30,897	2,048	1,714
426	Plenty Road	Between Settlement Road And M80 Ring Road	2017	N	3,207	3,165	13,260	11,124	4,784	5,187	9,187	7,189	30,438	26,664	1,585	1,907
363	Plenty Road (South Bound)	Between Settlement Road And M80 Ring Road	2017	S	3,689	4,947	8,761	10,597	2,585	3,543	5,951	5,982	20,987	25,069	1,112	1,811
531	Princess St	Between Duke St And Wills St	2018	N	1,021	1,723	6,868	6,232	1,634	2,225	5,247	4,482	14,770	14,662	838	1,177
532	Princess St	Between Duke St And Wills St	2018	S	2,191	2,552	7,595	7,498	1,988	2,203	5,384	4,969	17,158	17,221	629	1,346
203	Reaserch-Warrandyte Rd	Between Main Rd And Kangaroo Ground-Warrandyte Rd	2017	N	781	702	1,578	1,350	804	994	1,290	803	4,453	3,848	168	221
204	Reaserch-Warrandyte Rd	Between Main Rd And Kangaroo Ground-Warrandyte Rd	2017	S	591	983	1,567	1,274	724	673	1,171	897	4,053	3,827	179	210
164	Reynolds Rd	At Mullum Mullum Creek	2017	E	768	848	2,977	2,060	1,859	1,724	2,174	1,415	7,778	6,047	397	214
165	Reynolds Rd	At Mullum Mullum Creek	2017	W	1,926	1,721	2,673	2,207	862	947	1,911	1,301	7,372	6,176	394	235
603	Reynolds Rd	Between Blackburn Rd & Andersons Creek Rd	2018	E	1,617	1,449	6,109	5,135	2,981	2,418	4,111	3,238	14,818	12,240	645	429
604	Reynolds Rd	Between Blackburn Rd & Andersons Creek Rd	2018	W	3,028	2,436	5,705	5,340	2,208	1,480	4,105	3,241	15,046	12,498	645	453
114	Reynolds Rd	Between Kangaroo Ground-Wattle Glen Rd And Orme Rd	2017	N	32	61	118	32	97	241	87	27	334	360	24	18
115	Reynolds Rd	Between Kangaroo Ground-Wattle Glen Rd And Orme Rd	2017	S	75	272	107	23	43	55	77	29	301	379	20	16
364	Reynolds Road	Between Blackburn Road And Williamsons Road	2017	W	3,279	2,708	6,006	5,659	2,454	1,989	4,119	3,435	15,858	13,792	1,135	589
365	Reynolds Road	Between Blackburn Road And Williamsons Road	2017	E	1,856	1,838	6,268	5,539	2,984	2,785	4,064	3,272	15,173	13,433	961	569
613	Ringwood Bypass	btw Ringwood St & Warrandyte Rd	2018	E	3,805	3,532	14,183	12,987	7,117	4,701	10,105	11,686	35,210	32,907	1,825	3,079
614	Ringwood Bypass	btw Ringwood St & Warrandyte Rd	2018	W	6,013	4,393	13,430	13,008	4,382	3,772	11,135	11,404	34,960	32,578	1,632	3,073
242	Ringwood Bypass	East of Eastern Freeway	2017	E	3,731	5,453	14,362	17,609	8,102	7,387	10,039	14,508	36,234	44,955	1,749	4,053
243	Ringwood Bypass	East of Eastern Freeway	2017	W	6,277	6,554	13,445	16,625	4,405	5,759	10,450	13,366	34,577	42,304	1,520	3,817
535	Ringwood-Warrandyte Rd	Between Milne Rd And Tortice Dr	2018	N	1,396	1,650	3,941	3,865	2,228	1,852	2,689	2,326	10,254	9,693	968	582
536	Ringwood-Warrandyte Rd	Between Milne Rd And Tortice Dr	2018	S	2,014	1,731	4,229	3,672	1,642	1,802	2,516	2,069	10,400	9,274	951	533
133	Ringwood-Warrandyte Rd	South of Jumping Creek Rd	2017	N	754	914	2,847	3,519	1,783	1,996	1,988	2,298	7,372	8,727	627	675
134	Ringwood-Warrandyte Rd	South of Jumping Creek Rd	2017	S	1,709	1,894	2,828	3,383	961	1,120	1,813	2,030	7,311	8,429	638	624
261	Rosanna Rd	Btwn Brown Street And Reid Street	2017	N	2,104	1,985	9,334	9,335	3,438	3,500	8,386	9,262	23,262	24,082	1,576	1,764
262	Rosanna Rd	Btwn Brown Street And Reid Street	2017	S	2,701	3,443	9,315	9,328	2,624	2,339	7,306	8,344	21,946	23,455	1,688	1,706
9436	Rosanna Rd	South of Lower Plenty Rd	2016	N	2,231	1,790	9,616	8,598	4,079	3,264	8,447	8,531	24,373	22,183	1,417	1,696

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9437	Rosanna Rd	South of Lower Plenty Rd	2016	S	3,828	3,140	9,940	8,589	2,827	2,136	7,491	7,874	24,086	21,739	1,466	1,624
110	Ryans Rd	Between Diamond Creek Rd And Allendale Rd	2017	N	714	918	2,761	2,751	1,478	1,798	1,947	2,005	6,900	7,472	222	217
111	Ryans Rd	Between Diamond Creek Rd And Allendale Rd	2017	S	1,427	1,731	2,650	2,641	908	1,116	1,869	1,763	6,854	7,252	332	233
210	Settlement Rd	At Darebin Creek	2017	E	1,194	1,930	4,267	4,562	1,538	1,584	2,269	2,548	9,268	10,624	914	783
211	Settlement Rd	At Darebin Creek	2017	W	1,436	1,526	3,852	4,639	1,142	2,056	2,373	2,180	8,802	10,401	903	753
537	Settlement Rd	Between Dalton Rd And High St	2018	E	389	683	2,659	2,312	995	1,237	1,457	1,327	5,500	5,559	642	991
538	Settlement Rd	Between Dalton Rd And High St	2018	W	944	1,160	2,615	2,247	558	656	1,437	1,387	5,554	5,450	572	992
539	Southern Rd	Between Waterdale Rd And Waiora Rd	2018	E	537	876	2,836	3,169	1,218	2,042	1,512	1,871	6,102	7,959	301	293
540	Southern Rd	Between Waterdale Rd And Waiora Rd	2018	W	1,051	2,016	2,916	3,243	832	1,090	1,305	1,636	6,104	7,985	397	301
541	Spring St	Between Broadway And Murray Rd	2018	N	1,220	1,702	5,031	5,960	2,112	3,280	4,739	3,935	13,102	14,877	784	948
542	Spring St	Between Broadway And Murray Rd	2018	S	2,094	3,189	4,973	5,700	1,567	2,015	4,034	3,128	12,669	14,032	804	923
205	Springvale Rd	North of Eastern Fwy	2017	N	2,567	2,502	7,696	8,395	3,942	4,104	6,456	5,812	20,662	20,813	978	804
206	Springvale Rd	North of Eastern Fwy	2017	S	3,347	4,045	7,933	7,950	2,518	2,581	5,125	4,389	18,924	18,966	1,299	782
366	Springvale Road	Between Reynolds Road And Old Warrandyte Road	2017	N	1,530	1,164	4,285	3,211	2,273	1,395	3,184	2,117	11,271	7,886	724	286
367	Springvale Road	Between Reynolds Road And Old Warrandyte Road	2017	S	1,875	1,358	4,471	3,154	1,472	1,216	2,691	1,916	10,510	7,644	753	272
427	Springvale Road	Between Whitehorse Road And Eastern Freeway	2017	S	4,532	3,209	12,146	12,650	3,852	5,041	9,072	9,841	29,806	30,742	3,010	1,492
369	Springvale Road (South Bound)	Between Whitehorse Road And Eastern Freeway	2017	S	4,523	4,768	12,188	11,840	3,864	3,327	9,214	9,081	29,601	29,016	3,030	1,424
547	St Georges Rd	Between Bell St And Normanby Ave	2018	N	2,126	3,145	8,331	11,932	3,069	4,279	8,327	9,362	21,854	28,719	1,286	1,992
548	St Georges Rd	Between Bell St And Normanby Ave	2018	S	3,389	4,266	8,822	11,930	2,795	3,397	7,647	8,563	22,653	28,155	1,573	1,900
549	St Georges Rd	Between Holden St And Alexandra Pde	2018	N	674	928	3,456	4,400	1,723	2,114	3,793	4,054	9,647	11,496	523	495
550	St Georges Rd	Between Holden St And Alexandra Pde	2018	S	1,944	1,951	4,160	4,890	995	1,223	3,761	3,259	10,860	11,323	812	516
551	St Georges Rd	Between Murray St And Bell St	2018	N	2,004	2,507	6,891	7,610	2,735	3,658	6,029	5,703	17,659	19,478	836	1,221
552	St Georges Rd	Between Murray St And Bell St	2018	S	2,386	3,562	6,181	7,568	1,908	2,747	5,099	5,053	15,573	18,931	1,078	1,235
553	St Georges Rd	Between Normanby Ave And Merri Pde	2018	N	2,181	2,599	8,624	10,723	3,172	4,027	8,788	9,405	22,764	26,754	1,002	1,438
554	St Georges Rd	Between Normanby Ave And Merri Pde	2018	S	3,140	4,016	8,480	10,683	2,668	2,880	7,756	8,288	22,043	25,867	959	1,426
543	Station St	Between Bell St And Darebin Rd	2018	N	1,895	2,479	7,323	8,264	2,823	3,143	5,884	4,781	17,925	18,667	1,632	1,917

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544	Station St	Between Bell St And Darebin Rd	2018	S	2,858	3,053	7,545	8,425	2,470	2,731	5,665	4,986	18,538	19,196	1,535	2,156
545	Station St	Between Darebin Rd And Heidelberg Rd	2018	N	1,129	2,203	3,757	3,990	1,392	1,360	3,236	1,892	9,513	9,445	548	749
546	Station St	Between Darebin Rd And Heidelberg Rd	2018	S	1,349	1,517	3,824	3,666	1,257	2,106	3,163	1,891	9,592	9,180	502	702
370	Station Street	Between Whitehorse Road And Eastern Freeway	2017	N	1,431	2,132	5,599	7,021	2,843	3,240	3,585	3,786	13,459	16,179	669	822
371	Station Street	Between Whitehorse Road And Eastern Freeway	2017	S	2,801	3,324	5,806	7,217	1,747	2,513	3,143	3,349	13,497	16,403	756	1,037
617	Studley Park	Rd at Yarra River	2018	E	1,123	1,616	3,322	4,225	1,956	2,558	2,608	2,494	9,009	10,894	227	572
618	Studley Park	Rd at Yarra River	2018	W	3,057	2,851	3,742	4,947	1,336	1,633	2,315	2,475	10,450	11,906	211	643
372	Surrey Road	Between Whitehorse Road And Eastern Freeway	2017	N	1,394	1,317	5,010	5,127	2,187	2,051	3,163	3,333	11,754	11,827	626	600
373	Surrey Road	Between Whitehorse Road And Eastern Freeway	2017	S	2,003	1,972	5,388	4,945	1,835	1,499	2,972	3,190	12,197	11,606	672	607
149	Templestowe Rd	Near Barrarrung Park	2017	W	2,041	1,928	3,464	2,640	904	850	2,363	1,542	8,772	6,959	369	408
150	Templestowe Rd	Near Barrarrung Park	2017	E	817	855	3,694	2,635	2,288	1,923	2,868	1,858	9,667	7,270	452	407
48	Thompsons Rd	Between Manningham Rd And Foote St	2017	N	510	814	2,398	4,139	1,454	1,840	2,322	3,283	6,684	10,076	-	-
49	Thompsons Rd	Between Manningham Rd And Foote St	2017	S	1,576	1,796	2,631	4,480	746	1,116	2,283	2,646	7,237	10,038	399	407
46	Thompsons Rd	North East Of Eastern Fwy	2017	E	813	926	3,929	4,510	2,545	2,310	3,957	4,051	11,243	11,796	419	485
47	Thompsons Rd	North East Of Eastern Fwy	2017	W	2,881	2,731	5,330	7,237	1,355	1,921	3,803	4,671	13,369	16,561	925	734
131	Tindals Rd	Between Stintons Rd And Mullum Mullum Creek	2017	E	419	555	1,333	2,354	771	1,405	913	1,666	3,437	5,979	206	225
132	Tindals Rd	Between Stintons Rd And Mullum Mullum Creek	2017	W	934	1,342	1,379	2,373	399	681	863	1,314	3,574	5,710	214	228
122	Tram Rd	North of Eastern Fwy	2017	N	2,235	2,402	6,882	7,219	2,807	2,711	4,452	4,461	16,376	16,793	926	940
123	Tram Rd	North of Eastern Fwy	2017	S	3,049	2,712	7,796	7,327	2,993	2,802	4,820	4,237	18,658	17,078	1,440	1,204
376	Upper Heidelberg Road	Between Banksia Street And Studley Road	2017	N	843	1,521	3,043	4,301	1,477	2,048	2,409	2,255	7,772	10,126	614	415
377	Upper Heidelberg Road	Between Banksia Street And Studley Road	2017	S	1,932	1,963	3,173	4,359	1,137	1,662	2,190	1,476	8,431	9,459	844	408
378	Upper Heidelberg Road	Between Burgundy Street And Waiora Road	2017	N	1,575	1,775	5,854	6,612	2,541	2,984	4,012	3,930	13,983	15,301	908	747
379	Upper Heidelberg Road	Between Burgundy Street And Waiora Road	2017	S	2,788	2,890	6,622	6,376	2,153	1,958	4,004	2,633	15,567	13,857	1,039	674
597	Victoria Pde	Between Hoddle ST & Lansdown St	2018	E	2,837	3,226	10,578	11,522	3,780	4,537	9,524	7,850	26,719	27,135	1,076	1,634
598	Victoria Pde	Between Hoddle ST & Lansdown St	2018	W	3,797	4,618	9,569	11,392	2,735	3,142	7,158	5,125	23,259	24,276	1,043	1,662
72	Waiora Rd	Between Southern Rd And Dougharty Rd	2017	N	1,163	1,376	4,299	3,300	1,823	2,007	2,589	1,755	9,874	8,438	463	391

Count ID	Road Name	Count Location	Year	Dir'n	AM count	AM Model	Inter peak count	Inter peak Model	PM count	PM Model	Evening Off Peak count	Evening Off Peak Model	Daily count	Daily Model	Daily CV count	Daily CV Model
73	Waiora Rd	Between Southern Rd And Dougharty Rd	2017	S	2,136	2,024	4,631	3,165	1,604	1,540	2,526	1,123	10,897	7,852	442	359
169	Wantirna Rd	South Of Maroondah Hwy	2017	N	1,330	1,211	4,385	4,016	1,584	1,308	2,486	2,677	9,785	9,213	266	313
170	Wantirna Rd	South Of Maroondah Hwy	2017	S	1,014	1,262	3,874	4,022	1,487	1,384	2,591	2,884	8,965	9,551	478	313
380	Warrandyte Road	Between Fitzsimons Lane And Blackburn Road	2017	E	968	910	2,333	1,123	760	1,038	1,261	616	5,322	3,687	326	205
381	Warrandyte Road	Between Fitzsimons Lane And Blackburn Road	2017	W	885	1,140	2,343	1,318	935	1,057	1,296	515	5,459	4,030	439	222
559	Waterdale Rd	Between Southern Rd And Bell St	2018	N	1,314	1,548	4,661	5,743	1,613	2,077	2,827	3,516	10,415	12,885	1,041	1,071
560	Waterdale Rd	Between Southern Rd And Bell St	2018	S	1,947	1,997	4,805	5,750	1,511	1,669	3,176	3,389	11,439	12,805	1,170	1,045
70	Waterdale Rd	Between Southern Rd And Dougharty Rd	2017	N	1,478	1,583	4,886	5,123	1,538	1,809	2,682	3,046	10,584	11,561	671	1,136
71	Waterdale Rd	Between Southern Rd And Dougharty Rd	2017	S	1,566	1,729	4,640	5,208	1,508	1,662	2,639	3,078	10,353	11,677	972	1,110
561	Watsonia Rd	Between Princes St And Bungay St	2018	N	1,122	501	3,425	1,454	1,760	659	2,046	501	8,352	3,115	520	124
562	Watsonia Rd	Between Princes St And Bungay St	2018	S	1,179	667	2,421	1,399	900	625	1,416	433	5,917	3,125	257	118
563	Watsonia Rd	Greensborough Rd And Rail Line	2018	N	1,506	960	3,459	1,623	1,346	744	1,992	1,177	8,303	4,504	392	172
564	Watsonia Rd	Greensborough Rd And Rail Line	2018	S	877	682	2,638	1,612	1,147	933	1,669	1,167	6,331	4,394	124	162
92	Wattletree Rd	At Diamond Creek	2017	N	1,252	1,859	3,716	5,150	1,437	2,129	2,983	3,526	9,388	12,665	811	404
93	Wattletree Rd	At Diamond Creek	2017	S	1,474	2,037	4,246	5,060	1,667	2,052	3,089	3,409	10,475	12,558	742	415
565	Westgarth St	Between High St And Heidelberg Rd	2018	E	459	1,176	1,676	2,125	546	1,435	1,274	1,070	3,955	5,806	300	229
566	Westgarth St	Between High St And Heidelberg Rd	2018	W	671	1,666	1,993	2,345	578	948	1,301	1,018	4,543	5,977	218	279
605	Whitehorse Rd	& Middleborough Rd & Surrey Rd	2018	E	1,427	2,565	6,404	6,267	2,809	3,889	3,833	3,141	14,473	15,862	380	727
606	Whitehorse Rd	& Middleborough Rd & Surrey Rd	2018	W	3,070	3,853	6,360	6,138	2,008	2,769	4,142	2,985	15,580	15,745	363	710
633	Whitehorse Rd	Between Burke Rd & Balwyn Rd	2018	E	867	1,374	3,103	2,660	1,478	2,271	2,066	1,309	7,514	7,614	154	308
634	Whitehorse Rd	Between Burke Rd & Balwyn Rd	2018	W	1,944	2,334	3,058	2,665	801	1,263	2,210	1,142	8,013	7,404	136	297
567	Whitehorse Rd	Between Station Street And Middleborough Rd	2018	E	1,534	1,664	7,209	5,439	3,426	3,011	4,572	3,126	16,741	13,240	630	534
568	Whitehorse Rd	Between Station Street And Middleborough Rd	2018	W	3,153	2,962	6,676	5,350	1,724	1,594	4,232	2,614	15,786	12,520	815	476
607	Whitehorse Rd	Between Surrey Rd & Springvale Rd	2018	E	1,934	2,057	8,973	5,313	3,766	3,475	4,653	2,651	19,326	13,496	574	758
608	Whitehorse Rd	Between Surrey Rd & Springvale Rd	2018	W	3,696	3,460	8,675	5,152	2,683	2,334	4,732	2,443	19,786	13,389	572	732
609	Whitehorse Rd	btw Springvale Rd & Mitcham Rd	2018	E	2,499	3,382	10,735	8,727	4,123	4,696	7,082	5,529	24,439	22,334	872	1,037
610	Whitehorse Rd	btw Springvale Rd & Mitcham Rd	2018	W	4,547	4,470	10,842	9,525	3,314	3,773	7,496	5,465	26,199	23,233	979	1,081
635	Whitehorse Rd	btw Union Rd & Elgar Rd	2018	E	1,179	1,727	4,198	3,185	1,801	1,920	2,523	1,224	9,701	8,056	198	256
636	Whitehorse Rd	btw Union Rd & Elgar Rd	2018	W	1,749	1,947	3,742	3,148	1,143	1,542	2,659	1,254	9,293	7,891	146	253
569	Whitehorse Rd	Elgar Rd And Station St	2018	E	1,664	1,993	6,224	6,522	2,539	2,662	3,863	3,423	14,289	14,600	674	1,379

Count ID	Road Name	Count Location	Year	Dir'n	AM count	AM Model	Inter peak count	Inter peak Model	PM count	PM Model	Evening Off Peak count	Evening Off Peak Model	Daily count	Daily Model	Daily CV count	Daily CV Model
570	Whitehorse Rd	Elgar Rd And Station St	2018	W	1,934	2,445	5,226	7,010	1,726	2,335	3,700	4,180	12,586	15,970	816	1,550
382	Williamsons Road	Between Doncaster Road And Manningham Road	2017	N	2,527	3,151	10,467	11,276	4,634	5,331	6,669	6,900	24,297	26,659	1,544	1,404
383	Williamsons Road	Between Doncaster Road And Manningham Road	2017	S	4,098	5,283	11,559	10,949	3,473	3,586	5,702	5,928	24,832	25,746	1,345	1,645
384	Williamsons Road	Between Foote Street And Warrandyte Road	2017	N	2,916	2,623	8,802	10,213	3,670	3,551	5,981	8,646	21,370	25,032	1,798	1,255
385	Williamsons Road	Between Foote Street And Warrandyte Road	2017	S	2,935	3,885	9,193	11,070	2,742	3,226	5,674	8,733	20,543	26,914	1,359	1,525
386	Williamsons Road	Between King Street And Foote Street	2017	N	1,562	1,160	6,516	5,582	2,139	1,901	3,853	4,525	14,071	13,168	1,648	647
387	Williamsons Road	Between King Street And Foote Street	2017	S	2,915	2,375	7,069	6,562	1,703	1,413	3,750	4,570	15,437	14,919	2,247	894
388	Williamsons Road	Between Manningham Road And King Street	2017	N	1,295	984	6,097	5,192	2,594	2,600	3,604	4,104	13,590	12,880	1,343	525
389	Williamsons Road	Between Manningham Road And King Street	2017	S	2,470	2,656	6,266	5,989	1,425	1,145	3,067	4,002	13,228	13,791	845	786
571	Wungan St	Between Skye St And Nicholls St	2018	N	310	251	1,756	682	1,347	641	1,041	309	4,453	1,882	426	32
572	Wungan St	Between Skye St And Nicholls St	2018	S	1,282	654	1,519	678	383	322	900	286	4,084	1,941	124	37
573	Yallambie Rd	Between Joules Ct And Fresham Rd	2018	E	162	43	782	381	536	213	679	213	2,160	851	115	27
574	Yallambie Rd	Between Joules Ct And Fresham Rd	2018	W	665	255	1,071	307	379	83	758	232	2,872	876	161	29
238	Yan Yean Rd	North of Diamond Creek Rd	2017	S	2,027	2,139	5,007	4,260	1,348	1,307	3,678	2,182	12,060	9,888	-	-
239	Yan Yean Rd	North of Diamond Creek Rd	2017	N	1,240	1,142	5,132	4,344	2,985	2,255	4,213	2,761	13,570	10,502	1,177	364
390	Yan Yean Road	Near Hockey Club	2017	N	1,361	1,142	5,189	4,344	2,868	2,255	3,959	2,761	13,377	10,502	1,029	364
391	Yan Yean Road	Near Hockey Club	2017	S	1,936	2,145	4,879	4,260	1,307	1,307	3,396	2,182	11,517	9,893	1,407	348
575	Yarra St	Between Cape St And Hawden St	2018	E	421	62	810	-	497	322	460	-	2,188	384	127	29
576	Yarra St	Between Cape St And Hawden St	2018	W	346	489	767	2	248	143	505	-	1,865	634	137	40

Appendix B2: Managed Motorway validation of traffic flows

Appendix Table B.36 - Monash Freeway daily (average weekday) traffic volumes – observed (2016) vs 2016 modelled

year	Road Name	Count Location	Direction	Observed 2016	Modelled 2016	Difference	% Difference
2016	Monash Fwy	btwn Yarra Blvd and Toorak Rd	In	81,531	78,815	- 2,716	-3%
2016	Monash Fwy	btwn Yarra Blvd and Toorak Rd	Out	85,170	81,529	- 3,641	-4%
2016	Monash Fwy	btwn Toorak Rd and Burke Rd	In	92,811	81,735	- 11,076	-12%
2016	Monash Fwy	btwn Toorak Rd and Burke Rd	Out	90,712	84,551	- 6,161	-7%
2016	Monash Fwy	btwn Burke Rd and High St	In	98,876	89,516	- 9,360	-9%
2016	Monash Fwy	btwn High St and Warrigal Rd	Out	96,612	81,637	- 14,975	-15%
2016	Monash Fwy	btwn High St and Warrigal Rd	In	92,894	83,877	- 9,017	-10%
2016	Monash Fwy	btwn Warrigal Rd and Huntingdale Rd	Out	97,391	84,166	- 13,225	-14%
2016	Monash Fwy	btwn Warrigal Rd and Huntingdale Rd	In	95,621	86,631	- 8,990	-9%
2016	Monash Fwy	btwn Huntingdale Rd and Forster Rd	Out	105,853	91,331	- 14,522	-14%
2016	Monash Fwy	btwn Huntingdale Rd and Forster Rd	In	107,261	94,406	- 12,855	-12%
2016	Monash Fwy	btwn Forster Rd and Blackburn Rd	Out	101,814	91,013	- 10,801	-11%
2016	Monash Fwy	btwn Forster Rd and Blackburn Rd	In	103,572	94,746	- 8,826	-9%
2016	Monash Fwy	btwn Blackburn Rd and Ferntree Gully Rd	Out	95,957	91,075	- 4,882	-5%
2016	Monash Fwy	btwn Blackburn Rd and Ferntree Gully Rd	In	98,745	94,751	- 3,994	-4%
2016	Monash Fwy	btwn Ferntree Gully Rd and Springvale Rd	Out	82,538	83,690	1,152	1%
2016	Monash Fwy	btwn Ferntree Gully Rd and Springvale Rd	In	80,040	87,284	7,244	9%
2016	Monash Fwy	btwn Springvale Rd and Wellington Rd	Out	92,588	91,190	- 1,398	-2%
2016	Monash Fwy	btwn Springvale Rd and Wellington Rd	In	93,231	95,121	1,890	2%
2016	Monash Fwy	btwn Wellington Rd and Jacksons Rd	Out	97,542	91,733	- 5,809	-6%
2016	Monash Fwy	btwn Wellington Rd and Jacksons Rd	In	92,602	95,764	3,162	3%
2016	Monash Fwy	btwn Jacksons Rd and Police Rd	Out	84,733	84,302	- 431	-1%
2016	Monash Fwy	btwn Jacksons Rd and Police Rd	In	88,867	96,144	7,277	8%
2016	Monash Fwy	btwn EastLink and Stud Rd	Out	82,120	89,901	7,781	9%
2016	Monash Fwy	btwn EastLink and Stud Rd	In	79,139	89,805	10,666	13%
2016	Monash Fwy	btwn Stud Rd and Heatherton Rd	Out	89,672	90,245	573	1%
2016	Monash Fwy	btwn Stud Rd and Heatherton Rd	In	87,087	91,118	4,031	5%
2016	Monash Fwy	btwn Heatherton Rd and SGF Interchange	Out	90,047	89,991	- 56	0%
2016	Monash Fwy	btwn Heatherton Rd and SGF Interchange	In	86,945	91,095	4,150	5%
Total	**Total**	**Total**		**2,671,971**	**2,577,162**	**- 94,809**	**-4%**

Appendix Table B.37 - Monash Freeway AM peak (7am-9am, average weekday) traffic volumes – Observed (2016) vs 2016 Modelled

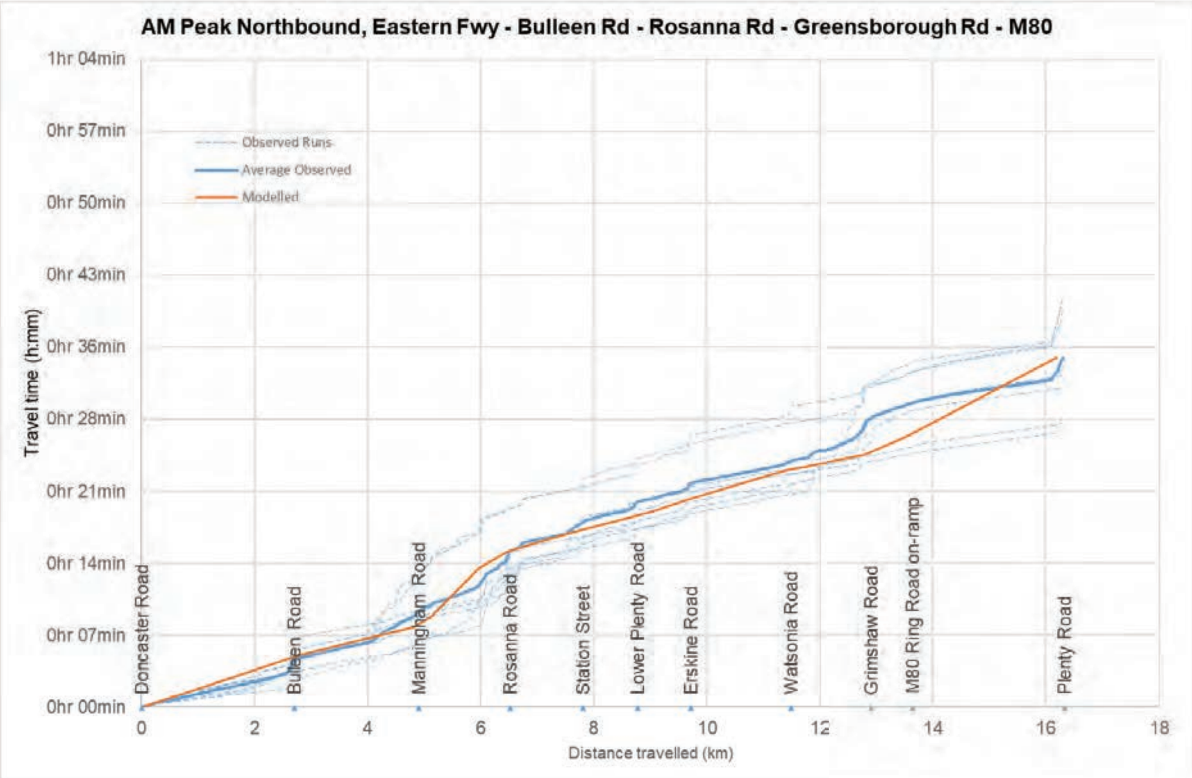
year	Road Name	Count Location	Direction	Observed AM 2016	Modelled AM 2016	Difference	% Difference
2016	Monash Fwy	btwn Yarra Blvd and Toorak Rd	In	13,739	14,830	1,091	8%
2016	Monash Fwy	btwn Yarra Blvd and Toorak Rd	Out	10,252	9,566	- 686	-7%
2016	Monash Fwy	btwn Toorak Rd and Burke Rd	In	14,578	14,934	356	2%
2016	Monash Fwy	btwn Toorak Rd and Burke Rd	Out	10,516	9,648	- 868	-8%
2016	Monash Fwy	btwn Burke Rd and High St	In	12,147	9,716	- 2,431	-20%
2016	Monash Fwy	btwn High St and Warrigal Rd	Out	14,460	14,917	457	3%
2016	Monash Fwy	btwn High St and Warrigal Rd	In	11,731	8,955	- 2,776	-24%
2016	Monash Fwy	btwn Warrigal Rd and Huntingdale Rd	Out	13,435	15,111	1,676	12%
2016	Monash Fwy	btwn Warrigal Rd and Huntingdale Rd	In	12,026	9,051	- 2,975	-25%
2016	Monash Fwy	btwn Huntingdale Rd and Forster Rd	Out	14,207	15,999	1,792	13%
2016	Monash Fwy	btwn Huntingdale Rd and Forster Rd	In	14,167	9,895	- 4,272	-30%
2016	Monash Fwy	btwn Forster Rd and Blackburn Rd	Out	13,420	16,075	2,655	20%
2016	Monash Fwy	btwn Forster Rd and Blackburn Rd	In	12,498	9,865	- 2,633	-21%
2016	Monash Fwy	btwn Blackburn Rd and Ferntree Gully Rd	Out	12,761	16,197	3,436	27%
2016	Monash Fwy	btwn Blackburn Rd and Ferntree Gully Rd	In	12,049	9,886	- 2,163	-18%
2016	Monash Fwy	btwn Ferntree Gully Rd and Springvale Rd	Out	11,550	15,398	3,848	33%
2016	Monash Fwy	btwn Ferntree Gully Rd and Springvale Rd	In	9,269	9,094	- 175	-2%
2016	Monash Fwy	btwn Springvale Rd and Wellington Rd	Out	12,689	16,288	3,599	28%
2016	Monash Fwy	btwn Springvale Rd and Wellington Rd	In	10,776	9,912	- 864	-8%
2016	Monash Fwy	btwn Wellington Rd and Jacksons Rd	Out	13,336	16,304	2,968	22%
2016	Monash Fwy	btwn Wellington Rd and Jacksons Rd	In	10,608	9,860	- 748	-7%
2016	Monash Fwy	btwn Jacksons Rd and Police Rd	Out	11,014	15,459	4,445	40%
2016	Monash Fwy	btwn Jacksons Rd and Police Rd	In	10,385	9,870	- 515	-5%
2016	Monash Fwy	btwn EastLink and Stud Rd	Out	11,657	13,551	1,894	16%
2016	Monash Fwy	btwn EastLink and Stud Rd	In	9,653	9,208	- 445	-5%
2016	Monash Fwy	btwn Stud Rd and Heatherton Rd	Out	12,367	13,499	1,132	9%
2016	Monash Fwy	btwn Stud Rd and Heatherton Rd	In	10,523	9,249	- 1,274	-12%
2016	Monash Fwy	btwn Heatherton Rd and SGF Interchange	Out	12,367	13,224	857	7%
2016	Monash Fwy	btwn Heatherton Rd and SGF Interchange	In	10,498	9,250	- 1,248	-12%
Total	**Total**	**Total**		**348,678**	**354,813**	**6,135**	**2%**

Appendix Table B.38 - Monash Freeway PM peak (4pm-6pm, average weekday) traffic volumes – Observed (2016) vs 2016 Modelled

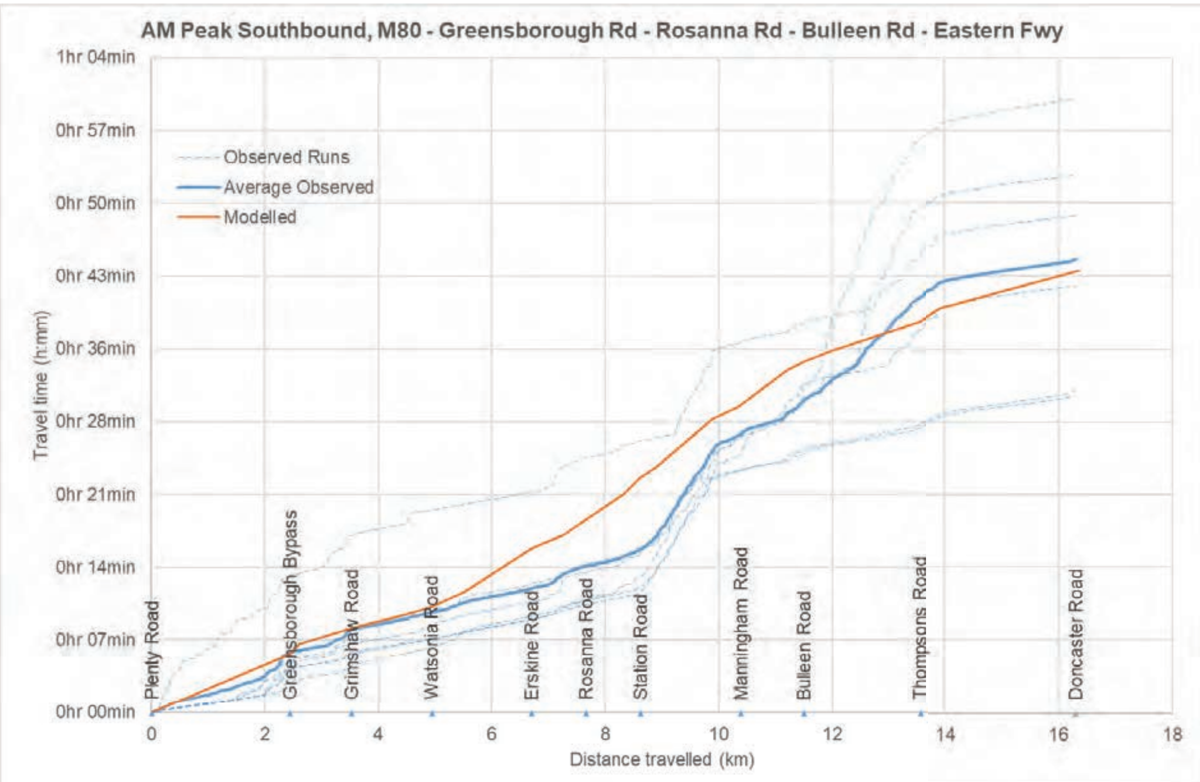
year	Road Name	Count Location	Direction	Observed PM 2016	Modelled PM 2016	Difference	% Difference
2016	Monash Fwy	btwn Yarra Blvd and Toorak Rd	In	9,493	10,475	982	10%
2016	Monash Fwy	btwn Yarra Blvd and Toorak Rd	Out	11,728	15,117	3,389	29%
2016	Monash Fwy	btwn Toorak Rd and Burke Rd	In	10,952	10,570	- 382	-3%
2016	Monash Fwy	btwn Toorak Rd and Burke Rd	Out	12,875	15,378	2,503	19%
2016	Monash Fwy	btwn Burke Rd and High St	In	13,771	16,107	2,336	17%
2016	Monash Fwy	btwn High St and Warrigal Rd	Out	12,338	9,858	- 2,480	-20%
2016	Monash Fwy	btwn High St and Warrigal Rd	In	12,726	15,209	2,483	20%
2016	Monash Fwy	btwn Warrigal Rd and Huntingdale Rd	Out	13,046	10,011	- 3,035	-23%
2016	Monash Fwy	btwn Warrigal Rd and Huntingdale Rd	In	13,003	15,453	2,450	19%
2016	Monash Fwy	btwn Huntingdale Rd and Forster Rd	Out	14,660	10,895	- 3,765	-26%
2016	Monash Fwy	btwn Huntingdale Rd and Forster Rd	In	14,820	16,409	1,589	11%
2016	Monash Fwy	btwn Forster Rd and Blackburn Rd	Out	13,513	10,854	- 2,659	-20%
2016	Monash Fwy	btwn Forster Rd and Blackburn Rd	In	15,394	16,515	1,121	7%
2016	Monash Fwy	btwn Blackburn Rd and Ferntree Gully Rd	Out	12,668	10,888	- 1,780	-14%
2016	Monash Fwy	btwn Blackburn Rd and Ferntree Gully Rd	In	14,707	16,667	1,960	13%
2016	Monash Fwy	btwn Ferntree Gully Rd and Springvale Rd	Out	10,334	10,065	- 269	-3%
2016	Monash Fwy	btwn Ferntree Gully Rd and Springvale Rd	In	11,745	15,840	4,095	35%
2016	Monash Fwy	btwn Springvale Rd and Wellington Rd	Out	11,858	10,959	- 899	-8%
2016	Monash Fwy	btwn Springvale Rd and Wellington Rd	In	14,110	16,801	2,691	19%
2016	Monash Fwy	btwn Wellington Rd and Jacksons Rd	Out	12,141	10,870	- 1,271	-10%
2016	Monash Fwy	btwn Wellington Rd and Jacksons Rd	In	13,994	16,876	2,882	21%
2016	Monash Fwy	btwn Jacksons Rd and Police Rd	Out	10,651	10,004	- 647	-6%
2016	Monash Fwy	btwn Jacksons Rd and Police Rd	In	12,319	16,901	4,582	37%
2016	Monash Fwy	btwn EastLink and Stud Rd	Out	10,393	10,792	399	4%
2016	Monash Fwy	btwn EastLink and Stud Rd	In	10,799	14,065	3,266	30%
2016	Monash Fwy	btwn Stud Rd and Heatherton Rd	Out	11,288	10,804	- 484	-4%
2016	Monash Fwy	btwn Stud Rd and Heatherton Rd	In	12,643	14,060	1,417	11%
2016	Monash Fwy	btwn Heatherton Rd and SGF Interchange	Out	11,763	10,787	- 976	-8%
2016	Monash Fwy	btwn Heatherton Rd and SGF Interchange	In	12,251	13,968	1,717	14%
Total	**Total**	**Total**		**361,983**	**383,197**	**21,214**	**6%**

Appendix B3: Travel time validation

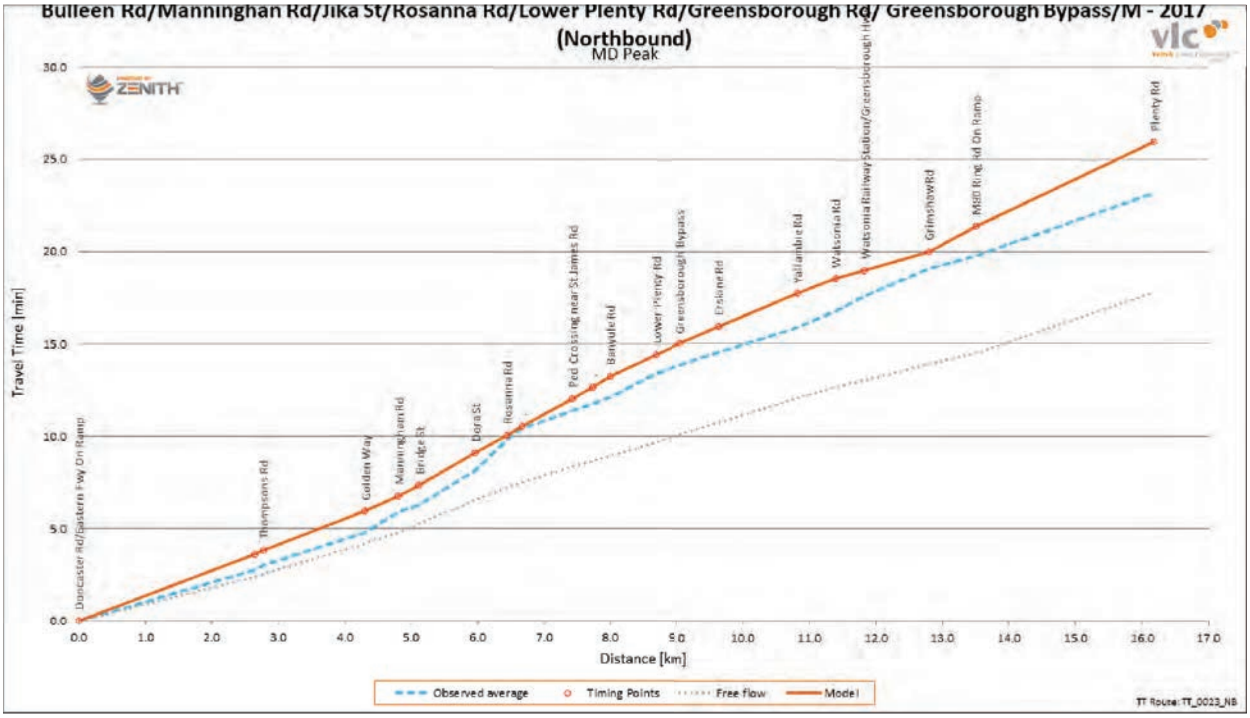
Appendix Figure B.29 - Rosanna Road corridor AM peak northbound travel time comparison



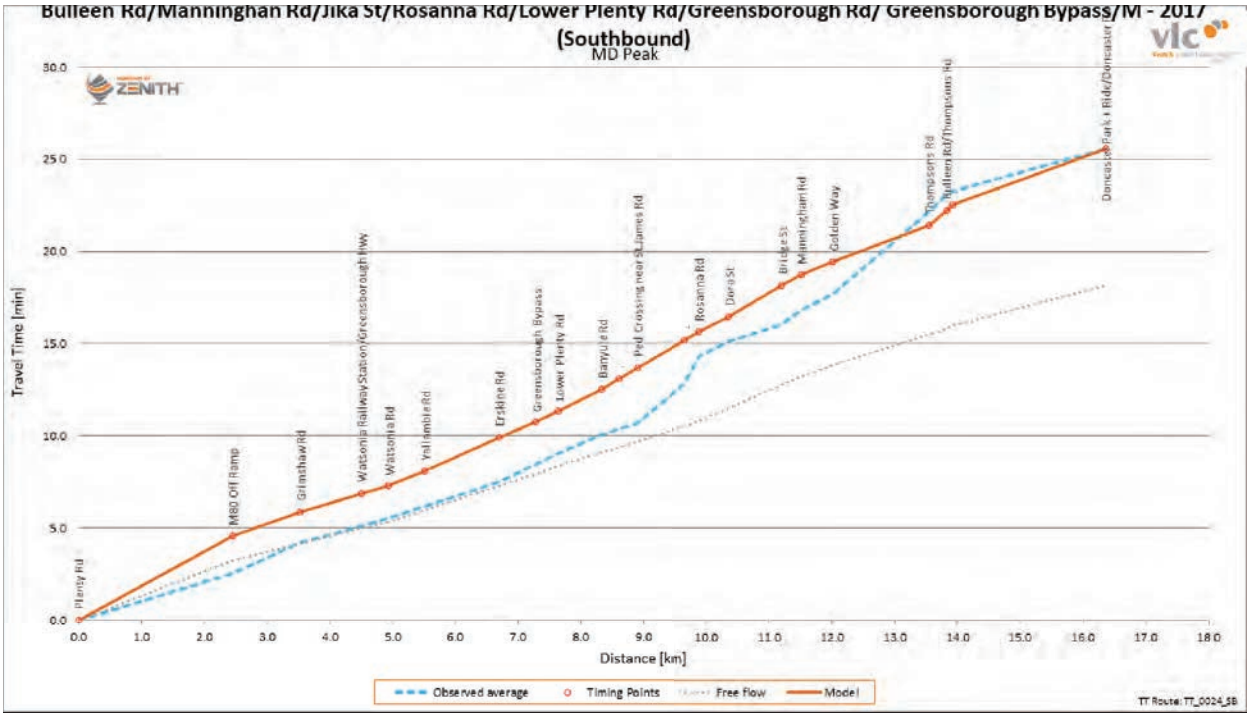
Appendix Figure B.30 - Rosanna Road corridor AM peak southbound travel time comparison



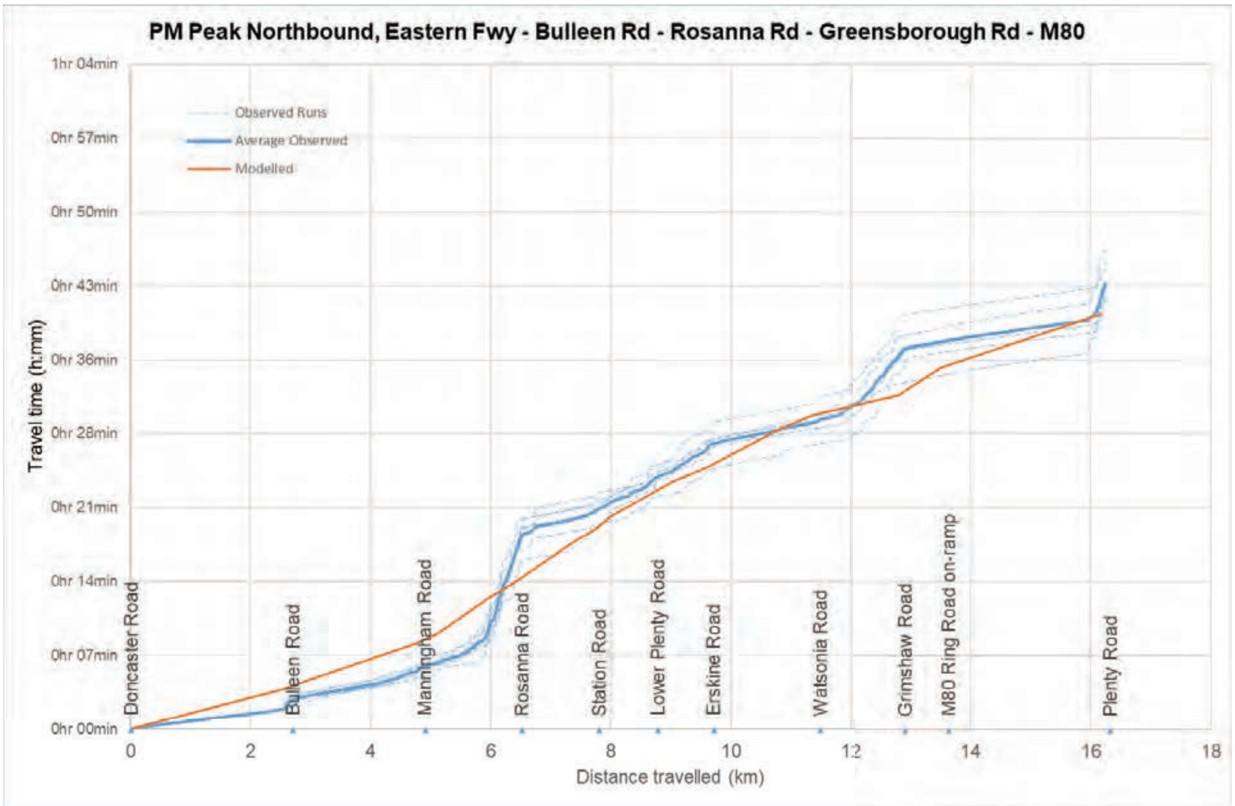
Appendix Figure B.31 - Rosanna Road corridor inter peak northbound travel time comparison



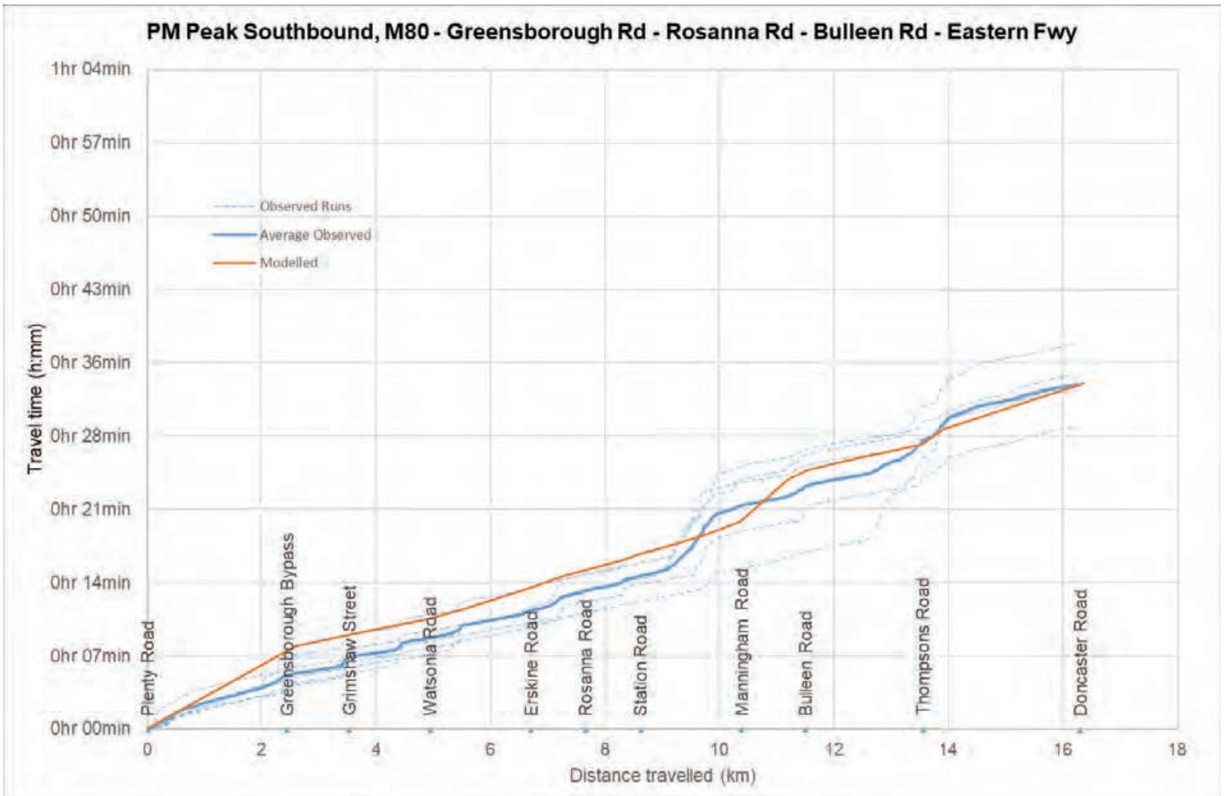
Appendix Figure B.32 - Rosanna Road corridor inter peak southbound travel time comparison



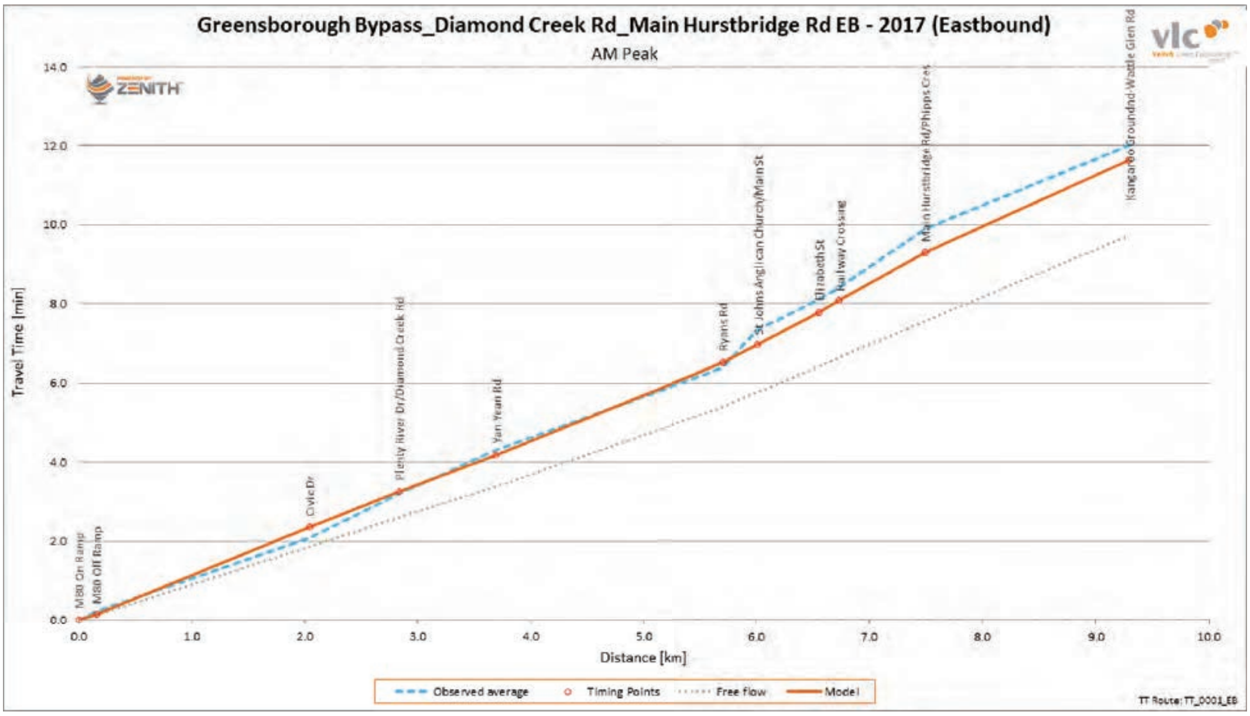
Appendix Figure B.33 - Rosanna Road corridor PM peak northbound travel time comparison



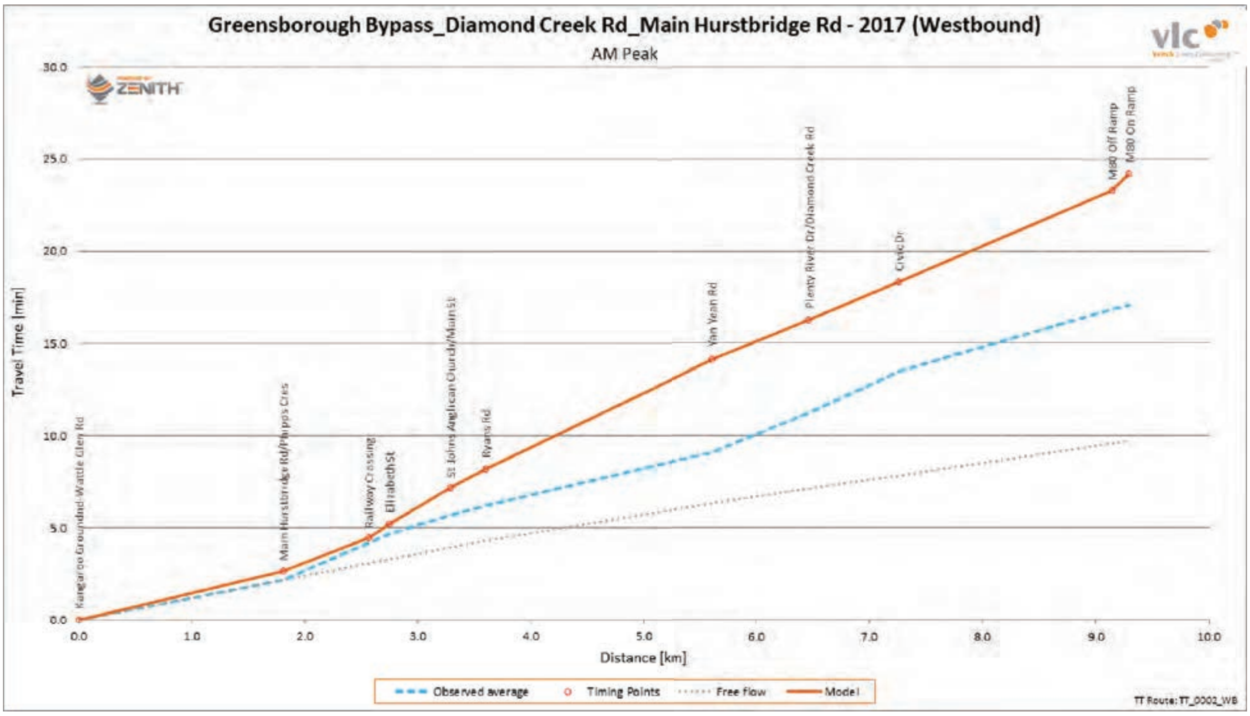
Appendix Figure B.34 - Rosanna Road corridor PM peak southbound travel time comparison



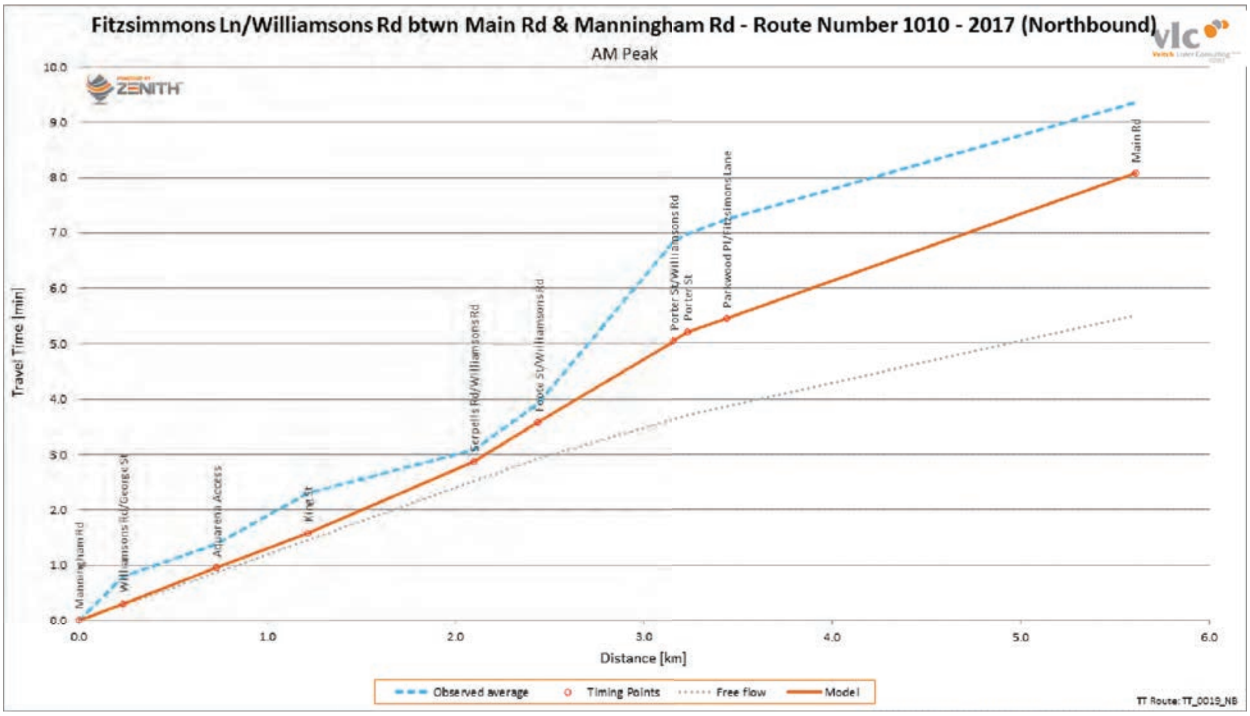
Appendix Figure B.35 - Greensborough Bypass to Main Hurstbridge Road AM peak eastbound travel time comparison



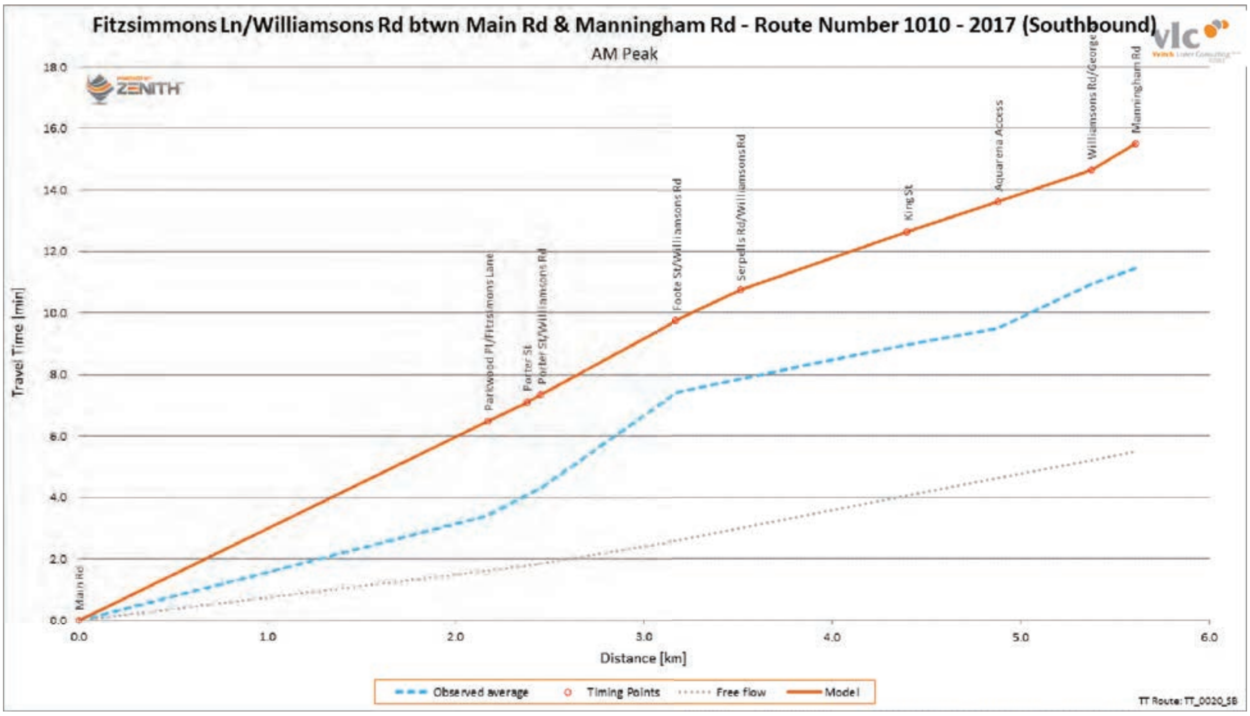
Appendix Figure B.36 - Greensborough Bypass to Main Hurstbridge Road AM peak westbound travel time comparison



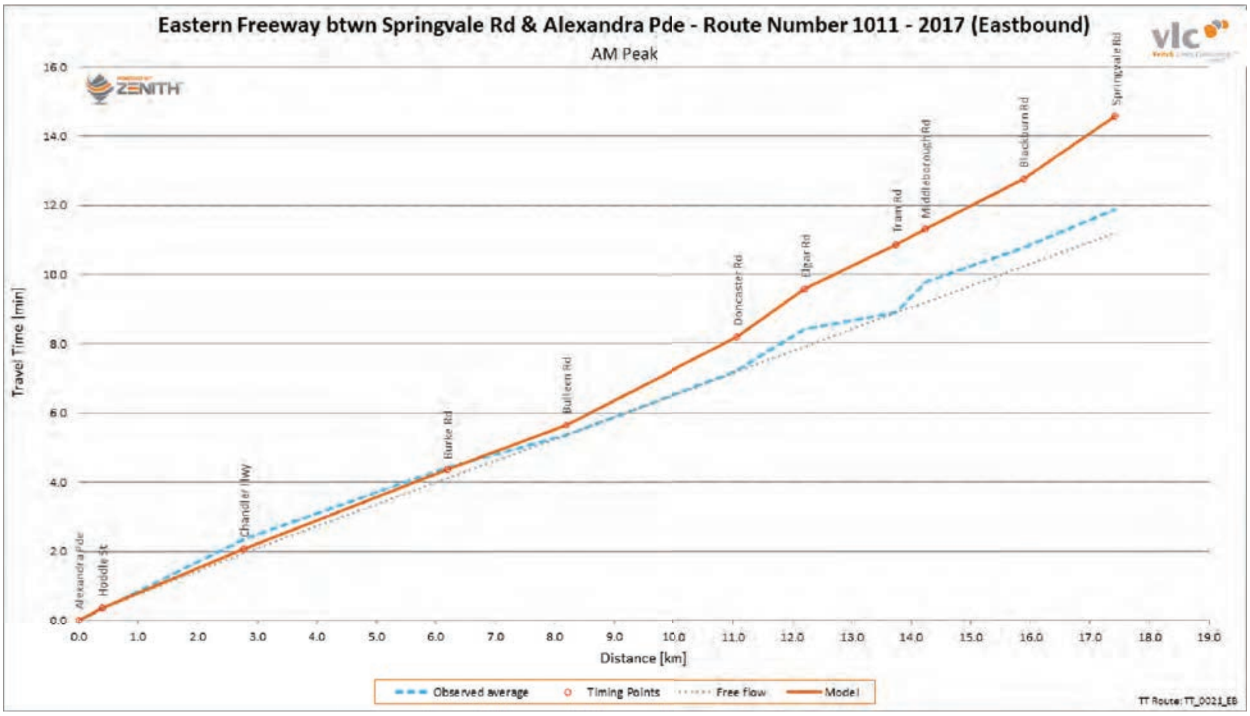
Appendix Figure B.37 - Fitzsimons Lane AM peak northbound travel time comparison



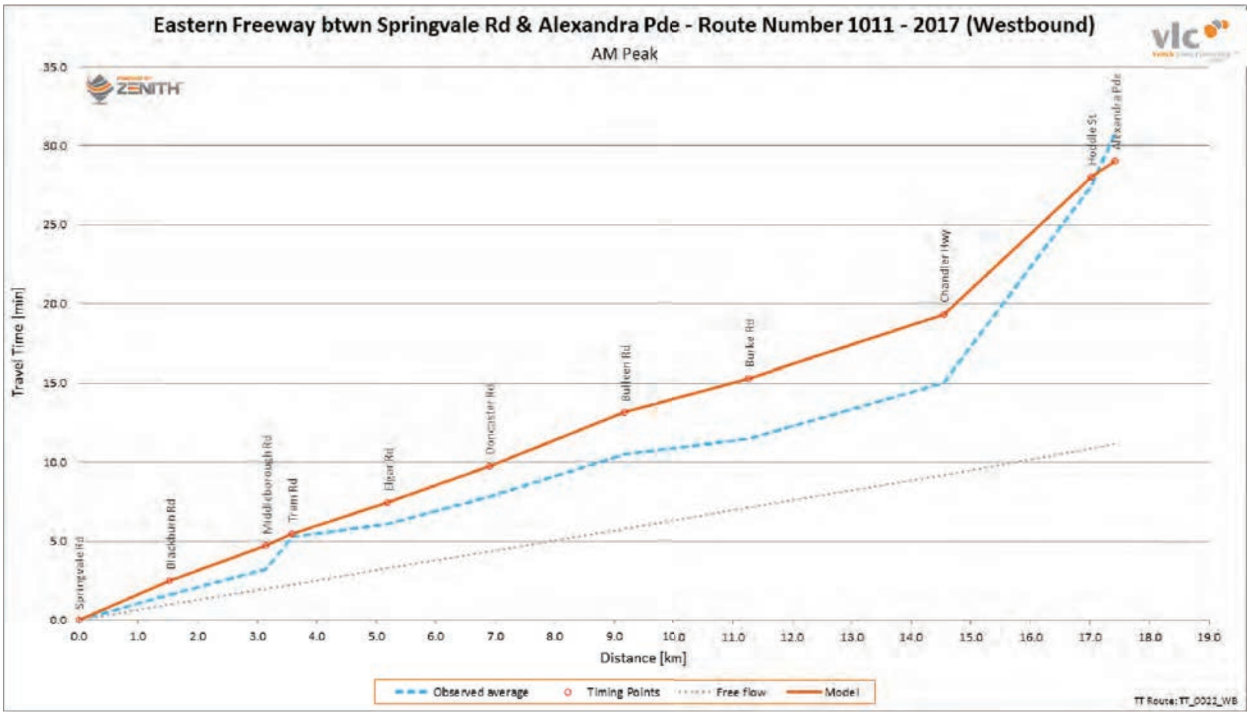
Appendix Figure B.38 - Fitzsimons Lane AM peak southbound travel time comparison



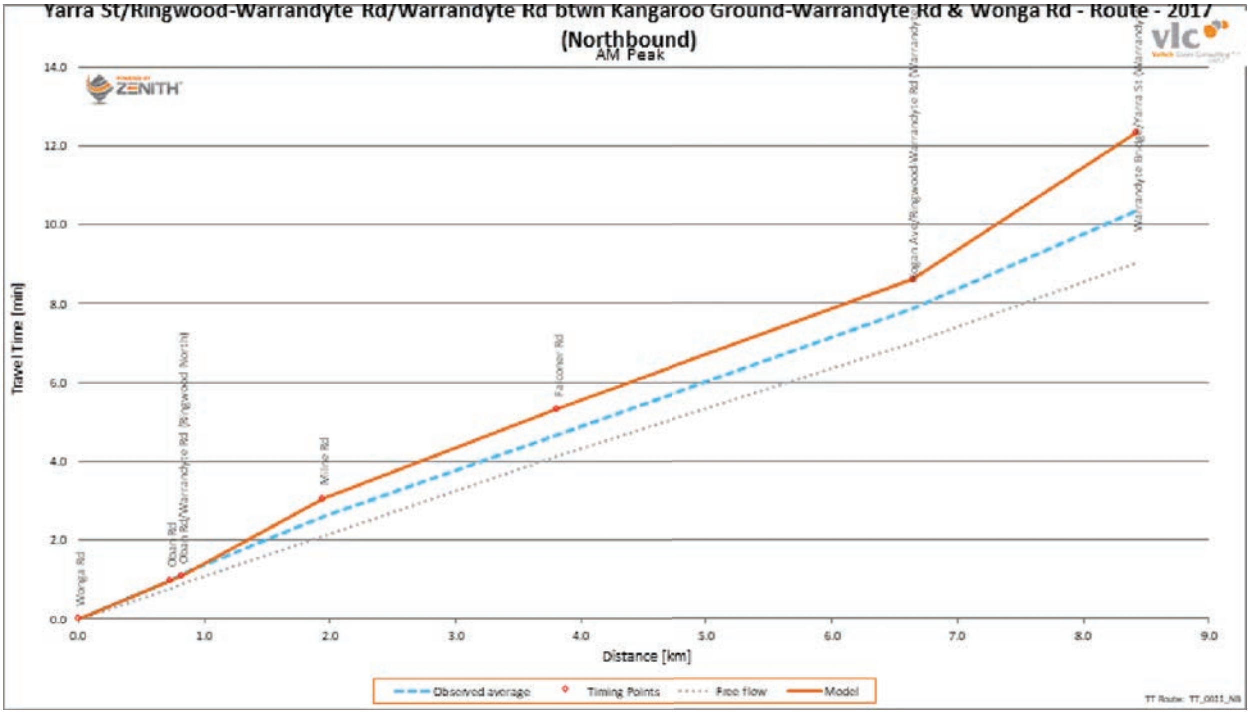
Appendix Figure B.39 - Eastern Freeway AM peak eastbound travel time comparison



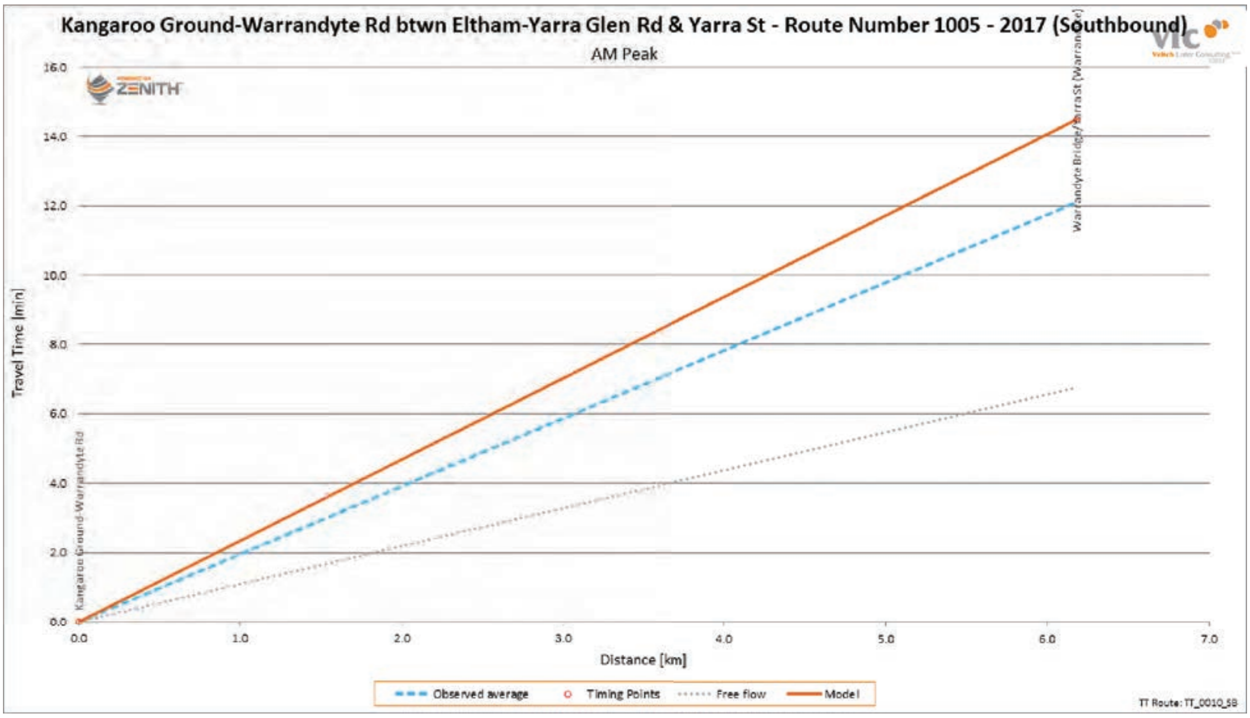
Appendix Figure B.40 - Eastern Freeway AM peak westbound travel time comparison



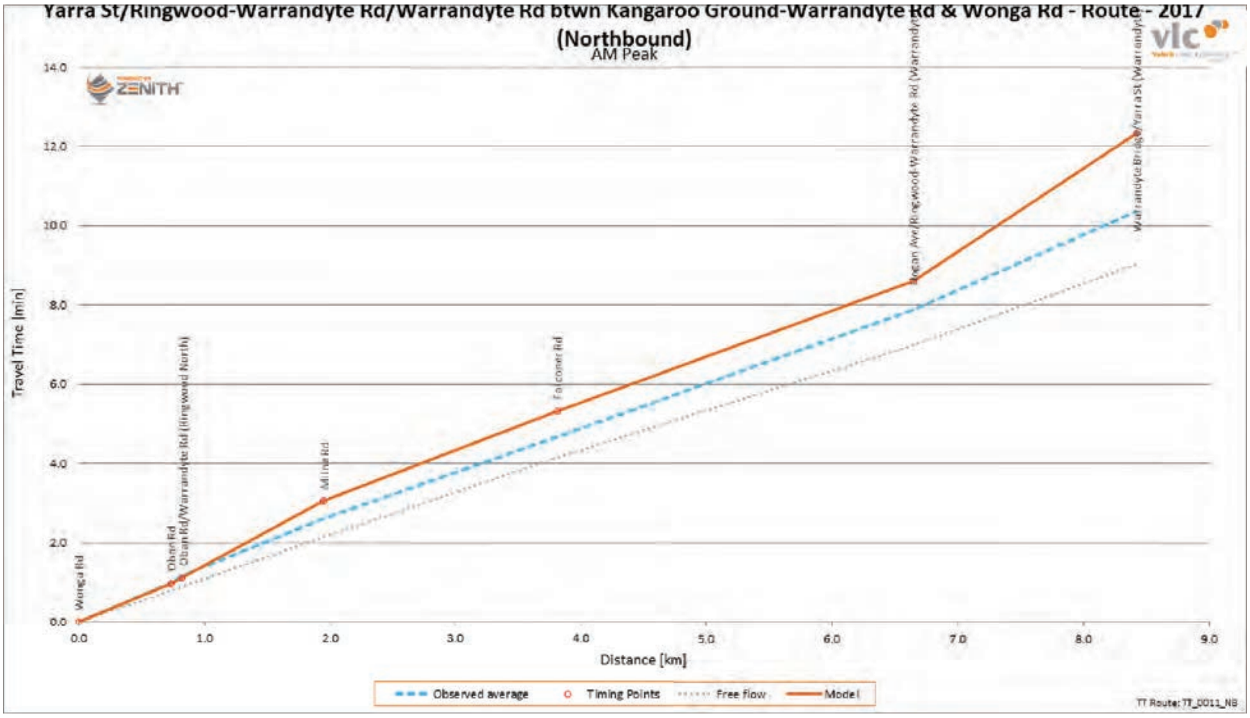
Appendix Figure B.41 - Kangaroo Ground-Warrandyte Road AM peak northbound travel time comparison



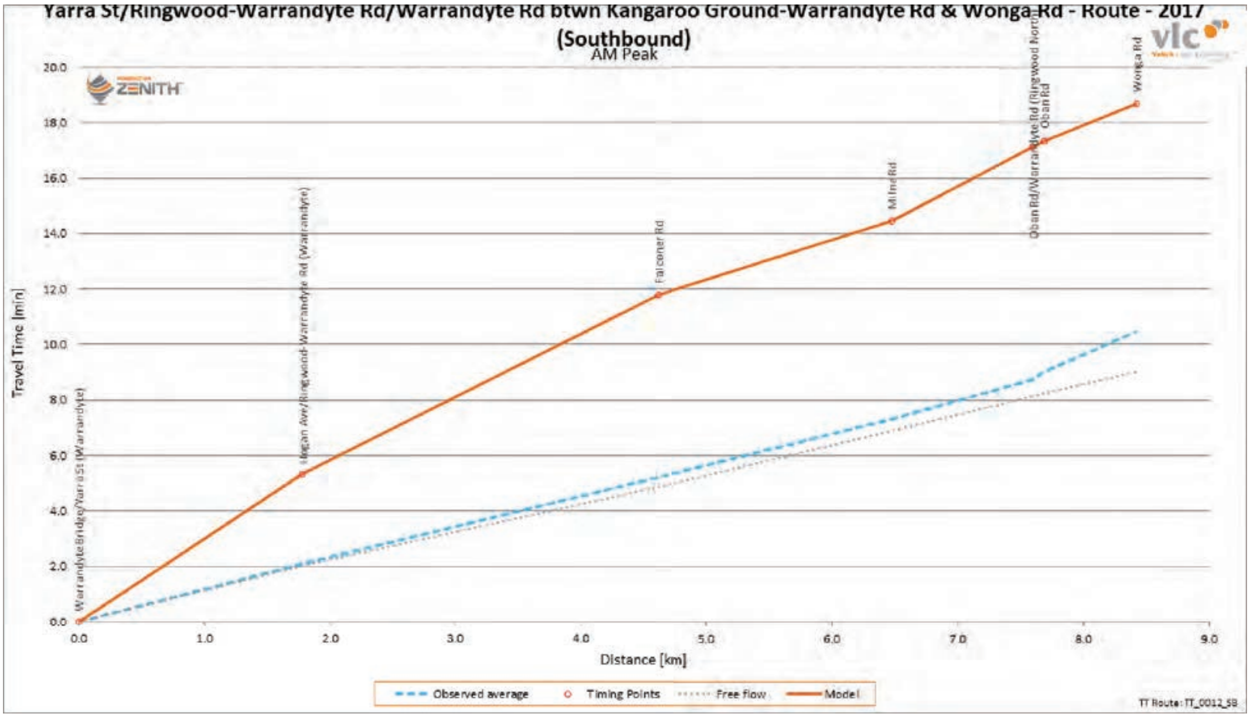
Appendix Figure B.42 - Kangaroo Ground-Warrandyte Road AM peak southbound travel time comparison



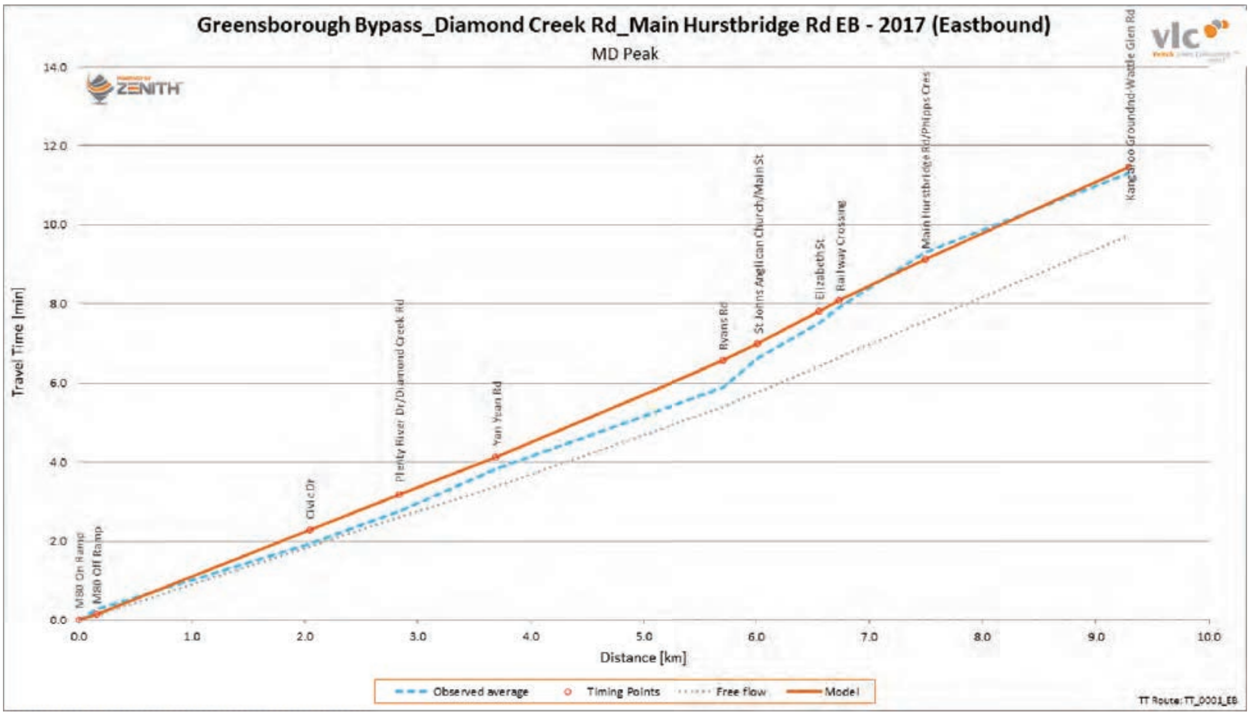
Appendix Figure B.43 - Ringwood-Warrandyte Road AM peak northbound travel time comparison



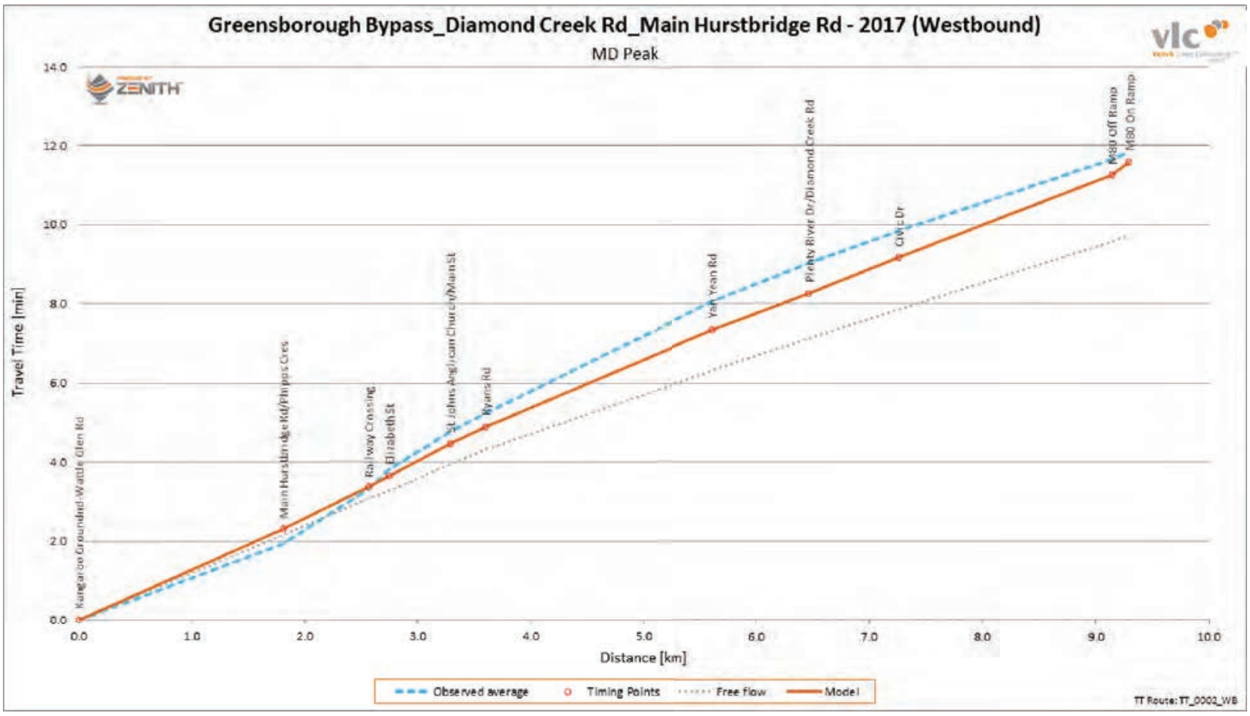
Appendix Figure B.44 - Ringwood-Warrandyte Road AM peak southbound travel time comparison



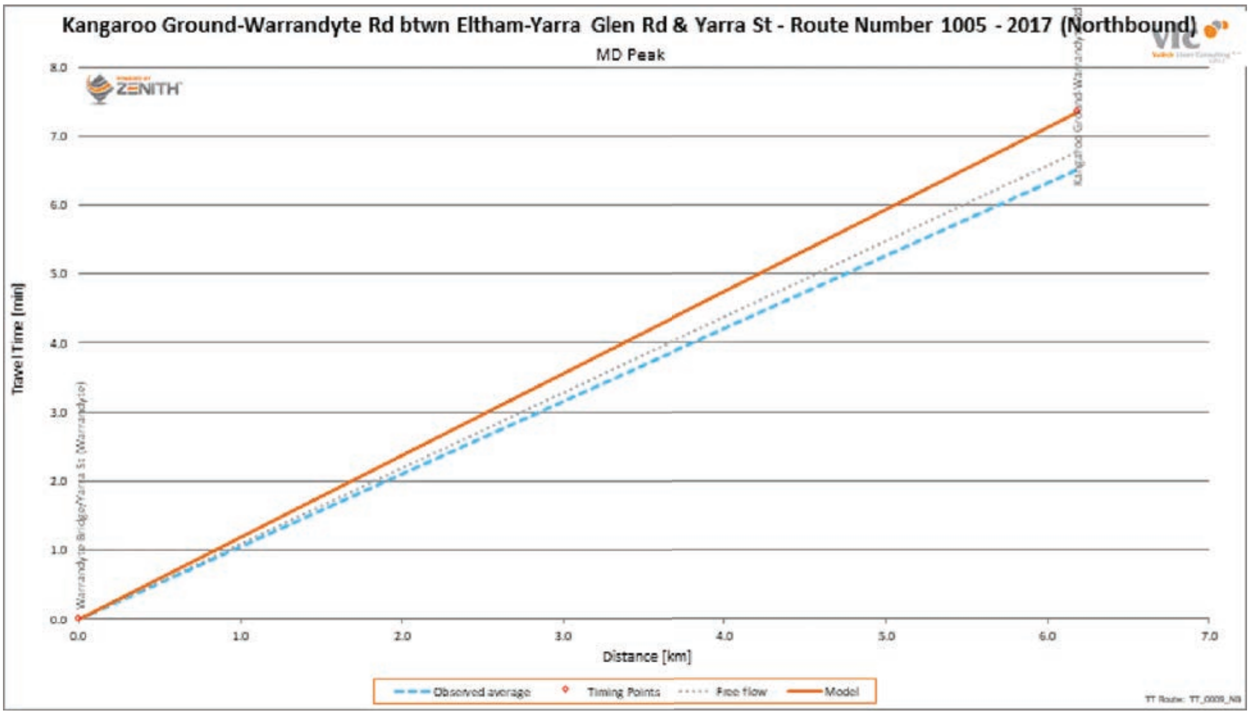
Appendix Figure B.45 - Greensborough Bypass to Main Hurstbridge Road inter peak eastbound travel time comparison



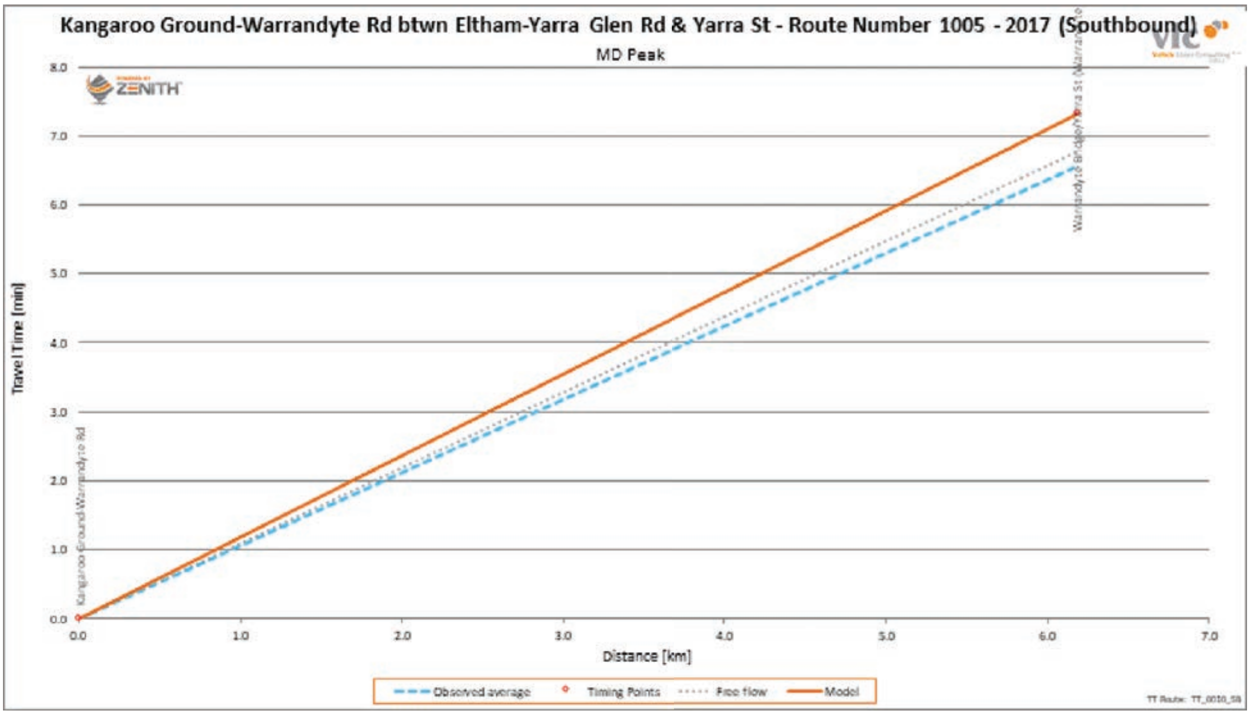
Appendix Figure B.46 - Greensborough Bypass to Main Hurstbridge Road inter peak westbound travel time comparison



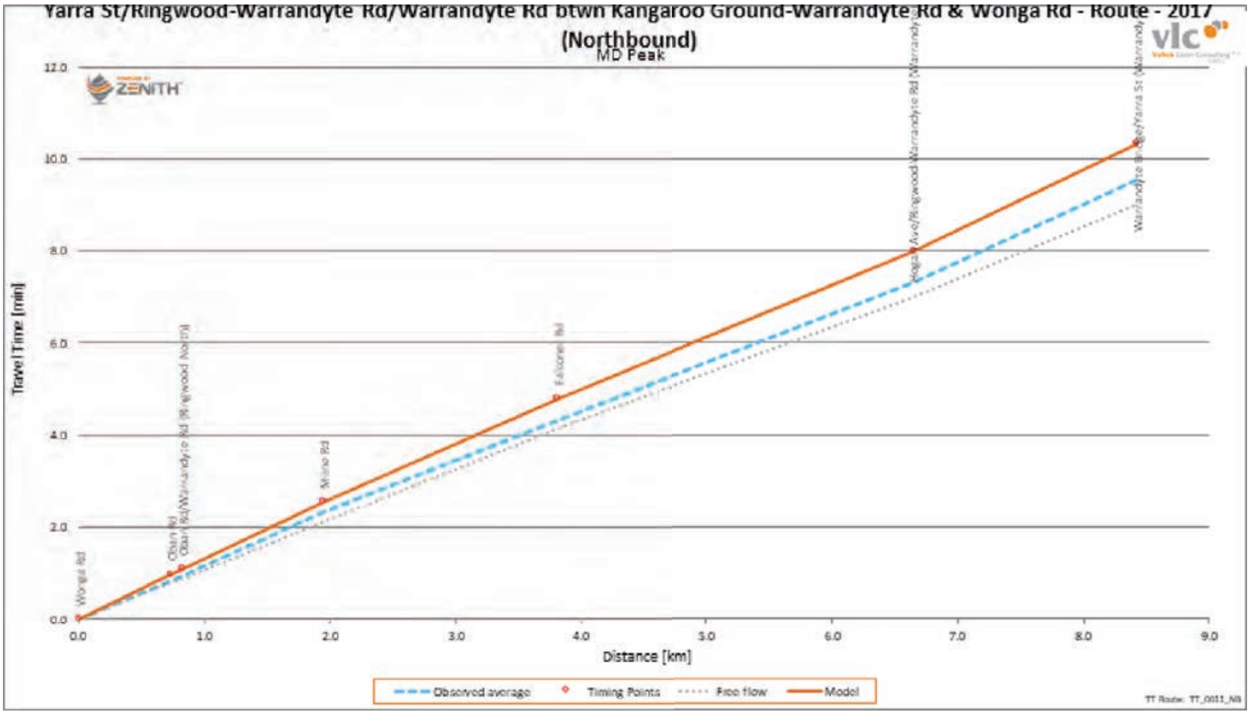
Appendix Figure B.47 - Kangaroo Ground-Warrandyte Road inter peak northbound travel time comparison



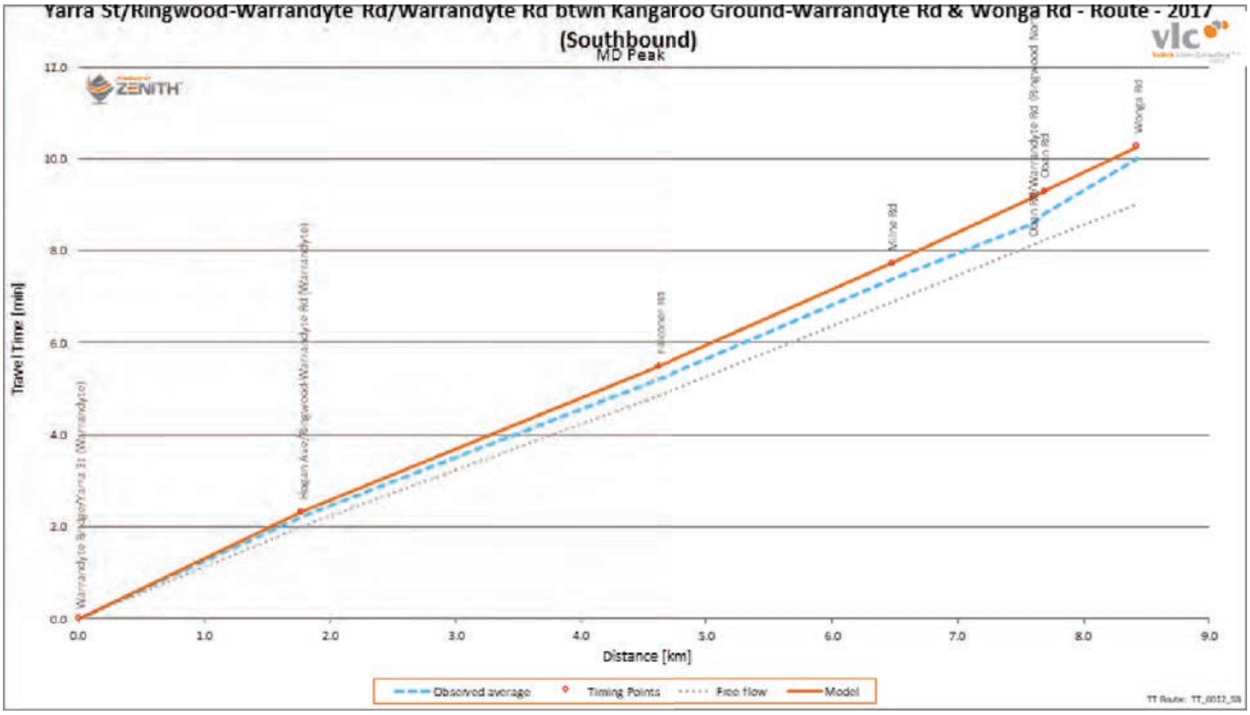
Appendix Figure B.48 - Kangaroo Ground-Warrandyte Road inter peak southbound travel time comparison



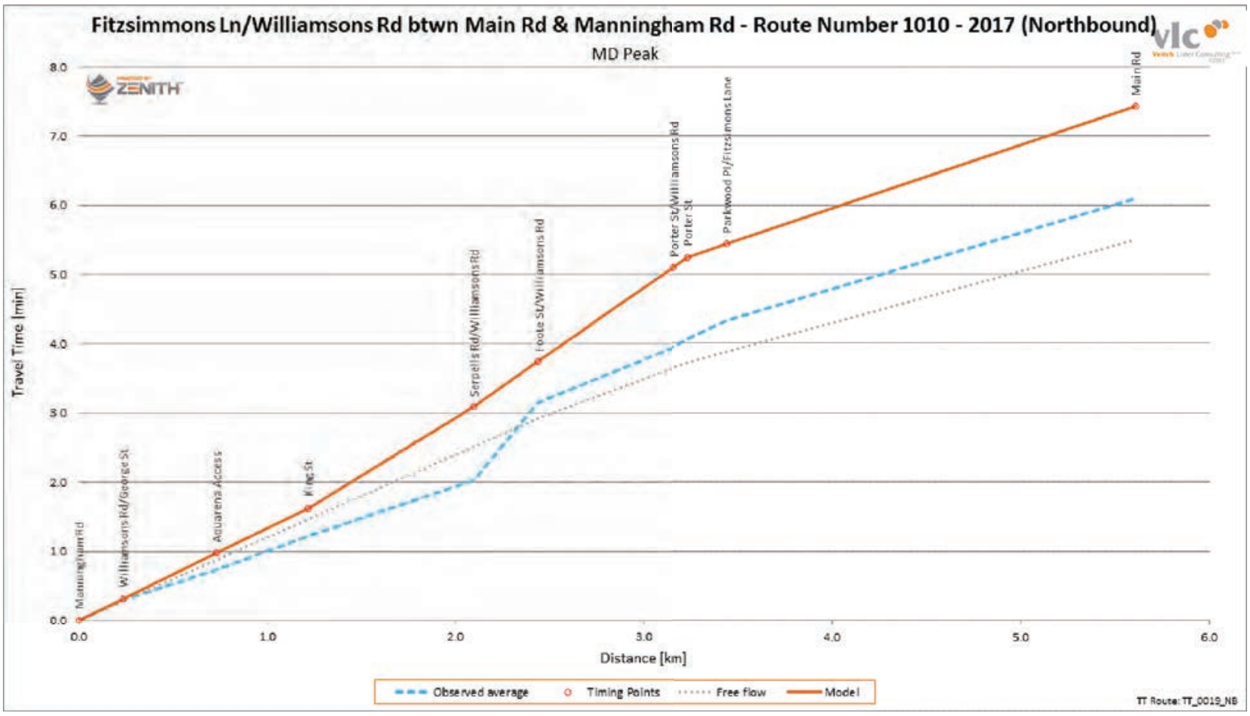
Appendix Figure B.49 - Ringwood-Warrandyte Road inter peak northbound travel time comparison



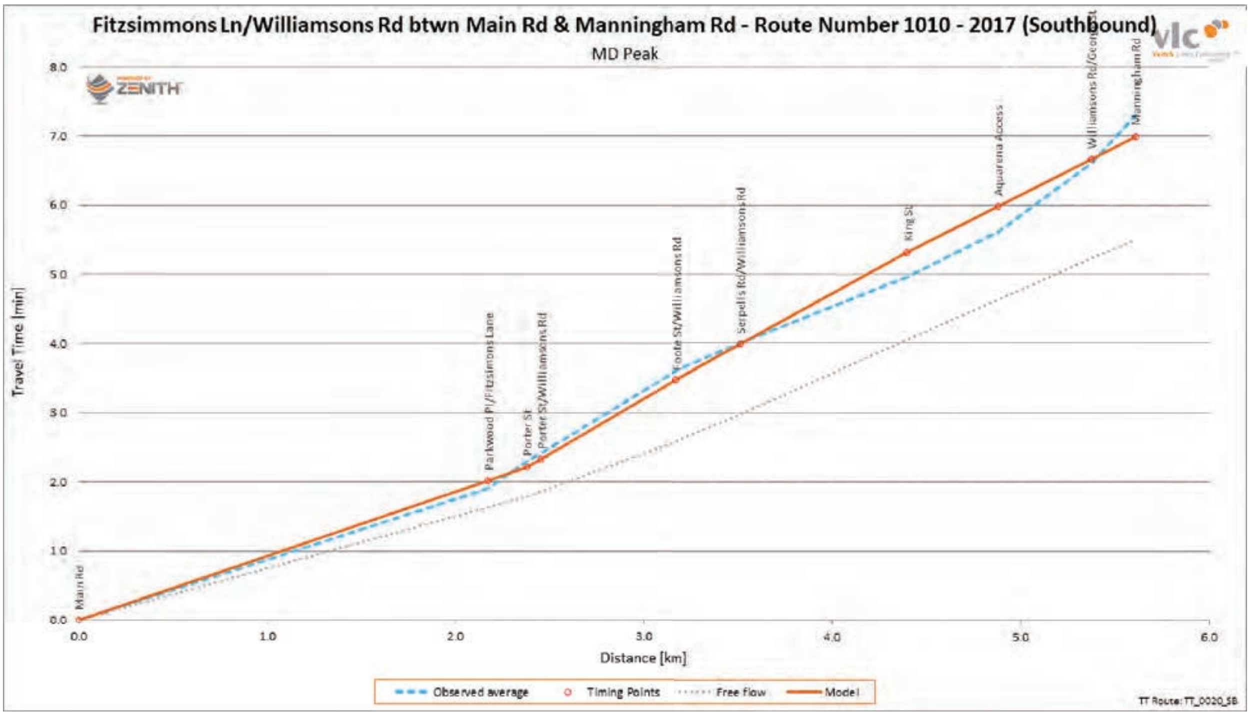
Appendix Figure B.50 - Ringwood-Warrandyte Road inter peak southbound travel time comparison



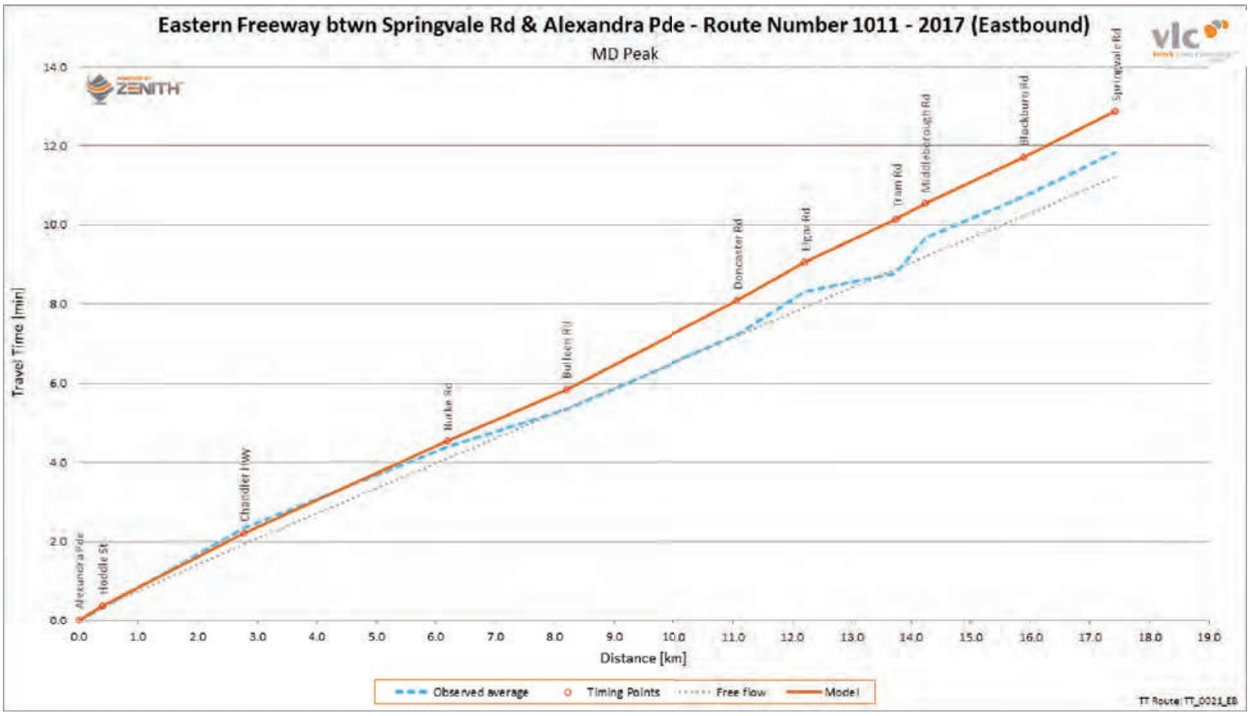
Appendix Figure B.51 - Fitzsimons Lane inter peak northbound travel time comparison



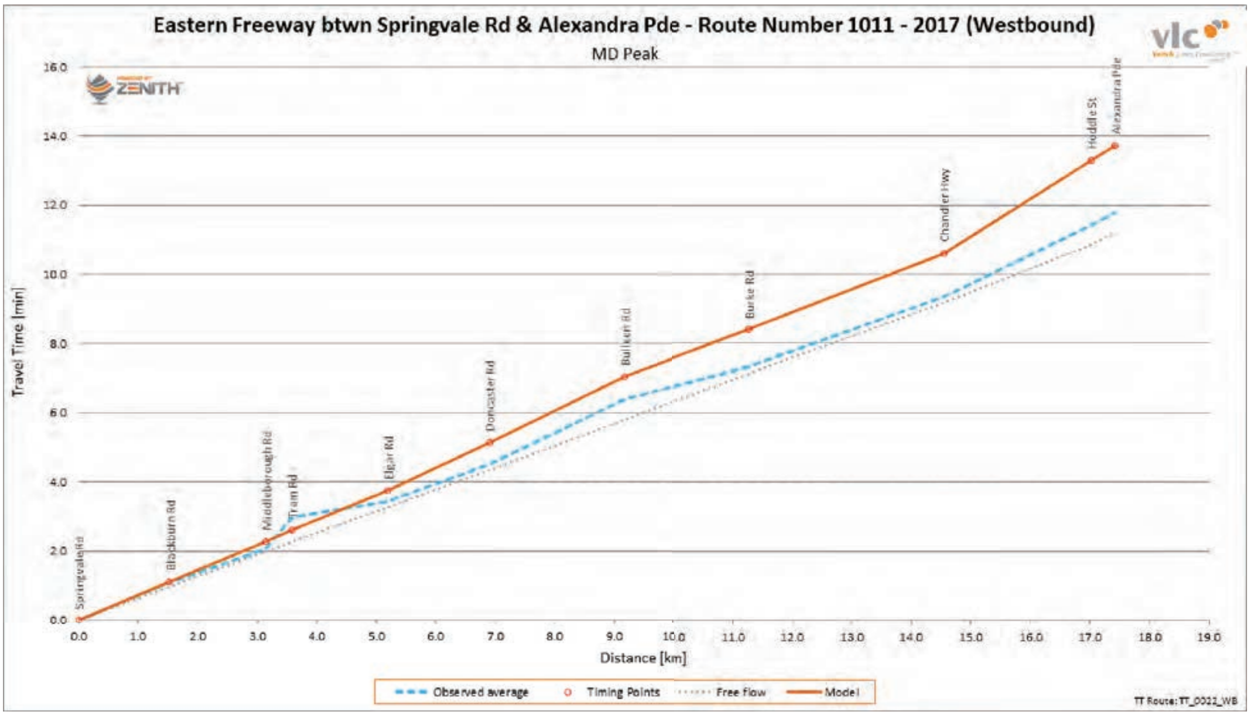
Appendix Figure B.52 - Fitzsimons Lane inter peak southbound travel time comparison



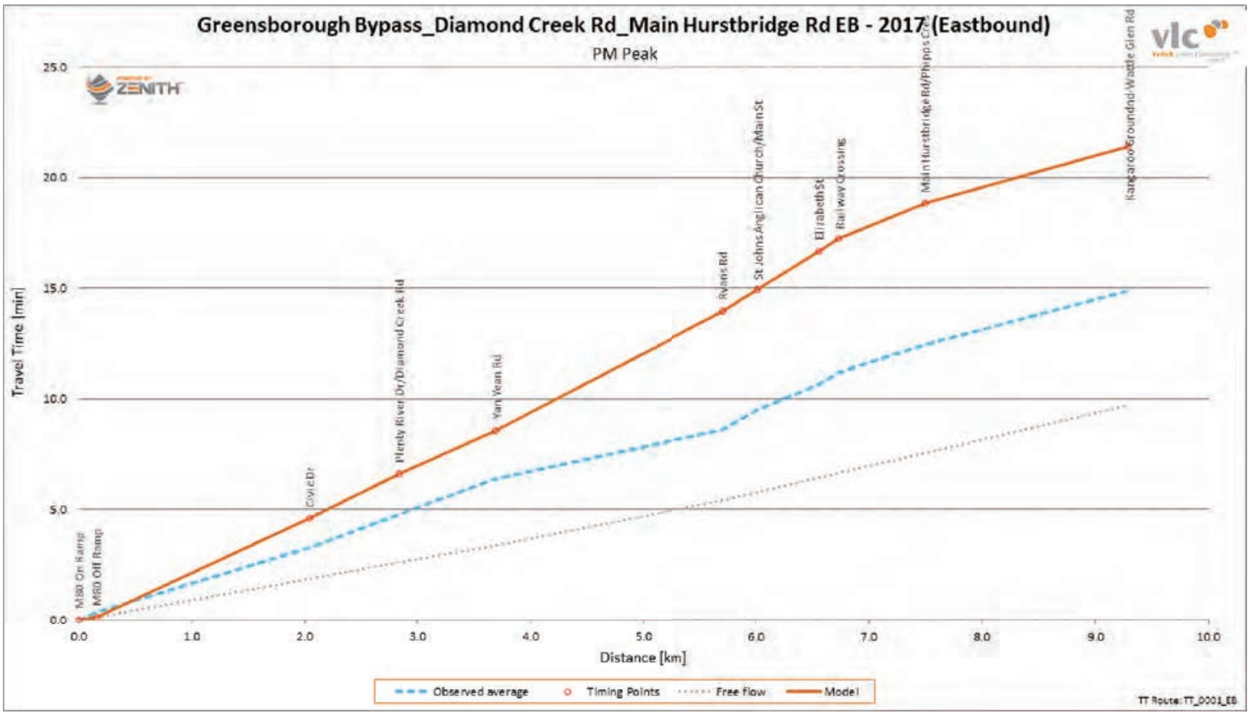
Appendix Figure B.53 - Eastern Freeway inter peak eastbound travel time comparison



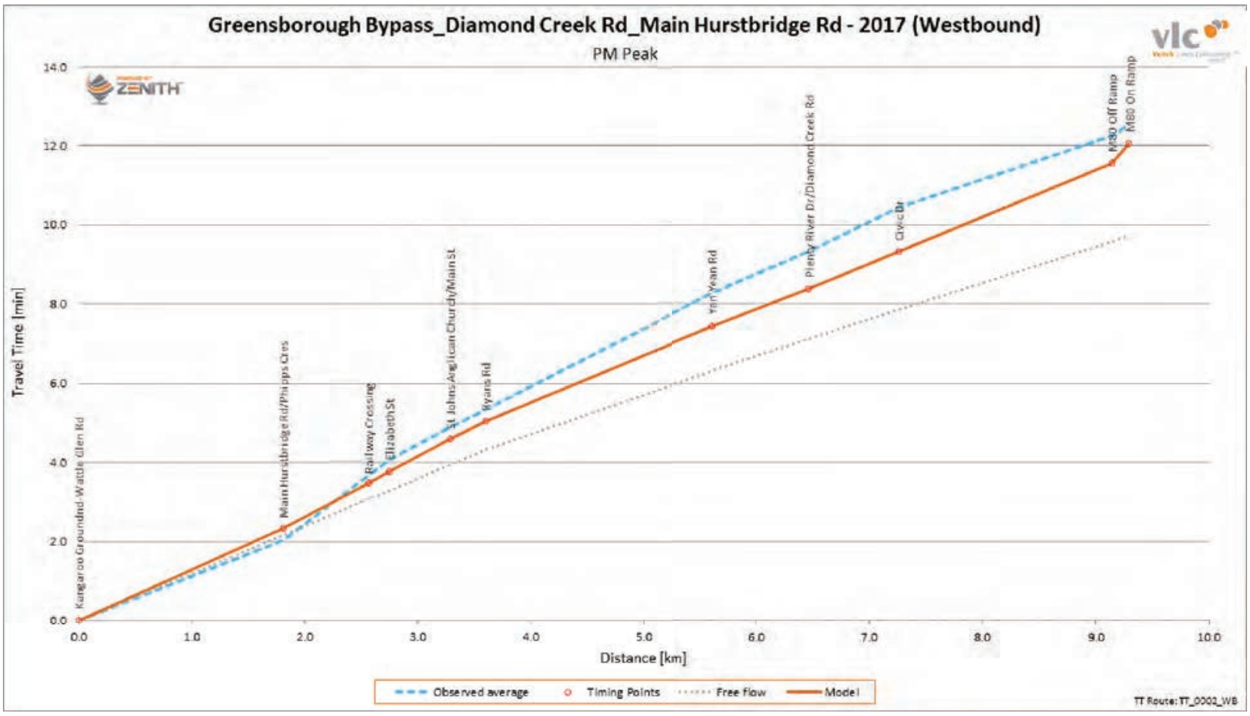
Appendix Figure B.54 - Eastern Freeway inter peak westbound travel time comparison



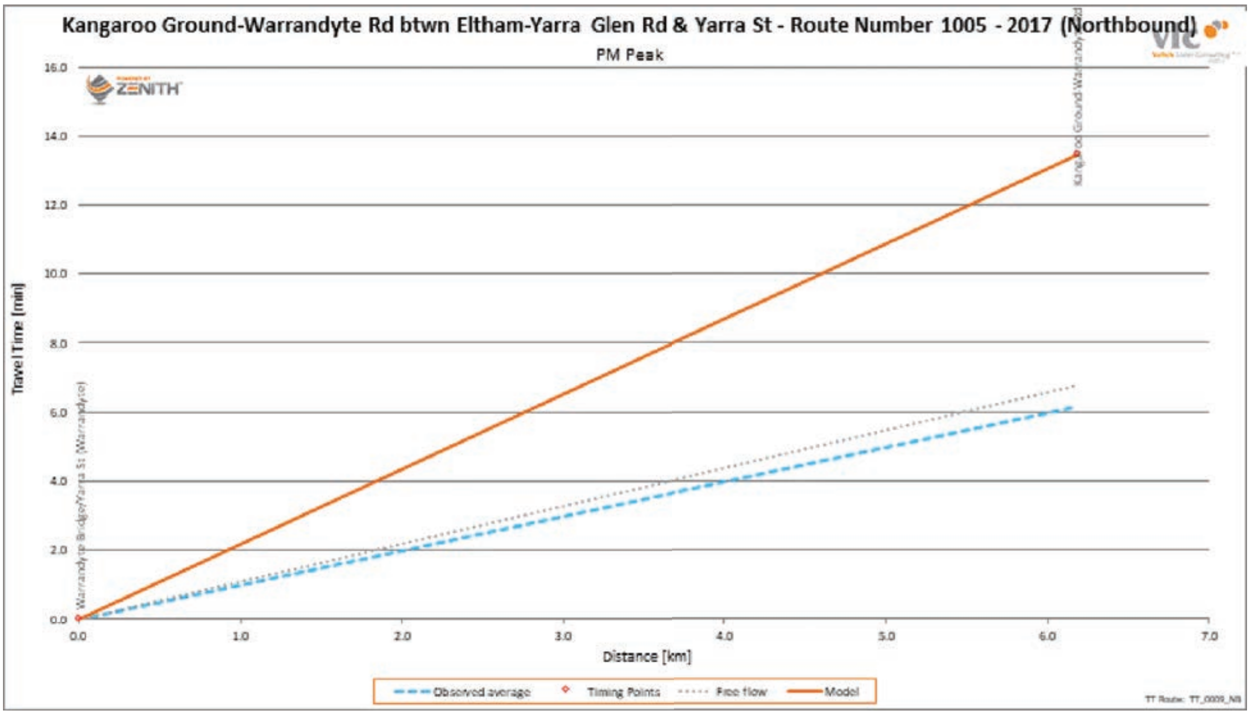
Appendix Figure B.55 - Greensborough Bypass to Main Hurstbridge Road PM peak eastbound travel time comparison



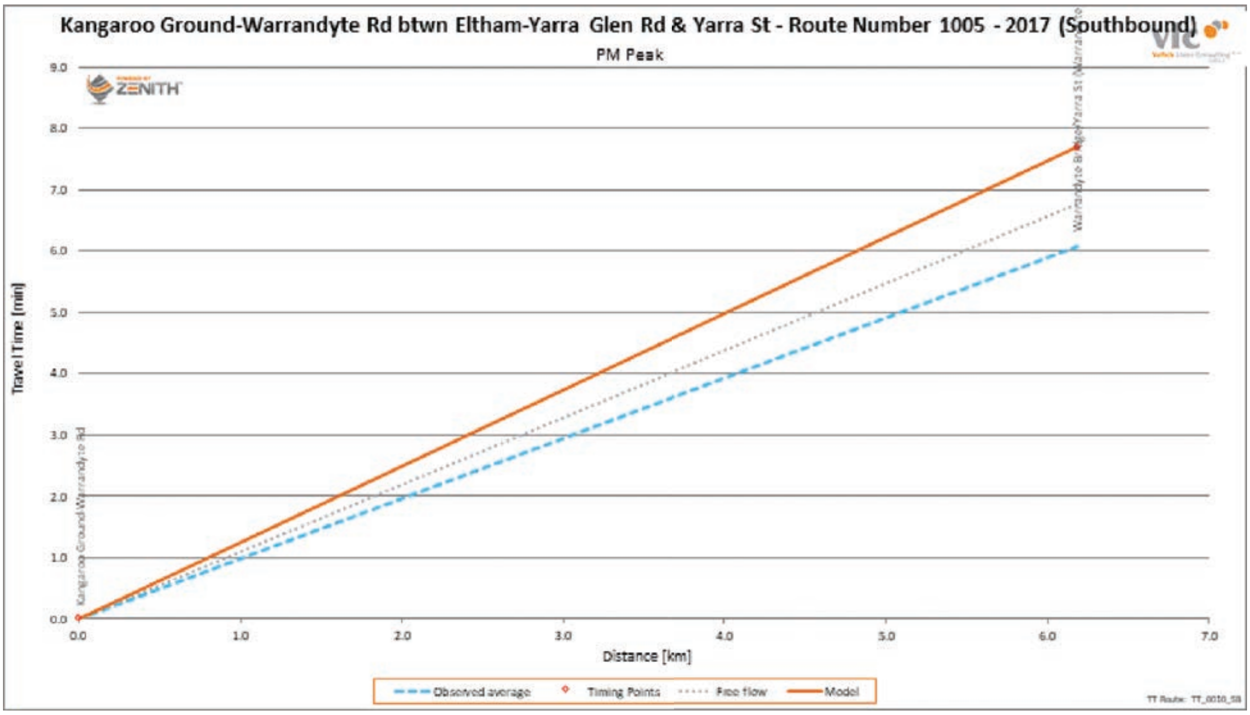
Appendix Figure B.56 - Greensborough Bypass to Main Hurstbridge Road PM peak westbound travel time comparison



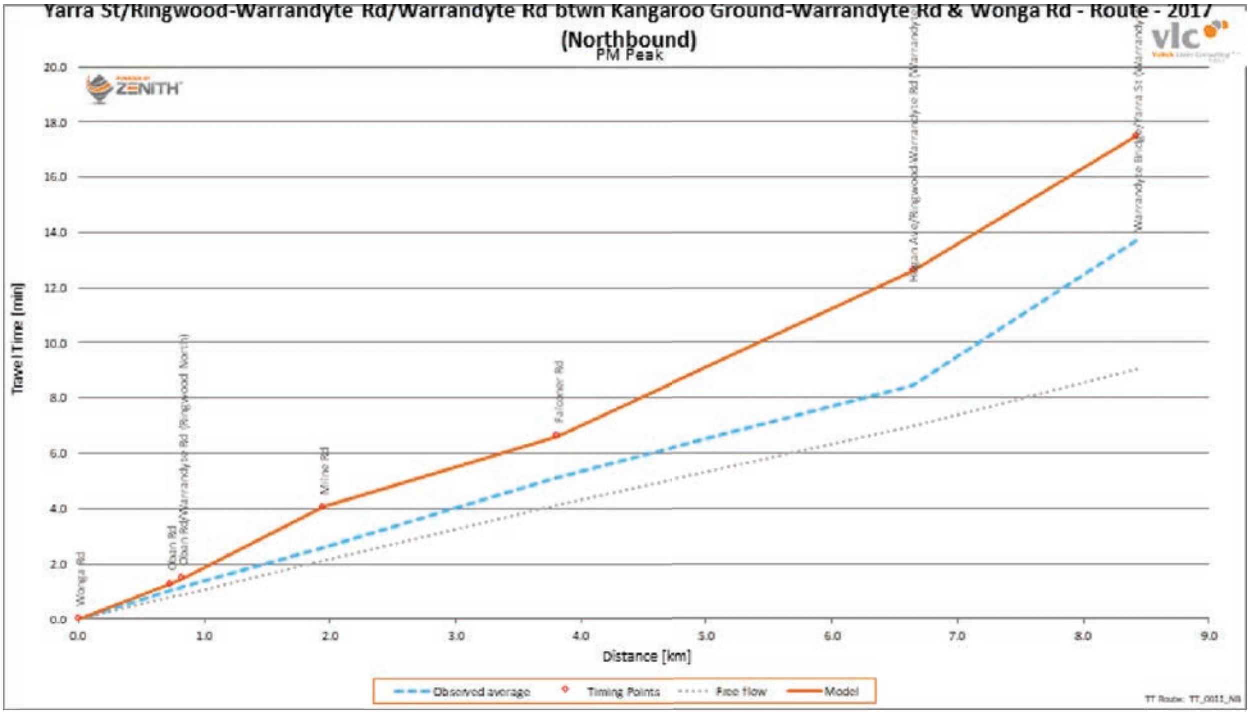
Appendix Figure B.57 - Kangaroo Ground-Warrandyte Road inter peak northbound travel time comparison



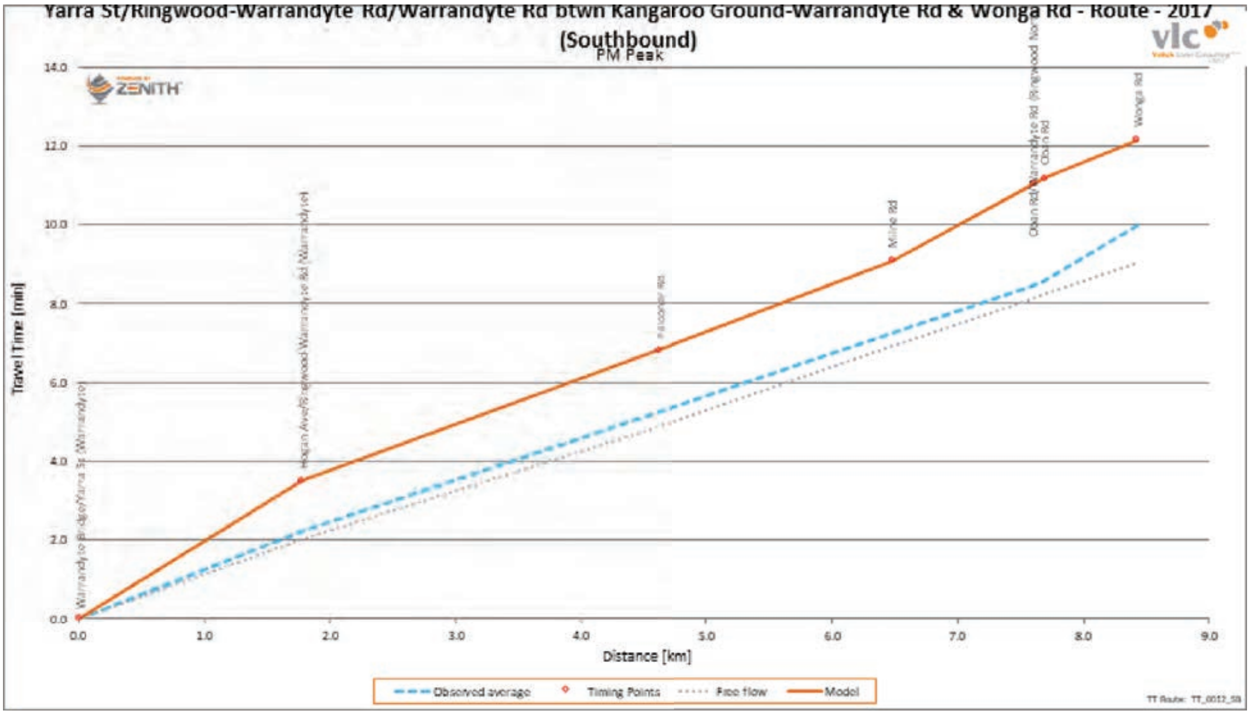
Appendix Figure B.58 - Kangaroo Ground-Warrandyte Road inter peak southbound travel time comparison



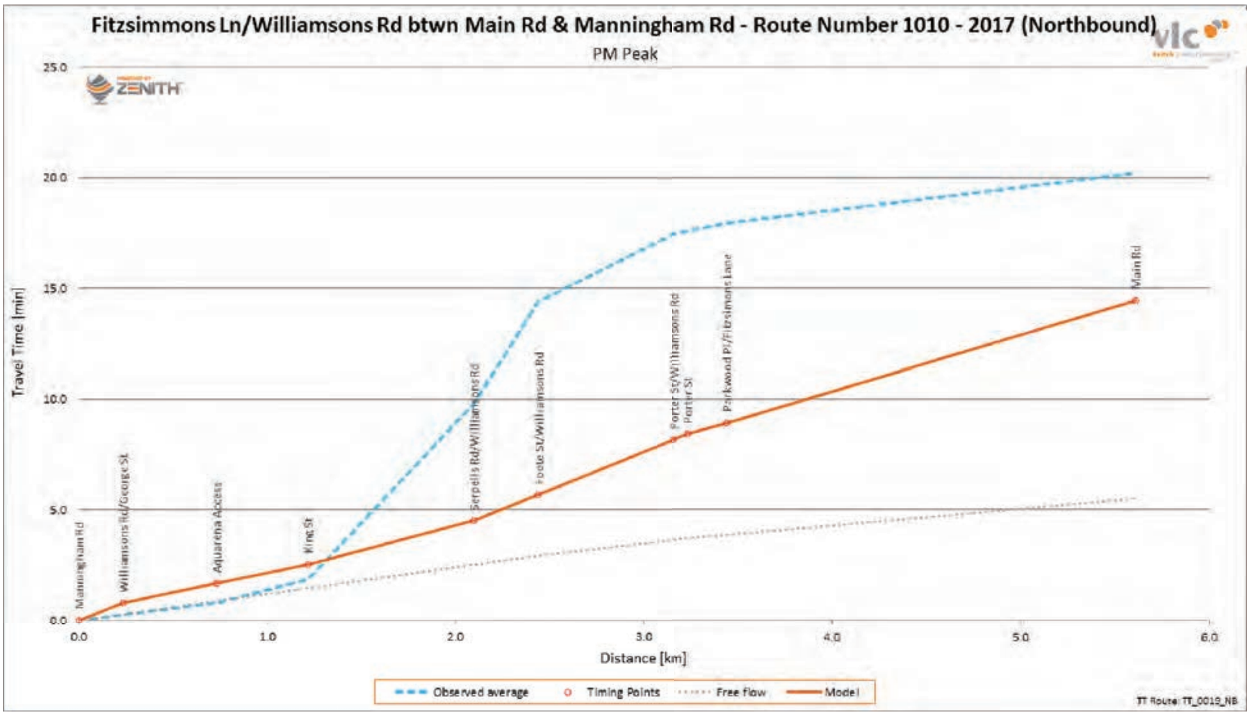
Appendix Figure B.59 - Ringwood-Warrandyte Road PM peak northbound travel time comparison



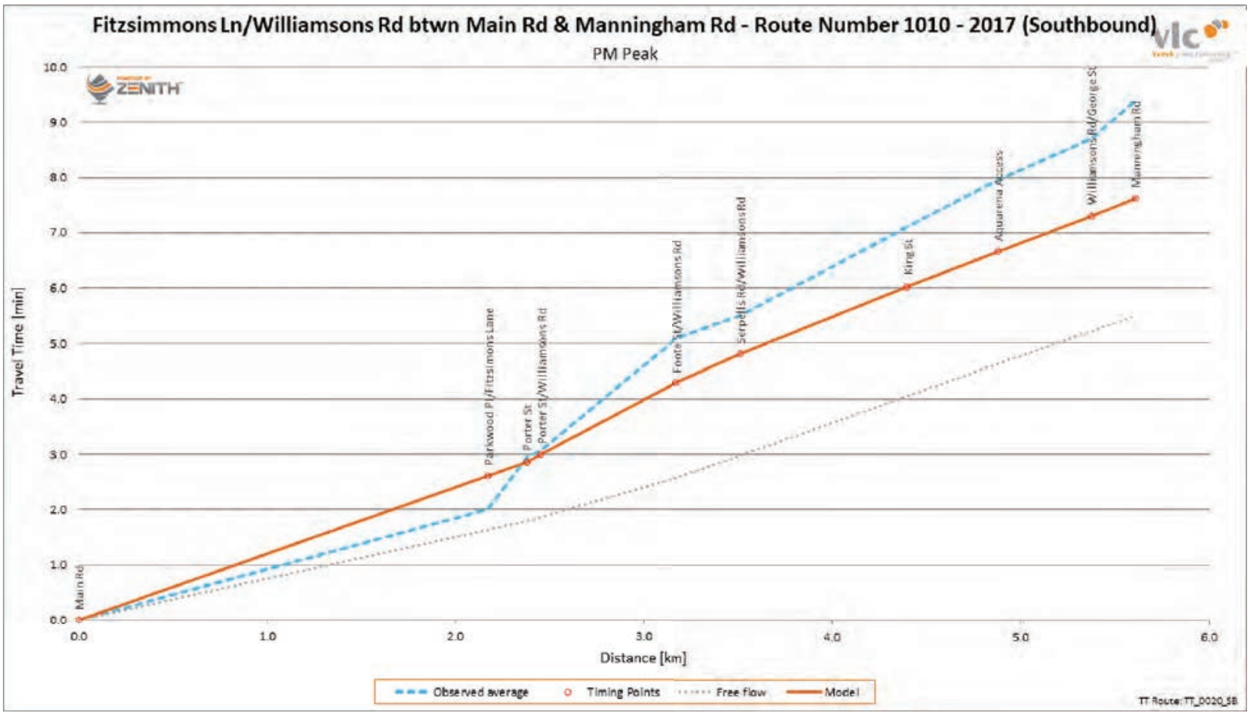
Appendix Figure B.60 - Ringwood-Warrandyte Road PM peak southbound travel time comparison



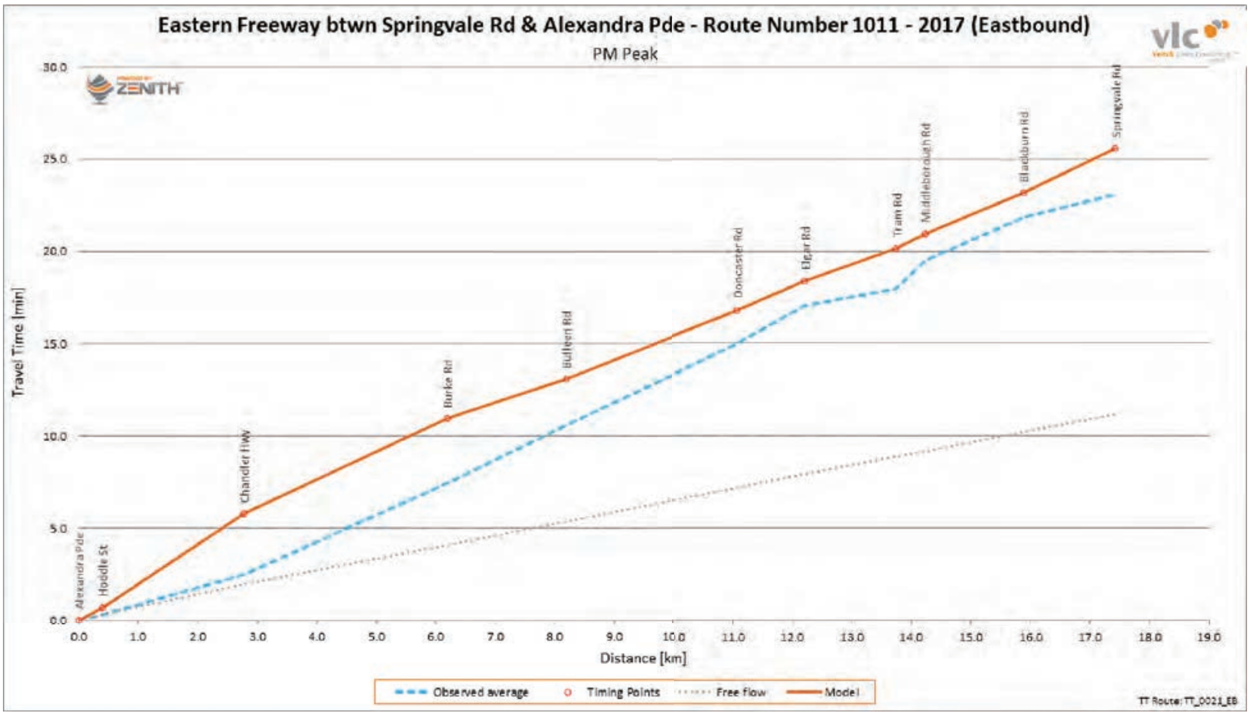
Appendix Figure B.61 - Fitzsimons Lane PM peak northbound travel time comparison



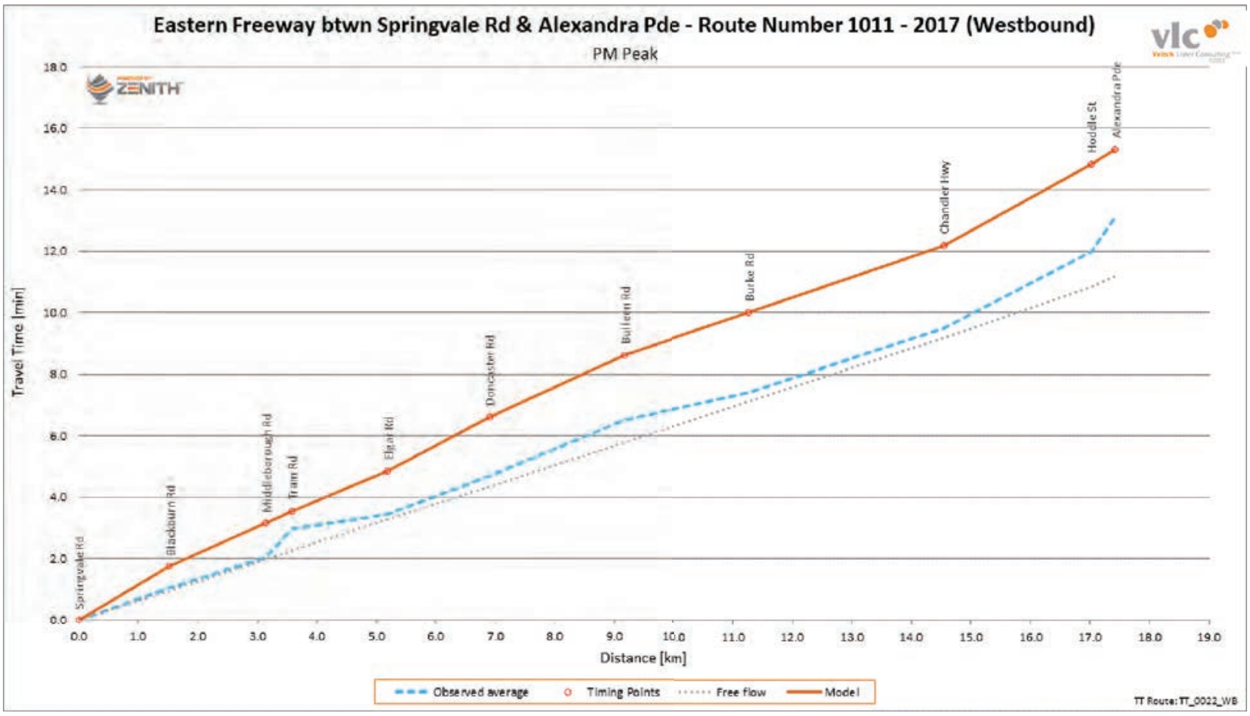
Appendix Figure B.62 - Fitzsimons Lane PM peak southbound travel time comparison



Appendix Figure B.63 - Eastern Freeway PM peak eastbound travel time comparison



Appendix Figure B.64 - Eastern Freeway PM peak westbound travel time comparison



Appendix B4: Assessment of realism

To assess the level of realism of the model, its response to change in input values has been tested using sensitivity tests of the model. This process is described in the *National Guidelines for Transport System Management in Australia* (Transport and Infrastructure Council (TIC), 2015) and more recently in the TfV *Strategic Transport Model Elasticity Guidelines*.

Following the approach recommended in these guidelines, the sensitivity is measured in terms of elasticity.

The elasticity approach for travel characteristics

Elasticity is a useful measure of the sensitivity of a model to changes in key variables, such as pricing and policy inputs. Elasticity considers the percentage change of an output in response to a percentage change in a key input. As an example, a fuel price increase of 10 per cent is expected to have the effect of reducing traffic trips. The ratio of the corresponding percentage reduction in traffic trips against the 10 per cent fuel price increase represents the elasticity. The sign of the elasticity represents a directional change, where a negative elasticity, for example, represents the relationship between an input that increases and results in a reduction in the output. A higher elasticity indicates the model is more sensitive to small changes in pricing and policy inputs, while a lower elasticity indicates the model is less sensitive.

There are some difficulties with the use of elasticity though. While it is a useful measure of the sensitivity of an output to an input, its traditional mathematical form is not constant or even consistent from one study to another nor one community to another. Its definition includes a measure of the separation of two states, and also includes a measure of the initial state. As a result, the elasticity of a peak period value may differ radically from the same measure over a day or weekend and the elasticity on an individual public transport route may differ from a model wide impact.

An alternative measure, which is a ratio of the log differences of the initial and final states, provides a measure that is constant across the full range of the independent variables. We have thus used the alternative method to calculate elasticities. The form of this calculation is:

$$\epsilon = \frac{[\log(D_2) - \log(D_1)]}{[\log(P_2) - \log(P_1)]}$$

Where:

ε is the elasticity of demand (the dependent variable)
D_2 is the demand for the changed situation
D_1 is the demand in the original situation
P_2 is the value of the independent variable (such as Fuel Price) in the changed situation
P_1 is the value of the independent variable (such as Fuel Price) in the original situation

In 2015 TfV published a series of recommended ranges for direct elasticities, using the alternative measure, as shown in Table 2 of its *Strategic Transport Model Elasticity Guidelines*.

TfV implied cross-elasticity approach

While the TfV guidelines '…*treat cross-elasticities as a by-product, and consider the primary validation should be based in the direct elasticities*', Table 3 of the elasticity guidelines document provides a series of recommended ranges for implied cross-elasticities to describe the expected range of impact on the alternative modes. The approach recommended by the Department to calculate implied cross-elasticities from the direct elasticities involves assuming a 100 per cent diversion rate between cars and public transport, as well as the following mode share assumptions (based on VISTA 07 and 09 data):

- All purpose trips – 10 per cent public transport, 90 per cent car
- All purpose kilometres travelled – 16 per cent public transport, 84 per cent car
- Commuting trips to the CBD and inner – 43 per cent public transport, 57 per cent car.

Cross-elasticities based on the TfV method above have been calculated for each required sensitivity test.

As the Zenith model also includes the active transport modes of walking and cycling, along with private car and public transport, the TfV's assumption of a 100 per cent diversion rate between cars and public transport for the calculation of cross-elasticities will not accurately represent the actual model's response to the changed inputs. Using the example from the previous section, a fuel price increase of 10 per cent is expected to reduce car trips (used for direct elasticity), and also increase trips in public transport and active transport modes (used for cross-elasticity).

Therefore, for reference, VLC has also included the elasticity for the alternative mode (as calculated using the Department's direct elasticity method) using modelled output data directly.

Transport model scenarios

The sensitivity of the Zenith transport model was analysed for the 2016 validated model. All results relate to an average weekday during school term (AWDT). Key variables tested included:

Private vehicle (car)

1. Fuel prices (increased by 10 per cent)
2. Parking charges (increased by 10 per cent in CBD and inner areas)
3. Car in-vehicle time (increased by 10 per cent).

Public transport

4. Public transport fares (increased by 10 per cent)
5. Public transport service levels (increased by 10 per cent)
6. Public transport in-vehicle time (increased by 10 per cent).

Other (no elasticity measure provided)

7. Value of time (car) (increased by 10 per cent)
8. Value of time (public transport) (increased by 10 per cent)
9. Zonal trip generation (increased by 10 per cent)
10. Volume delay function free flow speed on freeways (decreased by 10 per cent)
11. Toll prices (increased by 20 per cent).

Assessment of realism results private vehicle (car)

Fuel cost

An increase of 10 per cent in fuel cost was tested in the model. The resultant elasticities for this change are shown in Appendix Table B.39. Cross-elasticities for public transport passenger kilometres as calculated by the method suggested by TfV have also been included, while the actual modelled cross-elasticities for this measure (including private cars, public transport, walking and cycling), as calculated using Zenith model outputs, are also shown for reference.

Appendix Table B.39 - Fuel price elasticities of demand for car and public transport travel - TFV's elasticity ranges

	Lower Range	Upper Range	Transport Model Elasticity
Daily Car Km Travelled	-0.15	-0.30	-0.33
Daily PT Passenger Kms *	0.79	1.58	1.73 / 0.31
Daily Car Trips	For additional information		-0.06

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

The sensitivities show that the transport model responds as expected to a change in fuel prices, although it is about 10 per cent outside the given range in the TFV guidance.

However, the modelled results are within the direct measure elasticity ranges provided in *Table A1: National and Overseas Elasticity Range Guidelines* of the TFV guidance[22], where the range provided is -0.25 to -0.35 for daily car kilometres travelled.

While the implied cross-elasticity of public transport passenger kilometres (using the TFV method) indicate a movement in the correct direction, they are also outside the given range.

The actual modelled cross-elasticity for public transport kilometres (+0.31) is much lower than the value calculated using the TFV method (+1.79), because the model responds to this test by increasing public transport, walking and cycling trips.

Parking charges

An increase of 10 per cent on parking charges (which are primarily applied to the Melbourne CBD and surrounds) was tested in the model.

The resultant elasticities for car commuting trips (home based work trips) to the CBD and Inner regions (Melbourne, Yarra and Port Phillip LGAs, and Stonnington-Prahran SLA) as well as cross-elasticities for the corresponding public transport trips are shown in Appendix Table B.40.

Appendix Table B.40 - Parking charge price elasticities of demand for car and public transport travel - TFV's elasticity ranges

	Lower Range	Upper Range	Transport Model Elasticity
Car Commuting Trips to the CBD and Inner	-0.10	-0.40	-0.46
PT Commuting Trips to the CBD and Inner (Based on DEDJTR Method)	0.13	0.53	0.61 / 0.39

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

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[22] Sourced from the UK WebTAG (2014)

The sensitivities show that the transport model responds correctly to a change in parking charge prices, although the elasticity falls outside the given range.

However, the modelled results are within the internationally recognised direct measure elasticity ranges of -0.10 to -0.60 for car commuting trips which were provided in the TFV guidance.

The implied cross-elasticity of public transport commuting trips to the CBD change as expected, although it is also outside the ranges given.

However, the actual modelled cross-elasticity for public transport commuting trips to the CBD and inner suburbs is +0.39 which is within TFV's ranges.

Car in-vehicle time

An increase of 10 per cent of the car in-vehicle time was tested in the model, which was applied to the generalised cost calculations. The resultant elasticities for daily car trips as well as cross-elasticities for the corresponding daily public transport trips are shown in Appendix Table B.41.

Appendix Table B.41 - Car in-vehicle time elasticities of demand for car and public transport travel - TFV's elasticity ranges

	Lower Range	Upper Range	Transport Model Elasticity
Daily Car Trips	-0.2	-0.8	-0.14
Daily PT Trips *	1.8	7.2	1.3 / 0.33
Daily Car Km Travelled	For additional information		-0.48

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

The elasticities shown are outside the published TFV ranges, though they move in the correct direction.

However, the modelled results are within the UK's WebTAG (2014) direct measure elasticity ranges (0.00 to -2.00), and just outside the equivalent Wallis (2004) direct measure elasticity ranges of -0.15 to -0.80.

Public transport

Fares

An increase of 10 per cent in public transport fares (including metropolitan, regional and airport services) was tested in the model. The calculated elasticities for this increase are shown in Appendix Table B.42.

Appendix Table B.42 - Public transport fare elasticities of demand for car and public transport Travel - TFV's elasticity ranges

	Lower Range	Upper Range	Transport Model Elasticity
Daily PT Trips	-0.2	-0.6	-0.20
Daily Car Trips *	0.02	0.07	0.02 / 0.02

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

The table shows the transport model responds as expected (that is, public transport trips reduce) in response to an increase in public transport fares, and it is within the given ranges.

Daily car trips are also shown to increase as a result of the fare increase, and the elasticities fall within the guideline's ranges. This is at the lower end of the direct elasticity ranges, which could be due to the coverage of the model, which includes areas poorly serviced by public transport such as regional areas.

Service Level

The impact of public transport service improvements was tested with a 10 per cent increase in service frequencies (or a reduction of 9 per cent in headways), resulting in a 10 per cent increase in service-kilometres for all public transport services, including metropolitan services (trains, trams, buses) and regional services (V/Line rail, coaches and buses).

The overall service elasticity of public transport demand calculated from the model is shown in Appendix Table B.43, which appears to be slightly low compared with the published range. Once again, this is at the lower end of the direct elasticity ranges due to the coverage of the model, which includes areas poorly serviced by public transport such as regional areas.

Appendix Table B.43 - Public transport service level elasticities of demand for car and public transport travel - TFV's elasticity ranges

	Lower Range	Upper Range	Transport Model Elasticity
Daily PT Trips	0.2	0.6	0.16
Daily Car Trips *	-0.02	-0.07	-0.02 / -0.01

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Many of the public transport services in Melbourne operate at low frequencies of one or two services per hour, especially in off peak periods. With frequencies of one or two per hour, the headways reduce by only three to six minutes, from 30 or 60-minute headways. At the other extreme, a service with a frequency of six services per hour, the headways reduce by only one minute, from 10-minute headways. These changes are not expected to be big enough to have a significant impact on patronage.

Consequently, the model's elasticity of demand for public transport for service level changes is at the lower end of the range.

The cross-elasticity for daily car trips falls just within the lower end of the guideline's published ranges.

Public transport in-vehicle time

An increase of 10 per cent on the public transport in-vehicle time was tested in the model, which was applied uniformly across all public transport modes (including metropolitan trains, trams, buses, and airport buses, as well as regional trains, coaches and buses). The resultant elasticities for daily public transport trips as well as cross-elasticities for the corresponding daily car trips are shown in Appendix Table B.44.

Appendix Table B.44 - Public transport in-vehicle time elasticities of demand for car and public transport travel - TFV's elasticity ranges

	Lower Range	Upper Range	Transport Model Elasticity
Daily PT Trips	-0.1	-0.5	-0.48
Daily Car Trips *	0.01	0.06	0.05 / 0.04
Daily PT Passenger Km	For additional information		-0.97

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Appendix Table B.44 suggests that the transport model responds sensibly to changes in public transport in-vehicle time, with the resultant elasticities for trips falling within the TFV published ranges. In addition, the implied cross-elasticity of car trips shows a movement in the correct direction and expected scale.

Other

Several further measures were tested although there are no formal targets for this realism test in the TFV's guidelines. These are discussed below.

Value of time (Car)

An increase of 10 per cent of the value of time for car was tested in the model, which was applied to both the path-building and the generalised cost calculations. Appendix Table B.45 presents the car mode share (as a proportion of car, public transport, walking and cycling) in both the base case and +10 per cent value of time for cars, indicating a shift away from car usage when its value of time is increased.

Appendix Table B.45 - Value of time mode share impacts – car

	Assessment Measure	Transport Model Result
Car mode share	Shift Away from cars	Base Case: 77.55%, Test Case: 76.78%

Value of Time (Public Transport)

An increase of 10 per cent of the value of time for public transport was tested in the model, which was also applied to both the path-building and the generalised cost calculations. Appendix Table B.46 presents the public transport mode share in both the base and test cases.

Appendix Table B.46 - Value of time mode share impacts – public transport

	Assessment Measure	Transport Model Result
PT mode share	Shift Away from PT	Base Case: 9.07%, Test Case: 7.65%

Appendix Table B.46 indicates that a shift away from public transport is observed when its value of time is increased.

Zonal trip generation

An increase of 10 per cent to the population, employment and enrolment assumptions was tested, with a range of resultant global modelled statistics shown in Appendix Table B.47.

Appendix Table B.47 - Zonal trip generation global transport impacts

	Lower Range	Upper Range	Transport Model Result
Daily Car Trips	Increased Car Trips		964,000 (9%)
Daily PT Trips	Increase PT Trips		186,000 (11%)
Length of Congested Road	Increase congestion (V/C > 1)		1,130,000 (22%)
Metropolitan rail service km crowded	Increased crowding (Load > 1000 passengers per train)		1,450,000 (45%)

Car trips are shown to increase by approximately 9 per cent, while public transport trips increase by approximately 11 per cent. The number of car kilometres travelled in congested conditions (where the Volume/Capacity Ratio is greater than 1.0) and metropolitan rail kilometres travelled in crowded conditions (that is, exceeding 1,000 passengers per train) are also shown to increase substantially.

Volume delay function (speed-flow curves on freeways)

The speed-flow curves on freeway links were reduced by 10 per cent across the model to gauge the model's sensitivity to changes in the volume delay function. This was applied to the entire speed flow curve.

The TFV guidelines recommend that this test be performed for a traffic assignment only. As there are no specific metrics required for reporting, VLC has prepared the change in total daily vehicle kilometres travelled on both freeway and non-freeway links in Appendix Table B.48. This indicates a diversion away from links with reduced free flow speeds on freeways.

Appendix Table B.48 - Freeway volume delay function transport impacts – traffic assignment only

	Assessment Measure	Transport Model Result
Daily Total Vehicle Km Travelled on Freeway Links	Shift away from Freeway Links	-2,899,000 (-7%)
Daily Total Vehicle Km Travelled on Non-Freeway Links	Shift to Non-Freeway Links	2,274,000 (2%)

Toll prices

Appendix Table B.49 shows the toll demand elasticity calculated when comparing the base demand and the demand when tolls are increased by 20 per cent. These results show that the modelled demand on CityLink is more sensitive to toll prices than that on EastLink. It also shows that heavy commercial vehicles are effectively inelastic to changes in toll prices than other vehicles.

Appendix Table B.49 - Toll demand elasticities

	CityLink			EastLink		
	Base Demand	**Demand with 20% Increased Tolls**	**Calculated Elasticity**	**Base Demand**	**Demand with 20% Increased Tolls**	**Calculated Elasticity**
Total	754,184	730,997	-0.2	1,193,934	1,168,602	-0.1
HCV	99,311	99,854	0.0	100,376	99,652	0.0

Summary of elasticities by time-period

The following tables present the direct and cross-elasticities by time of day.

Appendix Table B.50 - Fuel price elasticities of demand for car and public transport travel by time of day

Fuel Price (+10%) Elasticity	Car Km Travelled	PT Passenger Kms*	Car Trips
AM Peak (7am - 9am)	-0.34	1.79 / 0.19	-0.05
Inter Peak (9am - 4pm)	-0.34	1.79 / 0.31	-0.06
PM Peak (4pm - 6pm)	-0.33	1.73 / 0.17	-0.05
Evening Off Peak (6pm - 7am)	-0.32	1.68 / 0.38	-0.06
Daily (24hr)	-0.33	1.73 / 0.26	-0.06

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Appendix Table B.51 - Parking charge price elasticities of demand for car and public transport travel by time of day

Parking Charges (+10%) Elasticity	Car Commuting Trips to the CBD and Inner	PT Commuting Trips to the CBD and Inner*
AM Peak (7am - 9am)	-0.52	0.69 / 0.31
Inter Peak (9am - 4pm)	-0.49	0.64 / 0.53
PM Peak (4pm - 6pm)	-0.36	0.47 / 0.29
Evening Off Peak (6pm - 7am)	-0.41	0.54 / 0.56
Daily (24hr)	-0.46	0.61 / 0.39

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Appendix Table B.52 - Car In-vehicle time elasticities of demand for car and public transport travel by time of day

Car In-Vehicle Time (+10%) Elasticity	Car Trips	PT Trips *	Car Km Travelled
AM Peak (7am - 9am)	-0.14	1.28 / 0.33	-0.50
Inter Peak (9am - 4pm)	-0.14	1.3 / 0.29	-0.49
PM Peak (4pm - 6pm)	-0.14	1.25 / 0.31	-0.50
Evening Off Peak (6pm - 7am)	-0.15	1.35 / 0.41	-0.45
Daily (24hr)	-0.14	1.3 / 0.33	-0.48

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Appendix Table B.53 - Public transport Fare elasticities of demand for car and public transport travel by time of day

PT Fares (+10%) Elasticity	PT Trips	Car Trips *	Car Trips (Based on Zenith Data)
AM Peak (7am - 9am)	-0.19	0.02 / 0.02	0.02
Inter Peak (9am - 4pm)	-0.19	0.02 / 0.01	0.01
PM Peak (4pm - 6pm)	-0.19	0.02 / 0.02	0.02
Evening Off Peak (6pm - 7am)	-0.21	0.02 / 0.02	0.02
Daily (24hr)	-0.20	0.02 / 0.02	0.02

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Appendix Table B.54 - Public transport service level elasticities of demand for car and public transport travel by time of day

PT Service Levels (+10%) Elasticity	PT Trips	Car Trips *	Car Trips (Based on Zenith Data)
AM Peak (7am - 9am)	0.15	-0.02 / -0.02	-0.02
Inter Peak (9am - 4pm)	0.16	-0.02 / -0.01	-0.01
PM Peak (4pm - 6pm)	0.13	-0.01 / -0.02	-0.02
Evening Off Peak (6pm - 7am)	0.18	-0.02 / -0.02	-0.02
Daily (24hr)	0.16	-0.02 / -0.01	-0.01

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Appendix Table B.55 - Public transport In-vehicle time elasticities of demand for car and public transport travel by time of day

PT In-Vehicle Time (+10%) Elasticity	PT Trips	Car Trips *	PT Passenger Km
AM Peak (7am - 9am)	-0.48	0.05 / 0.07	-0.93
Inter Peak (9am - 4pm)	-0.42	0.05 / 0.03	-0.98
PM Peak (4pm - 6pm)	-0.50	0.06 / 0.07	-0.93
Evening Off Peak (6pm - 7am)	-0.53	0.06 / 0.04	-1.06
Daily (24hr)	-0.48	0.05 / 0.04	-0.97

Note - * TFV implied cross-elasticity / Zenith actual cross-elasticity

Comments on draft TFV guidance

VLC was invited by TfV and DEDJTR to provide comments on their draft strategic transport model elasticity guidelines, which are listed below:

Question 1

DEDJTR cross-elasticity calculation assumes 100% diversion rate between car and public transport trips, and it makes no allowance for active transport modes (walking and cycling). Also, cross-elasticity is less transferable than direct elasticities – *Recommendation: cross-elasticity should be output for added information* only, therefore remove upper and lower bounds for cross-elasticity criteria

TfV/DEDJTR Response: As the guidelines state, the primary validation of elasticities should be based on direct elasticities. Reporting of cross-elasticities is for added information only. The cross-elasticity ranges provided are noted as indicative and the assumptions behind their derivation is stated. We will add commentary to reflect that models including non-motorised mode choice could be expected, ceteris paribus, to have lower cross-elasticities.

Question 2

Direct elasticity upper and lower bounds for Melbourne do not always reflect the ranges provided in Table A1 of the Draft guidance (referencing Wallis (2004), NGTSM (2006) and WebTAG (2014)) – *Recommendation: provide evidence for variation from Table A1 in the development of elasticity ranges for Melbourne*

TfV/DEDJTR Response: In developing the guideline ranges, in addition to referencing the national and overseas guidelines in Table A1, a literature review has also been undertaken. It is intended that evidence for variation to the ranges in Table A1 will be published in a second document.

Question 3

DEDJTR guidance should address all strategic transport models, now and into the future, that is, it should be appropriate for all strategic transport models, not just VITM. – *Recommendation: remove specific reference to VITM, especially in table notes*

TfV/DEDJTR Response: The guidelines are intended to apply to all strategic models. Reference to VITM is provided for example only - this will be made more clear.

Question 4

It is not clear in the tables whether Cars refers to Cars or the number of persons in Cars. For example, car trips or person car trips. – *Recommendation: clarify whether Car trips and Car kilometres travelled are person Car trips and person Car kilometres or not*

TfV/DEDJTR Response: Reference to 'cars' relates to car trips, not person car trips - this will be clarified.

Question 5 & 6

The ‘volume delay function’ realism test is to be run as a traffic assignment only. However, this does not evaluate the impact of mode choice, where public transport is a viable option. – *Recommendation: change the volume delay function’ realism test to be a full model run*

The ‘volume delay function’ realism test does not provide a specific metric to measure the impact. – *Recommendation: use VKTs*

TfV/DEDJTR Response: The 'volume delay function' realism test is intended to test traffic assignment in isolation, in line with the 2015 NGTSM guidelines validation approach. How to report the impact will be specified in more detail.

Question 7

No specific definition has been provided for “Service km crowded by PT mode” for the Zonal Trip Generation test, such as V/C >1 where C = seating capacity, load standard, crush capacity or an alternative. – *Recommendation: define measure for a crowded PT situation, possibly seating capacity*

TfV/DEDJTR Response: A specific measure of PT crowding will be defined.

Question 8

There is no mention of the Transport Modelling steering committee. – *Recommendation: In the preamble, it would be worth confirming whether or not this draft guidance has been approved for use by the Transport Modelling Steering Committee.*

TfV/DEDJTR Response: Guidelines will be discussed at the next transport modelling steering committee meeting. Outcomes will be reflected in guideline documentation.

Question 9

Overall there is a need for DEDJTR to collect and collate local advice on elasticity ranges for Melbourne and Victoria. There is probably a role for Universities in Melbourne to play (for example, Professor Graham Currie at Monash University has done a lot of work on public transport direct and cross-elasticities specifically for Melbourne).

TfV/DEDJTR Response: Agree this is a desirable long term initiative.

Appendix B5: Origin Destination validation

Appendix Table B.56 - Observed AM Peak (7am – 9am) Origins and destinations for the Eastern Freeway

	East of Springvale Rd	Springvale Rd	Blackburn Rd	Middleborough Rd	Tram Rd	Elgar Rd	Doncaster Rd	Bulleen Rd	Burke Rd	Chandler Hwy	West of Chandler Hwy	Total
East of Springvale Rd	-	1,000	-	700	1,500	-	700	1,400	-	800	2,100	**8,200**
Springvale Rd	1,100	-	-	200	500	-	400	600	-	300	1,000	**4,200**
Blackburn Rd	-	-	-	200	400	-	200	200	-	200	600	**1,800**
Middleborough Rd	700	300	100	-	300	-	200	300	-	200	600	**2,600**
Tram Rd	900	600	200	200	-	-	-	-	-	-	-	**1,900**
Elgar Rd	-	-	-	-	-	-	100	300	-	200	500	**1,000**
Doncaster Rd	600	400	100	200	-	200	-	100	-	200	600	**2,400**
Bulleen Rd	1,200	700	200	300	-	400	100	-	-	300	1,300	**4,500**
Burke Rd	-	-	-	-	-	-	-	-	-	100	500	**600**
Chandler Hwy	600	300	100	100	-	200	100	100	100	-	300	**2,000**
West of Chandler Hwy	1,500	900	300	400	-	800	300	300	400	1,200	-	**6,100**
Total	**6,600**	**4,200**	**1,000**	**2,400**	**2,800**	**1,600**	**2,200**	**3,200**	**500**	**3,400**	**7,500**	**35,300**

Appendix Table B.57 - Modelled AM Peak (7am – 9am) Origins and destinations for the Eastern Freeway

	East of Springvale Rd	Springvale Rd	Blackburn Rd	Middleborough Rd	Tram Rd	Elgar Rd	Doncaster Rd	Bulleen Rd	Burke Rd	Chandler Hwy	West of Chandler Hwy	Total
East of Springvale Rd	-	900	-	1,000	1,200	-	900	1,100	-	900	1,900	**8,000**
Springvale Rd	1,000	-	-	100	100	-	300	400	-	300	1,200	**3,400**
Blackburn Rd	-	-	-	100	400	-	100	100	-	200	800	**1,800**
Middleborough Rd	1,300	100	100	-	300	-	100	100	-	200	700	**2,900**
Tram Rd	800	200	100	100	-	-	-	-	-	-	-	**1,200**
Elgar Rd	-	-	-	-	-	-	100	100	-	100	400	**700**
Doncaster Rd	1,000	500	100	100	-	100	-	<50	-	200	1,300	**3,400**
Bulleen Rd	1,100	500	200	300	-	300	100	-	-	600	2,000	**5,100**
Burke Rd	-	-	-	-	-	-	-	-	-	300	600	**900**
Chandler Hwy	500	300	100	100	-	200	200	200	200	-	500	**2,300**
West of Chandler Hwy	1,200	800	500	400	-	800	800	700	600	600	-	**6,600**
Total	**7,100**	**3,300**	**1,100**	**2,200**	**2,000**	**1,400**	**2,600**	**2,800**	**800**	**3,500**	**9,400**	**36,100**

Appendix Table B.58 - Observed PM Peak (4pm – 6pm) Origins and destinations for the Eastern Freeway

	East of Springvale Rd	Springvale Rd	Blackburn Rd	Middleborough Rd	Tram Rd	Elgar Rd	Doncaster Rd	Bulleen Rd	Burke Rd	Chandler Hwy	West of Chandler Hwy	Total
East of Springvale Rd	-	1,200	-	600	900	-	700	1,300	-	600	1,800	**7,200**
Springvale Rd	900	-	-	200	500	-	400	500	-	300	1,100	**4,000**
Blackburn Rd	-	-	-	100	200	-	200	200	-	100	300	**1,100**
Middleborough Rd	500	200	200	-	200	-	200	300	-	100	400	**2,100**
Tram Rd	1,400	700	500	500	-	-	-	-	-	-	-	**3,100**
Elgar Rd	-	-	-	-	-	-	100	400	-	200	700	**1,400**
Doncaster Rd	700	500	200	200	-	100	-	100	-	100	500	**2,500**
Bulleen Rd	800	400	100	100	-	100	100	-	-	200	500	**2,300**
Burke Rd	-	-	-	-	-	-	-	-	-	100	700	**800**
Chandler Hwy	700	400	100	200	-	100	100	300	100	-	900	**2,900**
West of Chandler Hwy	2,700	1,300	600	600	-	500	500	1,600	600	1,200	-	**9,600**
Total	**7,800**	**4,600**	**1,800**	**2,500**	**1,800**	**900**	**2,400**	**4,600**	**700**	**2,900**	**6,900**	**37,000**

Appendix Table B.59 - Modelled PM Peak (4pm – 6pm) Origins and destinations for the Eastern Freeway

	East of Springvale Rd	Springvale Rd	Blackburn Rd	Middleborough Rd	Tram Rd	Elgar Rd	Doncaster Rd	Bulleen Rd	Burke Rd	Chandler Hwy	West of Chandler Hwy	Total
East of Springvale Rd	-	1,100	-	1,400	800	-	1,000	1,200	-	600	1,400	**7,500**
Springvale Rd	1,000	-	-	200	200	-	500	500	-	300	900	**3,600**
Blackburn Rd	-	-	-	<50	200	-	100	200	-	100	500	**1,100**
Middleborough Rd	1,200	100	100	-	200	-	100	300	-	200	400	**2,500**
Tram Rd	1,400	200	300	200	-	-	-	-	-	-	-	**2,100**
Elgar Rd	-	-	-	-	-	-	100	400	-	100	700	**1,400**
Doncaster Rd	1,000	300	100	100	-	100	-	100	-	200	800	**2,700**
Bulleen Rd	1,000	300	100	100	-	100	<50	-	-	300	900	**3,000**
Burke Rd	-	-	-	-	-	-	-	-	-	200	600	**800**
Chandler Hwy	700	200	100	100	-	100	200	300	<50	-	800	**2,600**
West of Chandler Hwy	2,300	1,300	1,100	800	-	500	1,600	2,200	1,200	800	-	**11,900**
Total	**8,600**	**3,500**	**1,900**	**3,000**	**1,300**	**800**	**3,700**	**5,200**	**1,200**	**3,000**	**7,000**	**39,200**

Appendix C: Model development

C.1 Introduction

The primary focus of this appendix is the documentation of the 2026 and 2036 future base case transport model development and assumptions for the North East Link EES.

C.1.1 Appendix structure

The balance of this appendix is structured as follows:

Section C.2 – A background on the Zenith Transport Model and the transport modelling process

Section C.3 – A summary of the upgrades made to the model for North East Link

Section C.4 – A summary of the future year demographic, land use and network assumptions

Section C.5 – A summary of North East Link network assumptions.

C.2 The Zenith transport model

C.2.1 Geographical coverage of the Zenith model

The model utilises a travel zone system which was originally developed specifically for large infrastructure projects in Victoria. It is based on an aggregation of the Zenith Small Area Travel Zone System. There are 3,477 zones in total across Melbourne and the regional cities of Geelong, Ballarat, Bendigo and Traralgon, as seen in Appendix Figure C.1. Travel zones outside of this area are not expected to impact the assessment of North East Link and have been removed to improve model run time. The level of zone disaggregation in the inner suburbs of Melbourne can be seen in Appendix Figure C.2.

The demographic, land use and enrolment data were supplied at the MITM 3,098 (Melbourne-wide only) travel zone system. These were then converted into the Zenith 3,477 zone system, which has a larger spatial coverage (including areas of regional Victoria).

As the geographic coverage is different, those areas without data provided, including regional cities (such as Geelong, Ballarat and Bendigo) were derived from Victoria in Future (VIF) 2015 forecasts at LGA and SA4 levels.

Appendix Figure C.1 - The Standard Zenith travel zone system – model wide

Appendix Figure C.2 - The Standard Zenith travel zone system – MSD

C.3 Local area model calibration

As part of strategic transport modelling undertaken for North East Link, the Zenith transport model has undergone several calibration and validation upgrades to improve its overall reflection of travel behaviour at the study area level. The key upgrades are summarised below:

Commercial vehicle upgrades

- Toll elasticities – To assess the commercial vehicle toll elasticity to changes in toll prices, where available, observed transactions on roads were analysed where toll prices had changed. It was concluded that for a typical weekday, the toll elasticity of commercial vehicle transactions was between -0.04 and -0.08. As a result, the Zenith toll diversion parameters for commercial vehicles were recalibrated, resulting in base year HCV elasticity to toll price changes changing from approximately -0.20 to -0.05.

- Melbourne Market matrix – The Melbourne Market (Melbourne's wholesale fruit, vegetable and flower market) provided aggregated commercial vehicle data by postcode, which allowed for distribution of the 2,500 truck entries and exits. This was used to calibrate a Melbourne Market commercial vehicle trip matrix.

- Truck adjustment matrix – Camera Origin-Destination surveys undertaken by NELP indicated that approximately one-third of the trucks using Rosanna Road are through trips, travelling between the M80 Ring Road/Greensborough Bypass and Bulleen Road/Eastern Freeway. A commercial vehicle adjustment matrix was calibrated, which allocated approximately 1,000 commercial vehicle trips each way along this corridor. This matrix allowed for an improved replication of longer, cross-town truck trips through the project corridor in line with the Origin-Destination survey results.

Local area upgrades

- Travel time and link capacity review – In 2017/18 a variety of traffic counts and travel time surveys were received from NELP. This was used for a review of both the link free-flow speeds and capacities in the study area
- Yarra River skim adjustment – To address an over-estimation of traffic volumes crossing the Yarra River, a 'skim adjustment matrix' was implemented to dampen demand for these movements, leading to improved model travel time and validation

Each of these calibration and validation upgrades to the 2016 base year model were maintained in the forecasting scenarios.

C.4 Base case future year assumptions

This section identifies the transport model assumptions used in the future base case scenarios.

The forecast year 2036 was determined to be the core evaluation year for the EES, as it coincides with TfV's transport modelling reference case. Scenarios representing 2026 were additionally developed to assist the EES team in analysing expected traffic growth. While modelling assumptions are provided for alternative forecast years (up to 2051) in the TfV transport modelling reference case, they were not required during the EES.

The TfV transport modelling reference case was used for the majority of the future base case assumptions. These are listed in detail in the following documents:

1. TfV transport modelling reference case v1.09, Interim Road Networks (170710) & VIF2015 Land Use, by TfV, received 12 July 2017
2. 20150417 - Copy of (DOC-15-101558) -- MM Demand Forecast Spec Ver A1, 17 April 2015, PTV

Appendix Table C.1 summarises the sources of the key transport model assumptions.

Appendix Table C.1 - Sources of model assumptions

Model component	Assumption source
Demographics land use	TfV transport modelling reference case, using Victoria in Future (VIF2015)
Road network	TfV transport modelling reference case, road project list
Public transport network	TfV transport modelling reference case, using Melbourne Metro (now Metro Tunnel Project) rail, tram and bus service plans
Commercial vehicle demand	TfV transport modelling reference case, with adjustments as instructed by TfV
Airport passenger demand	TfV transport modelling reference case, using PwC 2014 air side/land side analysis for MRL
Fuel prices	NELP business case advisors, using forecasts by World Bank and EIA
Parking costs	TfV transport modelling reference case, using forecasts by Frontier Economics
Public transport fares	TfV transport modelling reference case, committed increases only

The TfV transport modelling reference case which underpinned the modelling assumptions are contained in Appendix C1: TfV transport modelling reference case. However, in some cases these assumptions were modified by the project team and the reasons for these changes are described in the following sections.

C.4.1 Demographics

C.4.1.1 Demographic information used

TfV provided demographic, land use and enrolment forecasts as part of its transport modelling reference case, based on Victoria In Future 2015 forecasts. These were provided at the MITM travel zone level, representing 3,098 travel zones in the MSD. This information was then converted to the Zenith standard travel zone system.

The population and employment assumptions for each Local Government Area (LGA) are detailed in Appendix Table C.11 and Appendix Table C.12 of Appendix C2: Demographic and land use assumptions. The TfV reference numbers for each dataset are listed in Appendix Table C.2 below.

Appendix Table C.2 - Transport modelling reference case demographic and land use data, representing VIF2015

Input Data Files	File Name	Date Received	Details / WorkSheet
Population & Employment	Demographic_w_ICSplit_2026_Z3098.dbf, Demographic_w_ICSplit_2036_Z3098.dbf	12/07/2017	VIF2015

Source: TfV Transport Modelling Reference Case, v1.09

C.4.1.2 Adjustments to the demographic information used

The majority of demographic and land use projection variables supplied were directly translated into the model. However, a small number of adjustments to the data provided were essential in order to be fully concordant with the variable definitions required and larger model zone system utilised. These are discussed in the following sections.

Total cars

As car ownership is required for each travel zone, the decision was made to take the car ownership levels from the Australian Bureau of Statistics (ABS) Census of Population and Housing. This was then grown to forecast levels using forecasted driving age population figures, thus maintaining the number of cars per driving population within each zone.

This enables the use of varying car ownership levels that exist due to geographic and transport differences and to apply it to the new demographic data to determine the average number of cars per household for each travel zone.

Enrolments

Tertiary enrolment data provided by TfV (which has historically been produced by SGS Economics & Planning) has not been directly concordant for use in the Zenith model due to a difference between definitions of tertiary enrolments.

It is understood that the tertiary enrolments include students with at least one hour per week over the year. For example, if someone had completed a one-week training course they would be included as a single tertiary enrolment. Over a year, if 30 people had completed 30 consecutive one-week training courses, they would equate to 30 tertiary enrolments. At any time, only one person would be travelling to the training course per day, so (for transport modelling purposes) a total of 30 tertiary enrolments would not reflect the number of students utilising the tertiary institution on a typical weekday, which is what the model results represent.

For the base year, suitable figures were obtained from 2016 Australian Curriculum, Assessment and Reporting Authority (ACARA) tertiary enrolments. The population growth rates for the 18-64 aged dependents cohort (from VIF2015) to each forecast year was used to estimate the growth in tertiary enrolments. In terms of primary and secondary school enrolments, 2016 ACARA enrolments were used, and population growth rates for the 0-17 aged dependents applied as they are reported in VIF2015. This dataset includes enrolments in government and non-government primary and secondary schools, and their respective addresses.

Employment blue / white collar categories by individual industry

The Zenith model requires the employment categories to be split into blue and white collar professionals by individual industry and the occupation that individual has within that industry. For example, an agricultural worker can be either a white collar or blue collar worker, depending on their occupation. Blue and white collar employment ratios were obtained from the ABS Census for each industry category and applied respectively to forecast employment totals by industry.

National employment and innovation clusters and metropolitan activity centres

North East Link would be impacted by the proposed development of the La Trobe national employment and innovation cluster (NEIC) and a number of nearby metropolitan activity centres (MAC). Following a desktop review, each of these clusters and centres were identified and it was concluded that the residential population and employment growth included in the TfV transport modelling reference case assumptions reflected these clusters and centres, including:

- La Trobe NEIC
- Box Hill MAC
- Epping MAC
- Ringwood MAC.

C.4.2 Transport network

The Zenith model's transport network contains freeways, arterial and collector roads, railway lines and road infrastructure dedicated to the use of trams and buses. It also includes details of all public transport routes, stop locations, service frequencies and stopping patterns by time of day, along with some key shared paths (bicycle and walking only routes). The transport network assumptions in the future base cases are described in the following sections.

C.4.2.1 Road network

Future year road assumptions were provided in TfV's transport modelling reference cases, as documented in the following report:

- **TfV transport modelling reference case v1.09 interim road networks (170710)** – an interim version of road project assumptions. This update included road project assumptions for each forecast year. This was the primary document used to inform the road network assumptions.

This road list is included in Appendix Figure C.15 of Appendix C1: TfV transport modelling reference case.

These assumptions were reviewed and in consultation with the North East Link project team, TfV and VicRoads, a series of minor amendments were made. In addition, the VicRoads *Melbourne road projects* page on the VicRoads website was consulted and contained some shorter-term projects not captured within the TfV transport modelling reference case. These additional projects are listed in Appendix C3: VicRoads Melbourne road projects road list. Lists of the adopted future year road projects in the North East Link model are listed in Appendix Table C.14, Appendix Table C.15 and Appendix Table C.16 of Appendix C4: Future road network for modelling purposes only.

Appendix Figure C.3 to Appendix Figure C.4 highlight the road network changes between each of the 2016, 2026 and 2036 modelled years. While these road network assumptions include many road upgrades that could be expected under a 'business as usual' regime, they have been created for transport modelling and planning purposes and do not necessarily represent future commitments regarding capital spending or infrastructure works.

Key projects in the base case include:

- CityLink-Tulla widening (West Gate Freeway to Melbourne Airport)
- M80 Upgrade (West Gate Freeway/ Princes Freeway West to Greensborough Highway)
- West Gate Tunnel
- Monash Freeway upgrade
- Aitken Boulevard (E14).

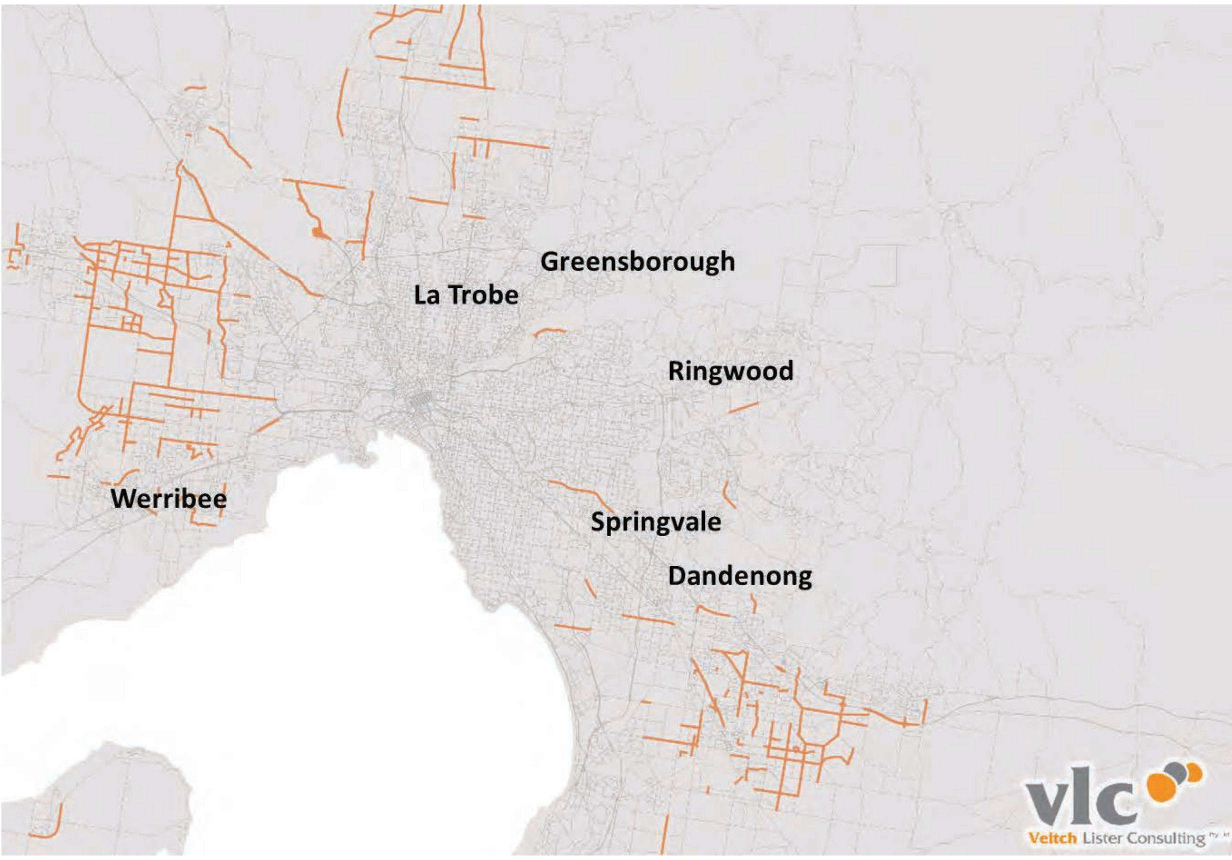
Key projects excluded from the future base cases are:

- North East Link ('the project')
- Craigieburn Bypass widening
- EastLink widening
- Williamsons Road Fitzsimons Lane widening
- East West Link – Western Section (WestLink) and Eastern Section
- Outer Metropolitan Ring (OMR) Road, including E6.

Appendix Figure C.3 - Key road network improvements 2016 to 2026

Source: TfV transport modelling reference case

Appendix Figure C.4 - Key road network improvements 2026 to 2036

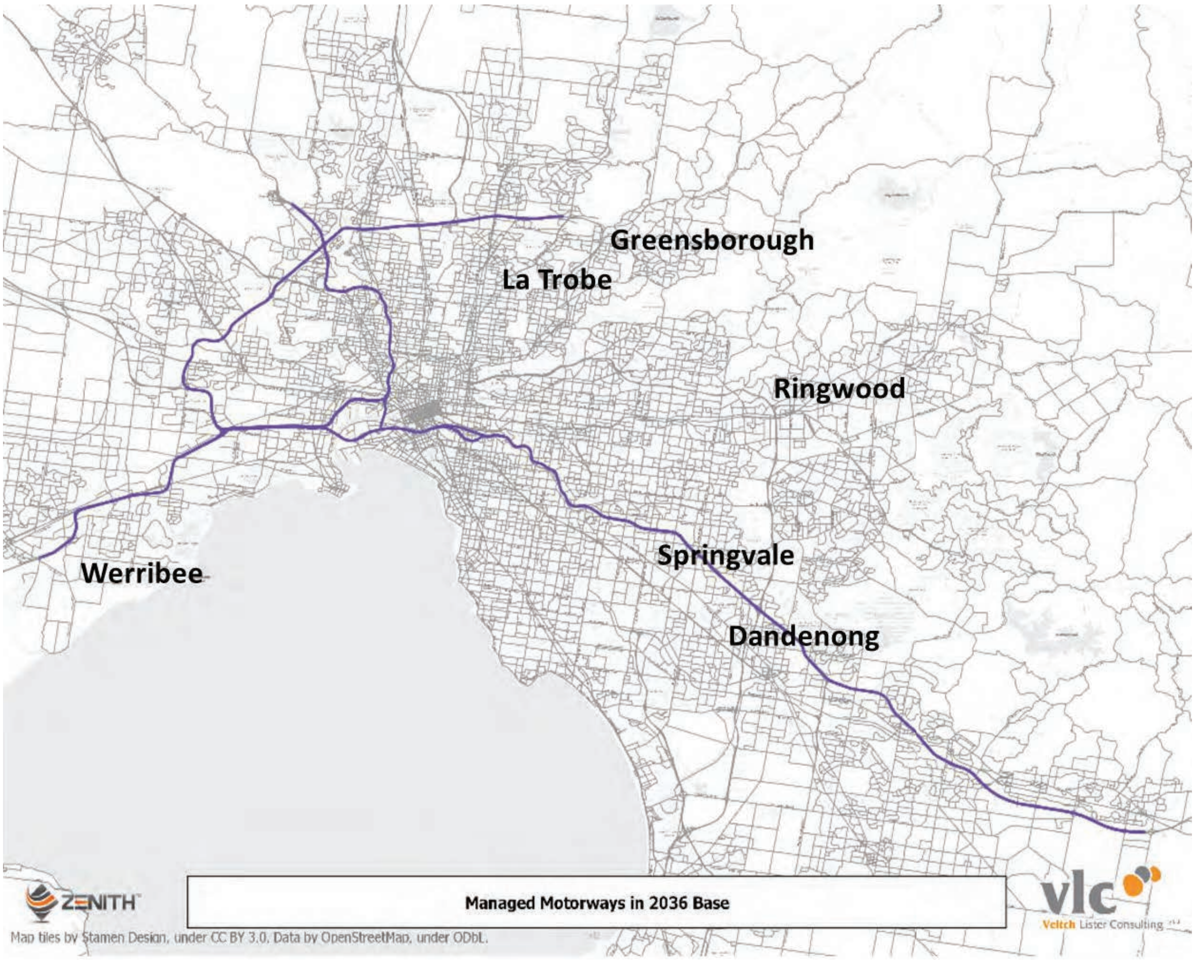


Source: TfV transport modelling reference case

Freeway management system

Future year freeway management system assumptions were provided by VicRoads and can be seen in Appendix Figure C.5. These included committed upgrades along the M1 corridor, CityLink-Tulla Widening, Western and Metropolitan Ring Road and the West Gate Tunnel.

Appendix Figure C.5 - Extent of the freeway management system improvements



Source: VicRoads

Key projects excluded from the future base cases are:

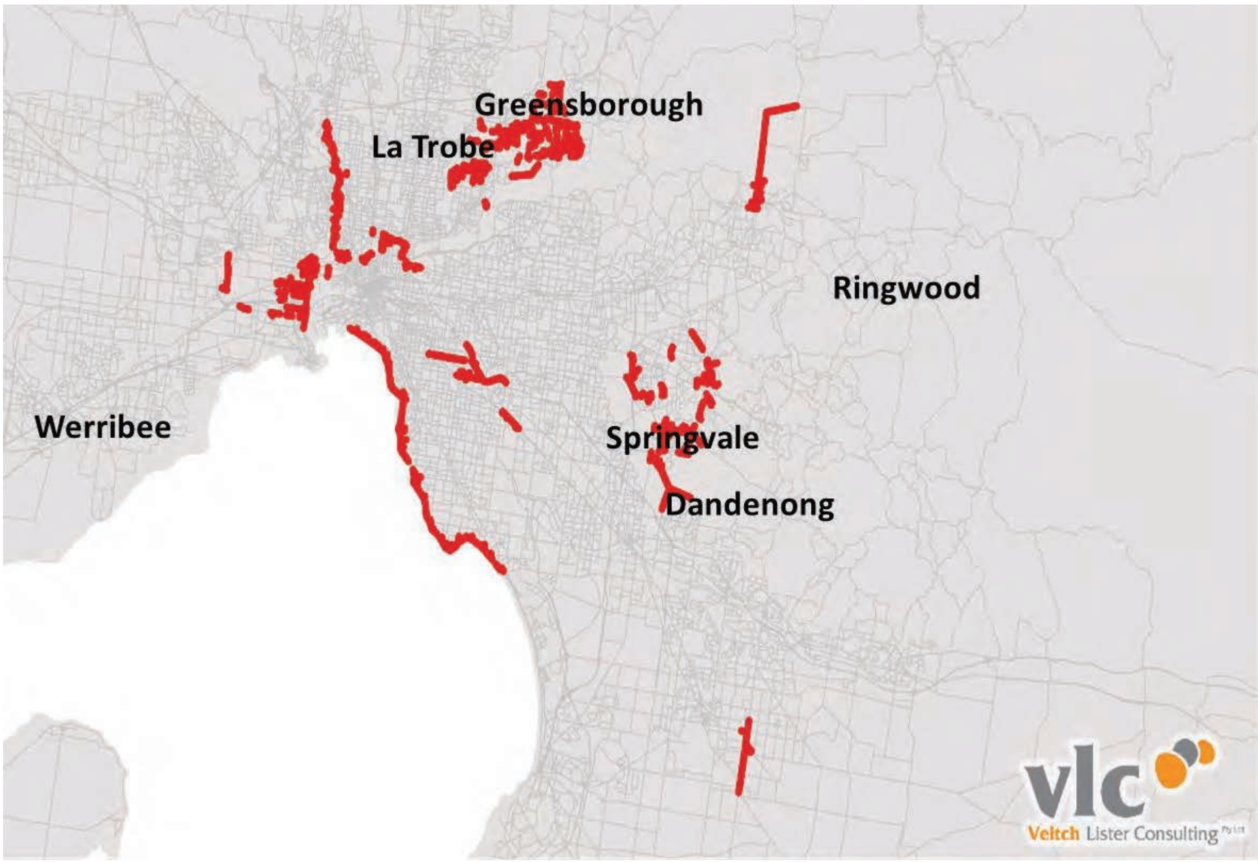
- North East Link (the Project)
- Eastern Freeway (the Project)
- EastLink
- Hume Freeway
- Peninsula Link.

Commercial vehicle bans

The Zenith model's transport network also contains commercial vehicle bans, reflecting curfews and infrastructure constraints. Appendix Figure C.6 depicts the bans assumed beyond the base year.

These bans are outlined in detail in Appendix C5: Commercial vehicle bans, including the VicRoads North East truck curfews.

Appendix Figure C.6 - Modelled commercial vehicle bans and curfews



Source: VicRoads

C.4.2.2 Public transport

The public transport rail specifications were provided by PTV, detailing a listing of the proposed upgrades to the public transport system; including – as of 2026 – the Metro Tunnel Project. These are consistent with the Metro Tunnel Project Business Case and have been adopted for the North East Link base cases. The public transport service plans details are outlined in Appendix Table C.3.

Appendix Table C.3 - Source of public transport service plans

Input Data Files	File Name	Date Received	Details / WorkSheet
Public Transport Projects	**Rail (2026, 2036):** 20150810 - MM-Train Service Specifications-STAGEB-2015-07-17 v11.XLSX TFV Ref Case v1.09_NELA.pdf	17/07/2015 02/06/2017	"STAGEB_MM-1C_2031" used for 2026 "STAGEB_MM-2B_2031" used for 2036
	Tram (2026, 2036): Melbourne Rail Link (MRL) Stage B - Tram Service Specifications - MRL Parkville ~141017 TFV Ref Case v1.09_NELA.pdf	14/10/2014 02/06/2017	As used in the MRL project with modifications as specified by the TFV Reference Case v1.09_NELA
	Bus (2026, 2036): Bus Changes MRL Stage B and NORTHERN GROWTH AREA ADDITIONS and WALLAN_BUS_CHANGES TFV Ref Case v1.09_NELA.pdf	14/10/2014 02/06/2017	As used in the MRL project with modifications as specified by the TFV Reference Case v1.09_NELA

Source: TfV transport modelling reference case

Appendix Table C.20 and Appendix Table C.21 of Appendix C6: Public transport service plans contain the source PTV rail service plans (metropolitan and regional). These plans include assumptions surrounding route extensions, city loop direction and average headway for each time period, along with seating and crush capacities.

Key projects included in the base case rail service plans are:

- Fare Zone change to remove Zone 2 (by extending the Zone 1 / 2 overlap)
- Regional Rail Link
- Mernda Extension
- Metro Tunnel
- Baxter extension
- Wallan electrification
- Melton electrification

The following projects have been excluded from the base cases:

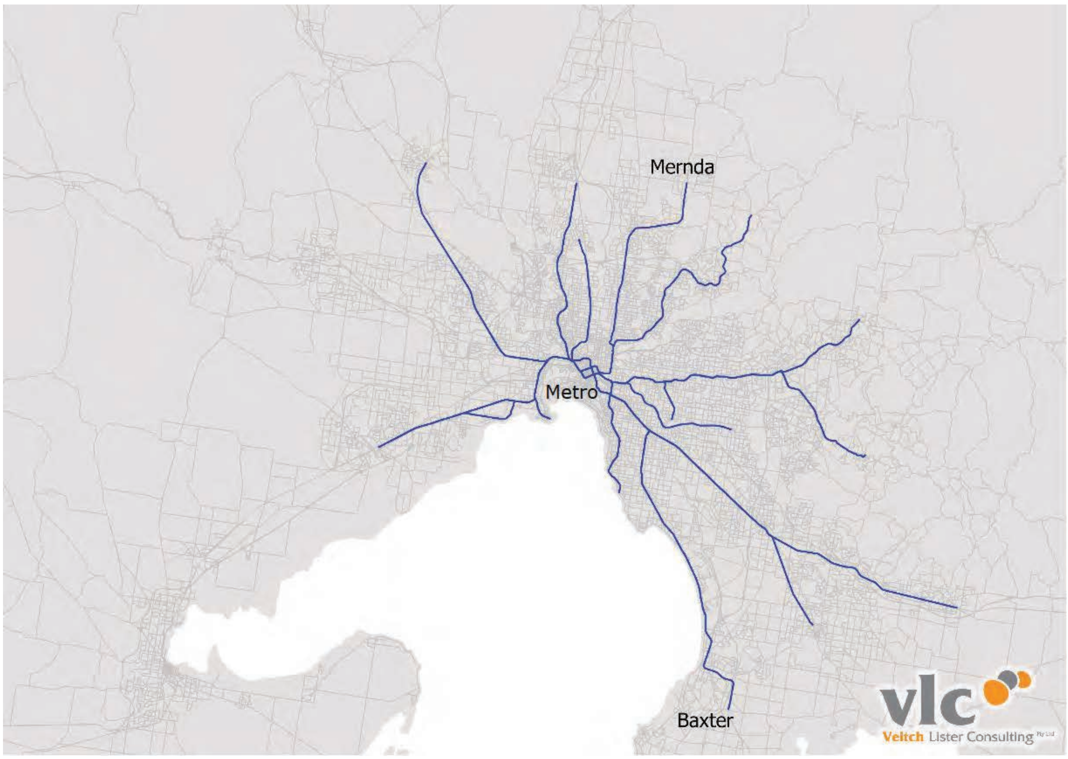
- Melbourne Airport Rail Link
- Avalon Airport Rail Link
- Rowville rail/tram
- Clyde electrification and extension
- Clifton Hill Metro, Melbourne Metro 2 from Clifton Hill to Newport
- Suburban rail loop
- Doncaster rail
- Geelong electrification

- Pakenham East electrification and extension
- Wollert extension.

Rail service plan

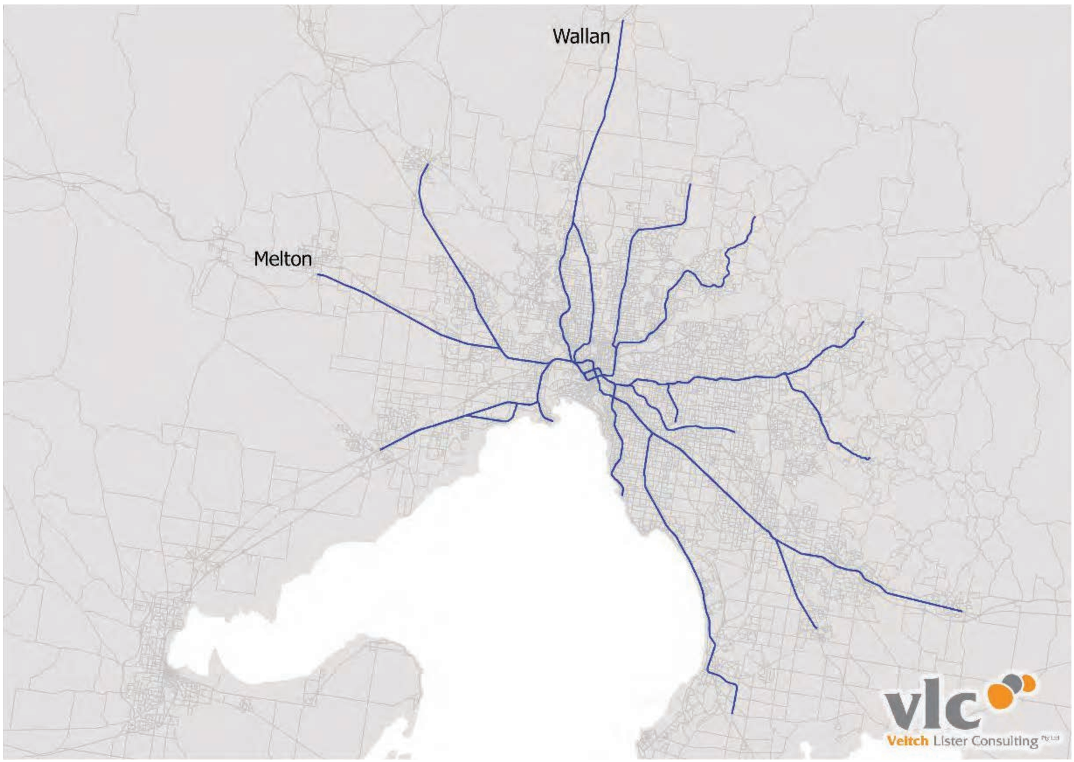
Appendix Figure C.7 to Appendix Figure C.8 depict the 2026 and 2036 modelled base case metropolitan rail networks, with key upgrades and projects labelled.

Appendix Figure C.7 - Metropolitan rail network configuration in 2026 base case



Source: TfV transport modelling reference case

Appendix Figure C.8 - Metropolitan rail network configuration in 2036 base case



Source: TfV transport modelling reference case

These service plans have been created for transport modelling and planning purposes, and do not necessarily represent future commitments regarding capital spending or infrastructure works.

New metropolitan rail stations

New or upgraded train stations included in the 2036 future base case are listed below:

Recently completed

- South Morang
- Williams Landing
- Cardinia Road
- Lynbrook
- Southland Shopping Centre

Mernda extension

- Mernda
- Williamsons Road

Metro Tunnel project

- North Melbourne (new)
- Parkville

Wallan

- Donnybrook
- Lockerbie
- Beveridge
- Wallan

Melton

- Caroline Springs
- Deer Park
- Melton
- Rockbank
- Toolern

Other

- State Library
- Town Hall
- ANZAC
- Calder Park
- Werribee East
- Campbellfield
- Ardeer

Tram

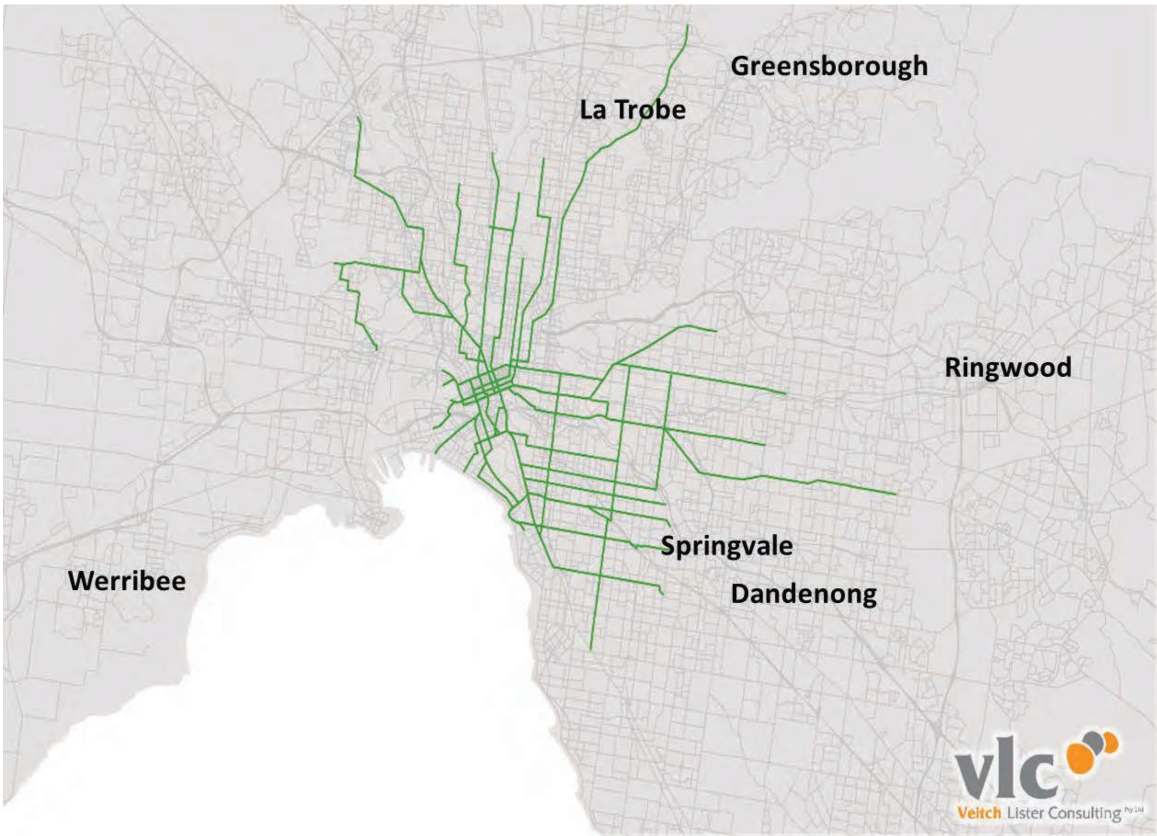
Appendix Figure C.9 and Appendix Figure C.10 show the tram networks assumed for the 2026 and 2036 base cases.

The tram networks were based on the PTV Tram service plan (Appendix Table C.22 of Appendix C6: Public transport service plans). These networks were then adapted to follow the assumptions detailed in the TfV transport modelling reference case (Appendix C1: TfV transport modelling reference case, v1.09).

Key projects included in the future base case scenario tram service plans include:

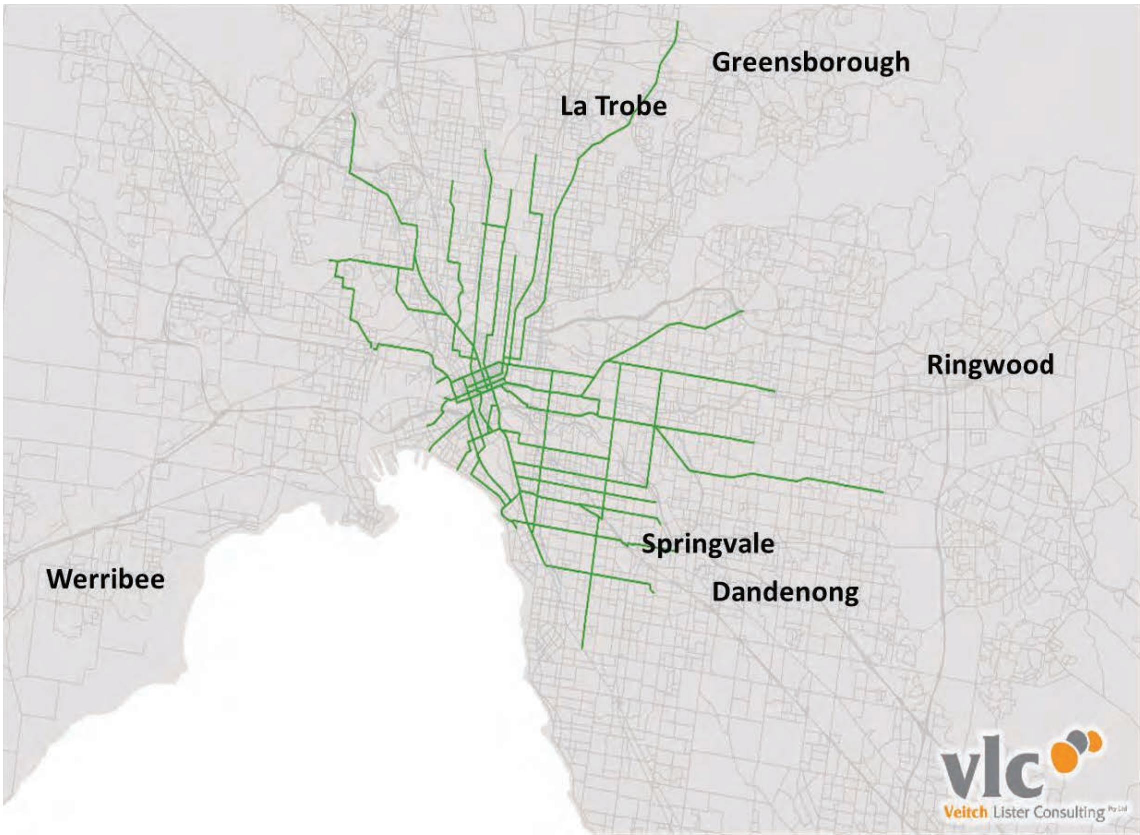
- Fare zone change to incorporate the free trams in the CBD
- Parkville package
- Route 68 becomes Glenferrie Road Shuttle (Malvern to Caulfield)
- Extension of Route 11 to Fishermans Bend
- Extension of Routes 70 and 75 to E-Gate
- Extension of Route 48 to Doncaster Park and Ride
- Extension of Route 3 to East Malvern Station
- Extension of Route 5 to Footscray via Dynon Road.

Appendix Figure C.9 - Modelled tram network in 2026



Source: TfV transport modelling reference case

Appendix Figure C.10 - Modelled tram network in 2036



Source: TfV transport modelling reference case

Bus

Appendix Figure C.11 and Appendix Figure C.12 show the metropolitan bus (including SmartBus) networks assumed for 2026 and 2036. Appendix Figure C.13 shows the regional bus and coach networks (as used in all future base cases).

Appendix Table C.23 and Appendix Table C.24 list the base case bus category assumptions for 2026 and 2036.

Bus services in the metropolitan area have been categorised into a three-tiered bus network by TfV as follows:

- **Premium** bus services operate along arterial roads serving high demand corridors, offering fast and direct routes to major activity centres and train stations. Service frequency will be a minimum of 10 minutes during peaks and during the day, with similar operating hours to trains. These services will cater primarily for longer trips across metropolitan Melbourne, although they may also be used for local/feeder trips to nearby activity centres and train stations

- **Connector** bus services will operate along lower demand (or secondary) corridors relative to premium routes. They will provide fast and direct services between major destinations, such as train stations or shopping centres. They will also operate similar hours to trains, with peak service frequency of 20 minutes or better. Connector routes will operate mostly on arterial roads, with only minor running in local streets

- **Neighbourhood** (and special) bus services offer a localised service, focusing on connections to local destinations such as shopping strips, medical precincts and nearby train stations. They will be less direct with low frequencies and slower journey times compared with connector or premium services, but provide much greater penetration into residential neighbourhoods

Note that no service improvements have been included for all other bus services including regional buses and regional coaches.

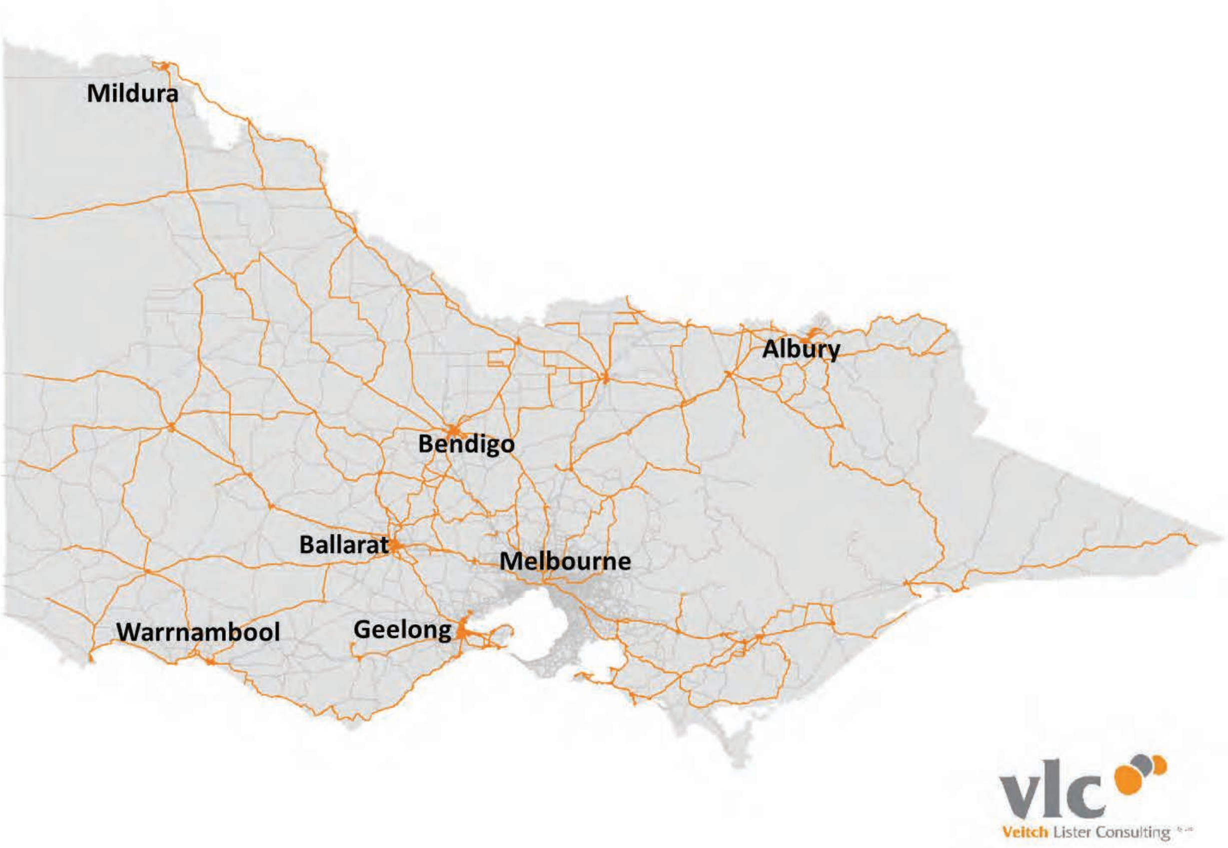
Appendix Figure C.11 - Modelled metropolitan bus network in 2026

Source: TfV transport modelling reference case

Appendix Figure C.12 - Modelled metropolitan bus network in 2036

Source: TfV transport modelling reference case

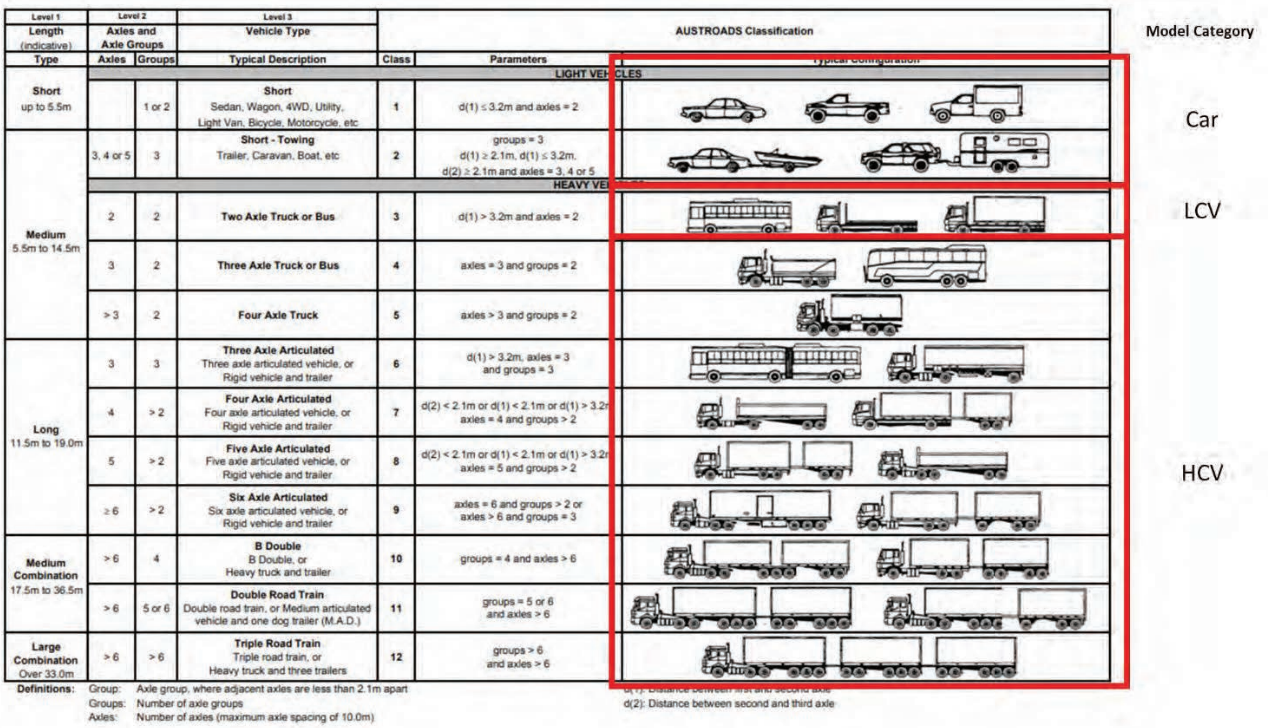
Appendix Figure C.13 - Modelled regional bus and coach network in 2026 and 2036



C.4.3 Commercial vehicle demand

The Zenith model separately forecasts light commercial vehicle (LCV) and medium/heavy commercial vehicle (HCV) flows for each of its four modelled time periods. An LCV is defined as Austroads Vehicle Classification 3, while an HCV is defined as Classifications 4 to 12, as identified in Appendix Figure C.14.

Appendix Figure C.14 - Austroads vehicle classification system and model category



Level 1 Length (indicative) Type	Level 2 Axles and Axle Groups: Axles	Groups	Level 3 Vehicle Type: Typical Description	AUSTROADS Classification: Class	Parameters	Typical Configuration	Model Category
			LIGHT VEHICLES				
Short up to 5.5m		1 or 2	**Short** Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc	1	d(1) ≤ 3.2m and axles = 2		Car
Medium 5.5m to 14.5m	3, 4 or 5	3	**Short - Towing** Trailer, Caravan, Boat, etc	2	groups = 3 d(1) ≥ 2.1m, d(1) ≤ 3.2m, d(2) ≥ 2.1m and axles = 3, 4 or 5		Car
			HEAVY VEHICLES				
	2	2	**Two Axle Truck or Bus**	3	d(1) > 3.2m and axles = 2		LCV
	3	2	**Three Axle Truck or Bus**	4	axles = 3 and groups = 2		HCV
	> 3	2	**Four Axle Truck**	5	axles > 3 and groups = 2		HCV
Long 11.5m to 19.0m	3	3	**Three Axle Articulated** Three axle articulated vehicle, or Rigid vehicle and trailer	6	d(1) > 3.2m, axles = 3 and groups = 3		HCV
	4	> 2	**Four Axle Articulated** Four axle articulated vehicle, or Rigid vehicle and trailer	7	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 4 and groups > 2		HCV
	5	> 2	**Five Axle Articulated** Five axle articulated vehicle, or Rigid vehicle and trailer	8	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 5 and groups > 2		HCV
	≥ 6	> 2	**Six Axle Articulated** Six axle articulated vehicle, or Rigid vehicle and trailer	9	axles = 6 and groups > 2 or axles > 6 and groups = 3		HCV
Medium Combination 17.5m to 36.5m	> 6	4	**B Double** B Double, or Heavy truck and trailer	10	groups = 4 and axles > 6		HCV
	> 6	5 or 6	**Double Road Train** Double road train, or Medium articulated vehicle and one dog trailer (M.A.D.)	11	groups = 5 or 6 and axles > 6		HCV
Large Combination Over 33.0m	> 6	> 6	**Triple Road Train** Triple road train, or Heavy truck and three trailers	12	groups > 6 and axles > 6		HCV

Definitions: Group: Axle group, where adjacent axles are less than 2.1m apart
Groups: Number of axle groups
Axles: Number of axles (maximum axle spacing of 10.0m)
d(2): Distance between second and third axle

Source: Austroads

In the generation of commercial vehicle trips the model uses vehicle trip generation rates based on blue and white collar workers for different types of employment (2 x 13 employment types). For trip distribution it uses separate deterrence functions within a gravity model for light and heavy commercial vehicles within metropolitan Melbourne and across regional Victoria. The model also utilises Passenger Car Unit (PCU) factors of 1.3 for LCVs and 2.3 for HCVs.

C.4.3.1 Port and rail terminals

For port related freight, the Zenith model sets the terminal as the ‘production’ end of the trip, and employment locations such as manufacturing, trucking & transport and agriculture, as the ‘attraction’ end of the trip. This allows the HCV movements forecast to be replicated at all horizons (that is, independent of modelled population, employment, etc.).

The additional HCV trips for each port terminal are consistent with the average weekday HCV trips detailed in the transport modelling reference case, however on advice from the Manager - Modelling Governance and Development, Policy & Reform Division at TfV, they have been adjusted for the following:

- Port of Melbourne (PoM) remains the only container port in Victoria (through to 2051), resulting in previous growth attributed to Port of Hastings (PoH) in earlier transport modelling reference cases shifted to PoM
- Assume no Metropolitan Intermodal System (MIS).

Additional freight data was supplied for Caltex-Newport and CC Container Yard by the WGT project team. The resultant port commercial vehicle productions and attractions are summarised in Appendix Table C.4 below.

Appendix Table C.4 - Assumed number of HCV productions and attractions at port and rail terminals

Freight Area	TZ_3477	2016	2026	2036
PoM- Swanson Dock West	163	3,105	4,394	5,984
PoM- Swanson Dock East	162	3,088	4,394	5,984
PoM- Appleton Dock	162	211	301	409
PoM- Victoria Dock	162	53	76	103
PoM- Swanson Dock Precinct Sub-Total		6,457	9,164	12,480
PoM- Webb Dock	167	2,251	4,299	6,578
Dynon Rail Terminal North	161	1,888	1,701	1,324
Dynon Rail Terminal South	161	1,888	1,701	1,324
Dynon Rail Terminal Sub-Total		3,776	3,402	2,649
PoM- Mobil Dock Yarraville*	472	1,660	1,660	1,660
PoM- CC Container Yard**	451	120	120	120
Caltex - Newport	472	170	170	170
Port of Hastings	1,936	210	210	215
WIFT / Truganina Terminal	2,713	1,198	4,447	7,732
Lyndhurst Terminal	2,018	-	-	-
Somerton Terminal	2,527	289	289	289

Source: DEDJTR Reference Case 2014/2015 + adjustments for No MIS and No PoH as instructed by TfV, and consistent with TfV transport modelling reference case

* Derived using traffic counts at the precinct entrance obtained from VicRoads
** Derived using traffic counts obtained from: Port of Melbourne Traffic Surveys 2012 - Report Volume 2: Port and Dynon Rail Terminal Gate Data

C.4.4 Melbourne airport demand

C.4.4.1 Travel markets

The basic methodology for modelling the ‘Air Travel’ markets is fully integrated in the Zenith model. It was developed in 2001 to improve validation of vehicle demands on roads in the general area of the Airport. Since then, eight airport travel markets have been adopted in the Zenith model to model behaviour of the different market segments. These are based on:

- The two primary travel markets (‘leisure’ and ‘business’)
- The airport terminals (‘domestic’ and ‘international’)
- Air passengers’ residence (‘local’ and ‘visitor’).

The resultant travel markets are summarised in Appendix Table C.5 below.

Appendix Table C.5 - Zenith airport travel markets

Airport travel market	Description
air_pax_dom_bus_local	Domestic outbound (local residents) business passenger movements
air_pax_dom_bus_vis	Domestic inbound (visitors) business passenger movements
air_pax_dom_leisure_local	Domestic outbound (local residents) leisure passenger movements
air_pax_dom_leisure_vis	Domestic inbound (visitors) leisure passenger movements
air_pax_int_bus_local	International outbound (local residents) business passenger movements
air_pax_int_bus_vis	International inbound (visitors) business passenger movements
air_pax_int_leisure_local	International outbound (local residents) leisure passenger movements
air_pax_int_leisure_vis	International inbound (visitors) leisure passenger movements

The total numbers for forecast 'business' and 'leisure' passenger movements at Melbourne Airport were sourced from the transport modelling reference case. The assumptions for Melbourne and Avalon Airport are summarised in Appendix Table C.6.

Appendix Table C.6 - Airport passenger demands (average weekday during school term)

Melbourne Airport Specific Parameters		Air Passengers
Melbourne Airport Air Passenger Demand	2016	79,245
pass / ave. weekday	2026	109,724
	2036	137,310
Avalon Airport Air Passenger Demand	2016	4,768
pass / ave. weekday	2026	13,508
	2036	23,085

Source: TfV transport modelling reference case

C.4.5 Transport costs

In addition to the infrastructure and operational changes described above, the model is sensitive to real changes in transport costs, including:

- Parking costs
- Toll levels
- Fuel costs
- Public transport fares.

The TfV transport modelling reference case provided revised transport cost assumptions, which included updates to the cost of fuel, parking, public transport fares, public transport travel perception (reliability) and toll levels in real terms that is over and above the expected consumer price index (CPI) increases. All other policy/pricing input assumptions remain unchanged and no real increase/decrease is included in the base case assumptions.

The following section details those assumptions.

C.4.5.1 Fuel cost

Fuel costs are a function of:

- Fuel price per litre

- Vehicle fuel efficiency.

Real fuel costs (net of both of the above effects) were assumed to change as shown in Appendix Table C.7 below. These assumptions were sourced from a submission made by the business case advisors to the Transport Modelling and Economics Steering Committee in TfV[23]. It is understood that the revised forecasts were developed using fuel price forecasts published by World Bank, and fuel efficiency forecasts produced by the ABS. The ABS's fuel efficiency forecasts don't make any allowance for electric vehicles, which have the potential to further reduce real fuel costs.

Appendix Table C.7 - Assumed change in real fuel cost

Period	Real fuel cost growth rate (CAGR)
2011-2021	-2.94%
2021-2031	0.03%
2031-2036	0.03%

Source: North East Link Business Case

C.4.5.2 Parking costs

Frontier Economics provided advice to TfV on parking cost parameters for the transport modelling reference case.

Frontier Economics used historical parking price changes since 2005 to generate the TfV transport modelling reference case forecasts for the growth rate in parking prices in the base case, as seen in Appendix Table C.8.

Appendix Table C.8 - Car parking cost growth rates (CAGR), in real terms over and above CPI

Road Cost Parameters		Car Parking costs
Parking cost change (CAGR)	2011- 2016	2.4%
Applied to trips arriving in the AM peak & other periods	2016-2021	1.8%
	2021-2026	1.6%
	2026-2031	1.5%
	2031-2036	1.4%

Source: TfV transport modelling reference case

C.4.5.3 Public transport fares

According to TfV's transport modelling reference case, the Victorian Government increased public transport fares by 5 per cent CAGR greater than CPI for 2012 and 2013, and by 2.5 per cent CAGR for four years from 2015 to 2018. No growth in real terms (that is, over and above CPI) beyond 2018 has been assumed for the base cases.

Note that in 2015, a change to the public transport fare zone structure saw the removal of Zone 2, by extending the Zone 1/2 overlap.

C.4.5.4 Public transport travel reliability

Earlier versions of the TfV transport modelling reference case document refer to public transport perception surveys that identify public transport reliability as a major consideration in the level of customer satisfaction, which in turn affects their mode choice.

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[23] Appendix Q1 – Economic Appraisal of the North East Link Business Case

Key initiatives to improve public transport reliability could include a reduction of delays and dwell time through additional maintenance, simplification of the network and new rolling stock, improvements in priority and better co-ordination of public transport modes.

The public transport value of time has been reduced by 0.2 per cent CAGR to 2026 in real terms for the future Base Cases.

C.4.6 Toll levels

New and existing toll roads

In the base year model, CityLink and EastLink gantry and toll cap prices represent the 2016 toll values.

In the base case future year scenarios, the gantry and toll cap prices on these and any proposed toll roads have been assumed to change in the following ways:

- CityLink:
  - Increase as per the West Gate Tunnel EES
  - Assumed to operate beyond the current concession period.
- EastLink:
  - Increase in line with forecast consumer price index (cpi)
  - Assumed to operate beyond the current concession period.
- West Gate Tunnel:
  - Increase as per the West Gate Tunnel EES
  - Assumed to operate beyond the current concession period.

These toll price assumptions have been created for transport modelling and planning purposes and do not represent future commitments regarding toll road infrastructure.

No other roads have been assumed to be tolled in the future scenarios.

C.4.7 Growth in the value of travel time savings (VTTS)

How drivers will value their time in the future is important from the perspective of predicting peoples' willingness to pay tolls for a given time saving.

Current values of travel time savings (VTTS) are derived by examining existing travel behaviour, where people are faced with making a trade-off between taking the fastest route and paying a toll or taking a longer un-tolled route to reach their destination. This trade-off is usually analysed using the results of either stated preference or revealed preference surveys - and is termed toll diversion analysis. The toll diversion parameters used in the Zenith model have been derived from revealed preference surveys conducted in Melbourne.

C.4.7.1 Calculation of the growth in VTTS

Experience has shown that as the community's wealth increases more people will be prepared to pay tolls, as their increased wealth results in them valuing their time more highly. Normal practice is to relate this increase in valuation of time to future real increase in average weekly ordinary time earnings (AWOTE). In other words, by the amount that wages increase above the consumer price index (CPI).

For many years a unit elasticity was assumed between the real growth in earnings and the increase in the VTTS. In other words, if real earnings increase by 10 per cent then the VTTS will also increase by 10 percent. This is the standard practice in the United States (U.S. DoT, 2011).

In 2013, the U.K. reviewed the elasticity of the values of travel time savings using data from the 2008-2010 National Travel Survey and updated the non-work value of travel time savings elasticity from 0.8 to 1.0 (like the U.S.), while retaining a unit elasticity (equal to 1.0) for working time (U.K. DoT, 2014).

We propose to adopt these elasticities for the estimation of future VTTS for toll road modelling; that is elasticity of 1.0 for cars and 1.0 for light and heavy commercial vehicles.

Appendix Table C.9 shows the historical trend in the consumer price index (CPI) and average weekly ordinary time earnings from 1995 to 2017 and shows that the real annual increase in earnings over the 22-year period to be 1.55 per cent.

Appendix Table C.9 - CPI and average weekly ordinary time earnings from 1995 to 2017

Financial year	CP Index (Australia)	Annual CPI % change (Australia)	Earnings; Persons; Full time; Adult; Ordinary time earnings; (Australia)	Annual earnings % change	Net earning % change
1995-96	66	4.06%	661.2	4.05%	-0.01%
1996-97	67	1.52%	686.1	3.77%	2.25%
1997-98	66.8	-0.30%	710.6	3.57%	3.87%
1998-99	67.8	1.50%	739.5	4.07%	2.57%
1999-00	69.1	1.92%	760.8	2.88%	0.96%
2000-01	73.1	5.79%	798.1	4.90%	-0.89%
2001-02	75.4	3.15%	842.6	5.58%	2.43%
2002-03	77.6	2.92%	882.1	4.69%	1.77%
2003-04	79.5	2.45%	929.1	5.33%	2.88%
2004-05	81.5	2.52%	965	3.86%	1.35%
2005-06	83.8	2.82%	1011.8	4.85%	2.03%
2006-07	86.6	3.34%	1044.1	3.19%	-0.15%
2007-08	89.1	2.89%	1098.6	5.22%	2.33%
2008-09	92.4	3.70%	1158	5.41%	1.70%
2009-10	94.3	2.06%	1226.8	5.94%	3.89%
2010-11	96.9	2.76%	1275.2	3.95%	1.19%
2011-12	99.8	2.99%	1330.1	4.31%	1.31%
2012-13	102	2.20%	1396	4.95%	2.75%
2013-14	104.8	2.75%	1437	2.94%	0.19%
2014-15	106.6	1.72%	1477	2.78%	1.07%
2015-16	108.4	1.69%	1500.5	1.59%	-0.10%
2016-17	110	1.48%	1533.4	2.19%	0.72%
			Average Net Earnings % Change:		**1.55%**

It is proposed that the observed historical increase in real earnings (that is, 1.55 per cent p.a.) be assumed to continue in the future when estimating VTTS for toll road forecasting.

Future year Zenith model forecasts of travel in Melbourne will therefore assume a 1.55 per cent annual increase in the growth of VTTS for light and heavy commercial vehicles, and a 1.55 per cent increase per annum for car travel. This will result in an increase in car and commercial vehicle driver's willingness of to pay tolls when performing future year model runs.

C.4.7.2 Application of VTTS increases in Zenith

The Zenith model's traffic assignment module includes a toll diversion algorithm that determines the probability of drivers choosing to travel on a toll road and pay a specified toll for a calculated travel time saving or choose to avoid the toll by taking an un-tolled route.

For future planning years the toll diversion model is run taking into account growth in VTTS that occurs as a consequence of society becoming more affluent. This is performed by discounting the tolls by a predetermined amount based on the relative predicted increases in incomes (wages) and the consumer price index. This is standard practice in the transport planning/travel modelling profession.

This change in VTTS is only applied in the route choice component of the traffic assignment model. It is not applied in other Zenith modules, such as trip distribution and mode choice.

C.5 Project case assumptions

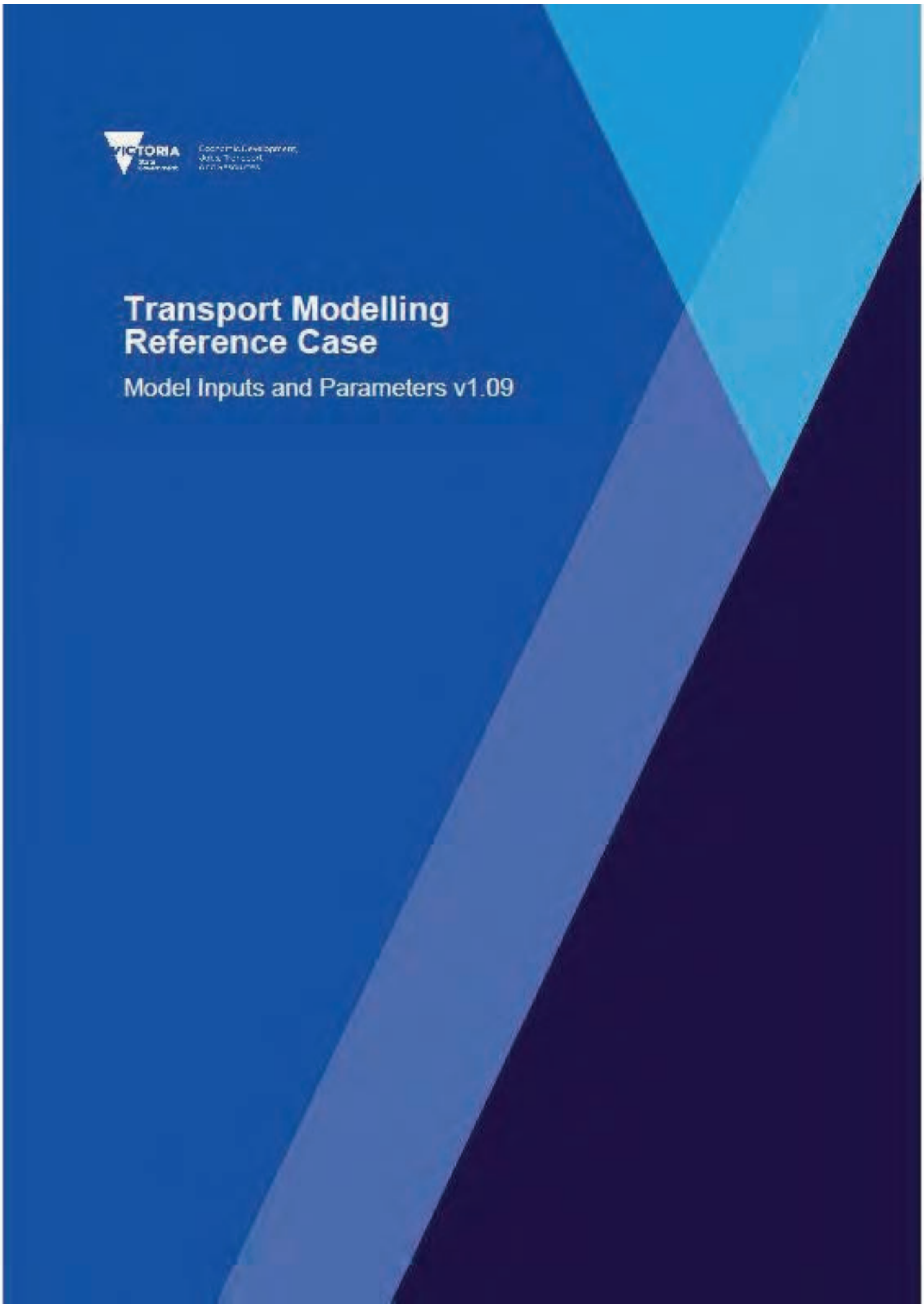
C.5.1 Transport network

Detailed project transport network assumptions within the transport model can be seen in Appendix C7: Project network assumptions. In summary the project scope in the transport model includes:

- Metropolitan (M80) Ring Road upgrades between Greensborough Bypass and Plenty Road
- A connection to Plenty Road
- A connection to the Greensborough Bypass
- A new freeway link from M80 Ring Road to the Eastern Freeway
- Interchange connections at:
    - Grimshaw Street
    - Lower Plenty Road / Greensborough Road
    - Manningham Road
- A connection to the Eastern Freeway
- Eastern Freeway upgrades between Chandler Highway and Springvale Road
- Eastern Freeway bus lanes for the Doncaster Busway, and 40 buses (SmartBus routes 905-908) per hour in the peak periods and 28 buses per hour outside the peaks.

Appendix C1: TfV transport modelling reference case, v1.09

Appendix Figure C.15 - Transport modelling reference case, Model Inputs and Parameters



1 Introduction

This document summarises the TFV Reference Case assumptions for the 2018/19 business case cycle. The information relates to public transport, road, land use, cost parameters, freight and Melbourne Airport.

2 Public Transport Investment Timing and Sequence

The following section contains an outline of the service specification for each mode (Train, Tram and Bus). In the case of Bus and train, the specification is an update to existing scenarios developed for use in the Melbourne Metro Rail Project (MMRP). The tram specification is new.

2.1 Rail

The Rail Reference Case is based on existing MM scenario specifications, but has changes that reflect internal discussions on the timing of projects, rolling stock investment and network reconfigurations to get better utilisation of the rail existing network.

Table 1 below is a summary Melbourne Metro rail service plans that form the basis of the Reference Case at each year plus any adjustments that need to be made to the plans.

Table 1: Summary of Rail Investment Sequence

Year	Project
2021	• Melbourne Metro service plan: STAGEB_MM-0_2021
2026	• Melbourne Metro service plan: STAGEB_MM-1C_2031 (MM Project / Melbourne Metro Day 1)[1,2]
2031	• Melbourne Metro service plan: STAGEB_MM-2_2031_P
2036	• Melbourne Metro service plan: STAGEB_MM-2B_2031 (MM Ext Project (with full rollout of extended trains on S'shine-D'nong, with Wallan Ext))[1,2]
2051	• Melbourne Metro service plan: STAGEB_MM Design 2

[1] Mernda services to stop at both stations b/w South Morang and Mernda
[2] Service Frequency on Mernda and Hurstbridge lines reduced from 2031 MM Service Plan levels to service frequency that will be offered by Hurstbridge Stage 2 project (i.e. service frequency aligning to 20 tph at Clifton Hill in 2026 and 2036 service frequency aligning to 24tph at Clifton Hill station.

2.2 Tram

Service specifications developed for the E-Class Tram roll-out and MMRP have been used as a basis to develop a new Tram Reference Case specification. By 2021 the diversion of services near Melbourne Metro construction works are included (i.e. the recently introduced Route 58), and track upgrades associated with the MMRP (i.e. Elizabeth Street) allow changes to existing routes at 2026.

Table 2: Summary of Tram Investment Sequence

Year	Project
2021	• Route 58 (Toorak-West Coburg introduced in 2017 to replace route 55 and Route 8). Route 6 extended to Moreland (top end of Route 8) and Route 55 extended to Toorak (bottom end of Route 8) • Glenferrie Rd Shuttle (68 Malvern to Caulfield), taken from Routes 16 & 64 • Route 12 via La Trobe St • E Class Tranche 2-3 (80-110) and Route 3 extension beyond Melbourne University to Brunswick Road • Route 2 discontinued
2026	• Route 86 runs to Port Melbourne • Route 109 runs to Victoria Harbour • Route 5 runs north to the Remand Centre on Spencer St via Park St link and south to Darling Station • Route 64 runs to Waterfront City via Park St Link to Malvern Station • Elizabeth St curves mean Route 19 runs to Jolimont, Route 57 to Melbourne Park, Route 59 to Jolimont • Route 12 via La Trobe St • Route 11 extension to Fishermans Bend • E-Gate extensions – Route 70, 75 • Route 30 discontinued • Next Generation Tram upgrades
2031	• Route 82 extension to Maribyrnong Defence Site • Route 48 extension to Doncaster • Route 3 extension to Malvern East Station • Route 5 extended to Footscray via Dynon Rd
2036+	No further changes

2.3 Bus

The bus specification is based on the PTV timetable (Post RRL / Nov 2015) for 2015 and MMRP project files associated with the rail service plan (outlined above) for Future years.

2021

As part of the On-Road Network Development Plan (NDP) developed by Public Transport Victoria (PTV) in 2014, a new bus network was proposed for Metropolitan Melbourne that was anticipated to be implemented by 2021, however the timing for the On-Road NDP is now assumed to be delayed and the revised Reference Case assumes it will not be delivered until 2026.

To reflect the above, the 2021 Bus Reference Case now includes all projects delivered as at August 2017 including:

- **Updated Skybus frequencies -** The Skybus frequencies were uplifted from once every ten minutes across the day to once every five minutes across the day.
- **Increased DART frequencies** – Improvements to DART frequencies as made in 2016.
- **New University Shuttle Routes -** The 403 bus route (Footscray Station to University of Melbourne via Royal Melbourne Hospital) and the 301 bus route (trial route from Reservoir Station to La Trobe University).

Plus additional projects to be delivered between 2016 and 2021 which include:

- **Caroline Springs Area Bus Network Upgrade:** Refer attached 'Draft Service Specification Caroline springs Bus Network Upgrade – Phase Three'

- **New Routes in Growth Areas:** In line with Melbourne's population growth forecasts between 2016 and 2021, new bus lines have been introduced along the growth corridors. These routes are located in the south-east growth corridor, the northern growth corridor, Sunbury, Melton, Mernda and in the Werribee region. The routes are listed in Table 6: Assumed bus projects for 2021/26/36 Reference Case years in the attached Appendices.

2026

The 2026 Bus Reference Case assumes the On-Road Network Development Plan (NDP) developed by Public Transport Victoria (PTV) in 2014. Hence it is built off the Melbourne Metro 'MM Base 2021' metropolitan bus service plan. Key features of the on-road bus network are:

- Direct routes – operating along direct alignments with minimal deviation from the shortest route between key destinations
- Frequent routes – including the provision of "turn up and go services" with real-time information
- Strong connection between modes – through refined route alignment and clear signage

- Improved coverage of growth areas – via route extensions and linkages to stations and activity centres
- A three tiered bus network - consisting of premium (which contains but is not limited to the current SmartBus network), connector, neighbourhood (and special) bus routes

A number of changes are assumed from the 'MM Base 2021' service plan, these are set-out in Table 6 of the Appendix. The changes relate to either replacing routes in the 'MM Base 2021' service plan with routes from the 'MM Project 2031' service plan or simply adding routes from the 2031 plan.

2031

The 2031 Bus Reference Case network builds on the 2026 network describe above and is consistent with the Melbourne Metro 2031 bus network (MM Project 2031). The network assumes the On-Road Network Development Plan (NDP) but with the following modifications.

Reduction of 401 bus and removal of 403 bus

The high frequency shuttles between the University of Melbourne and North Melbourne and Footscray train stations are not forecast to have the same importance after the introduction of Melbourne Metro (which includes a station at Parkville).

The 401 has been reduced to a ten minute frequency, while the 403 has been removed entirely.

Services around Mernda Station

New services have been introduced around Mernda Station as a result of the Mernda heavy rail extension.

Additional services in Melbourne's North

The increased rate of forecast growth in Melbourne's North has led to an upgrade in service frequencies along some routes in this area

High patronage routes

Routes were upgraded during the Melbourne Metro modelling for 2031 due to high demand. Routes that were upgraded are shown in table below with frequency upgrades shown in blue.

Table 3: Updated bus frequencies for 2031 Bus Reference Case

Service Name	2031 NDP				2031 Reference Case			
	AM	IP	PM	OP	AM	IP	PM	OP
Merrifield Express (Beveridge-Upfield via Roxburgh Park)	20	20	20	20	10	20	10	20
Beveridge - Epping via Cragieburn & Lockerbie	20	20	20	40	10	20	10	40
Craigieburn Central - South Morang via Epping Station	20	20	20	20	10	20	10	20
West Craigieburn to Craigieburn	20	40	20	40	10	20	10	40

West Craigieburn - Craigieburn via Brookfield Bvd	20	40	20	40	10	20	10	40
Donnybrook - Craigieburn North	20	20	20	40	10	20	10	40
Craigieburn - Roxburgh Park	20	40	20	40	10	20	10	40
Lockerbie - Epping via Lockerbie	20	40	20	40	10	20	10	40
Mandalay - Beveridge	60	60	60	60	20	40	20	60
Melton - Exford Rd	20	40	20	40	10	20	10	40
Werribee - Wyndham Vale (existing 449 modified)	20	40	20	40	10	20	10	40
Fishermans Bend - City	5	20	5	20	4	10	4	20
Werribee to Hoppers Crossing	40	40	40	60	20	40	20	60
Melton - Melton North (existing 455)	20	20	20	40	10	20	10	40
Melton - Kurunjang (existing 459)	20	20	20	40	10	20	10	40
Watergardens - Rockbank	60	60	60	0	20	40	20	0
Sunbury - Sunbury East	40	60	40	60	20	40	20	60
William's Landing - Point Cook Sth	20	20	20	40	10	20	10	40
Williams Landing - Saltwater Coast	20	20	20	40	10	20	10	40

Doncaster Area Bus Rapid Transit (DABRT) 2031

The Doncaster Area Bus Rapid Transit (DABRT) is introduced at 2031. The specification is set-out in Table 4.

Table 4: Doncaster Area Bus Rapid Transit

Route Structure	The routes will consist of the four existing DART routes 905, 906, 907, 908, plus the existing Route 305. Any other Doncaster routes that currently operate peak specials to the CBD will terminate at Doncaster Park & Ride.
Stations	Eastern Freeway Section: • Doncaster Park and Ride – Major Station and Interchange • Bulleen Road – Minor Station and Interchange • Burke Road – Local Interchange • Chandler Highway – Minor Station and Interchange • Victoria Park – Major Station and Interchange Other Sections: Other route sections will use existing bus stops
Service Frequency	Peak: • 8 services per hour. • 12 services per hour on Route 906 and 907 Non-peak:

	• 6 services per hour. • 8 services per hour on Route 906 and 907
Travel Time	**DABRT travel times to be achieved – AM Peak Inbound 35km/h average speed**

Section	Modified Travel Times – AM Peak Inbound		
	Length (km)	Travel Time (min)	Average Speed (km/h)
Eastern Freeway	10.76	9.3	69.5
Hoddle Street	1.54	4.4	20.8
Victoria Parade	1.83	5.9	18.5
Lonsdale Street	1.62	7.5	13.0
TOTAL	**15.75**	**27.2**	**34.8**

DABRT travel times to be achieved – PM Peak Outbound 35km/h average speed

Section	Modified Travel Times – PM Peak Outbound		
	Length (km)	Travel Time (min)	Average Speed (km/h)
Lonsdale Street	1.48	7.1	12.5
Victoria Parade	2	6.7	18.0
Hoddle Street	1.25	3.9	19.3
Eastern Freeway	11.46	10.0	68.8
TOTAL	**16.19**	**27.7**	**35.1**

Travel times along Eastern Freeway section

Station	Distance to Vic Park (km)	No. of Stops	Travel Time (mins)
Doncaster Park & Ride	10.7	3	10.7
Bulleen Road	8.4	2	8.4
Burke Road	6.5	1	6.5
Chandler Highway	3.2	-	N/A

•

Vehicle Capacity	Double decker buses: 90 seated 10 standing 100 capacity

New rail stations

Bus connectivity to be provided for new railway stations listed in the rail section.

2036

The 2036 Bus Reference Case builds on the 2031 network describe above and is similar to the Melbourne Metro 2031 project bus network (MM Project 2031). The network assumes the On-Road Network Development Plan (NDP) but with the following modifications:

- A number of changes are assumed from the MM Project 2031 service plan, these are set-out in Table 6 of the Appendix. The changes relate to either replacing routes in the MM Project 2031 service plan with routes from the MM Project 2046 service plan or simply adding routes from the 2046 plan. Predominately the changes involve the addition of bus services in the Growth Areas to provide coverage for areas experiencing development between 2031 and 2036.

New rail stations

Bus connectivity to be provided for new railway stations.

2041

The 2041 Bus Reference Case is assumed to align to the Melbourne Metro 2046 project bus service plan (MM Project 2046), except for the changes as set-out below.

New rail stations

Bus connectivity to be provided for new railway stations listed in the rail section.

2051

The 2051 Bus Reference Case is assumed to align to the Melbourne Metro 2046 project bus service plan (MM Project 2046), except for the changes as set-out below.

Removal of Skybus

With the inclusion of the Melbourne Airport Rail Link in the Rail Reference Case, Skybus is removed from the bus network.

Removal of the 603 bus

The 603 provides a shuttle between Huntingdale Station and Monash University. The Rowville Rail extension, included in the 2051 Rail Reference Case, will provide a rail link between Monash University and Huntingdale Station, along an identical route at faster speeds than the 603 bus.

New rail stations

Bus connectivity to be provided for new railway stations.

3 Road Networks

As per project list supplied to NELA on 12 July 2017 (TFV Ref Case v1.09 Road Networks (170710)_NELA.xlsx)

4 Land use

Demographics & Land Use
VIF2015 Based Population, Employment and Enrolments
SALUP - Update 2016 (Final)
Reference # 20160051 - Final Version
Refer files provided to NELA 12.07.2017
-> Land Use Ref Case - 160729 VITMb TZN 3098 16-51 DBFs.zip
-> Demographic_w_ICSplit_20xx_Z3098.dbf

5 Freight

Freight Assumptions

Freight assumptions:

Port of Melbourne remains the only container port in Victoria through to 2051

Interstate rail freight shifts from Dynon to WIFT in 2032, therefore WIFT first appears in the 2036 scenario

Port Rail Shuttle (PRS) is assumed to begin operation in 2032, therefore PRC first appears in the 2036 scenario

- PRS formerly Melbourne Intermodal System (MIS)

International Container Movements from PoM

Year	TEU (million)
2011	2.2
2016	2.5
2021	2.8
2026	3.3
2031	3.9
2036	4.7
2041	5.6
2051	8.0

6 Road Cost Parameters

Road Cost Parameter Values		
Road Cost Parameters		**Value/Assumption**
Values used in Generalised Cost		
Car Value of Time (VOT)	Private	As per model calibration
	Business	As per model calibration
Car VOT change		unchanged
Vehicle Occupancy		As per model calibration
Vehicle Occupancy change		unchanged
Car Vehicle Operating Costs (VOC)*	Private	As per model calibration
	Business	As per model calibration
Car VOC** change	2011-2021	1.4% CAGR
	2021-2031	1.2% CAGR
	2031-2041	0.5% CAGR
	2041-2051	unchanged
Parking Cost/trip,		
Work purpose, 2011	CBD/Docklands	As per model calibration
	Other CoM	As per model calibration
	Other Inner	As per model calibration
Non-w ork purpose, 2011	CBD/Docklands	As per model calibration
	Other CoM	As per model calibration
	Other Inner	As per model calibration
Parking Cost change,		
Work and Non-w ork purpose**	2008-2014	4.0% CAGR
	2014-2051	1.5% CAGR
Airport Parking Cost		As per model calibration
Airport Parking Cost change***	2011-2021	0.8% CAGR
	2021-2031	0.7% CAGR
	2031-2051	0.1% CAGR

Road Cost Parameters		Value/Assumption
Tolls / Road Charges, Existing Roads		Actual
Tolls assumed to operate beyond concession periods		
Tolls / Road Charge change		
City Link		As per concession
EastLink		unchanged
Future Tolls / Road Charges		
Western Distributor		assume for models:
		as per project announcements
North East Link		assume for models:
Tolls assumed to rise by cpi		per km charge matching EastLink
OMR		assume for models:
Tolls assumed to rise by cpi		per km charge matching half EastLink

7 Public Transport Parameters

Public Transport Cost Modelling Parameters		
Public Transport Cost Parameters		**Value/Assumption**
Public Transport VOT		As per model calibration
Public Transport Fares, 2011	Zone 1	As per model calibration
	Zone 2	As per model calibration
	Zone 1-2	As per model calibration
Public Transport Fare change	2012	5.00%
	2013	5.00%
	2014	cpi
	2015-2018	2.50%
	Beyond 2018	
Zone 1+2 fare to equal Zone 1 fare	2015 & beyond	unchanged
Free tram travel in CBD & Docklands	2015 & beyond	
Improved public transport reliability factor (reduction in PT generalised cost)	2011-2026	-0.2% CAGR per annum (3% total)
	beyond 2026	unchanged
SkyBus/ Airport Rail Fare		As per model calibration
SkyBus/ Airport Rail Fare change		As per standard public transport fare change

8 Airport Parameters

Airport Parameters

Melbourne Airport Specific Parameters		Value/Assumption
SkyBus/ Airport Rail Fare		As per model calibration
SkyBus/ Airport Rail Fare change		As per standard public transport fare change
Airport Parking Cost		As per model calibration
Airport Parking Cost change	2011-2021	[illegible] CAGR
	2021-2031	0.7% CAGR
	2031-2051	0.1% CAGR
Melbourne Airport Employment		Refer Demand Forecasting Specifications – MRL Project v8.1.4
Melbourne Airport Air Passenger Demand		Refer Demand Forecasting Specifications – MRL Project v8.1.4
Further breakdown of the air passenger base by purpose and direction is provided below		
Avalon Airport Air Passenger Demand**		ng Specifications – MRL Project v8.1.4

Melbourne Airport Air Passenger Demand Forecasts by Purpose and Direction

Air market	Trip type	Residence	Trip production/ attraction	2011	2016	2021	2026	2031	2036	2051
International	Business	Resident	Production	737	1027	1,431	1,621	1,836	2,105	3,174
International	Business	Resident	Attraction	737	1027	1,431	1,621	1,836	2,105	3,174
International	Business	Non Resident	Production	522	638	779	892	1,022	1,187	1,858
International	Business	Non Resident	Attraction	522	638	779	892	1,022	1,187	1,858
International	Non Business	Resident	Production	3,552	4,948	6,892	7,808	8,846	10,142	15,287
International	Non Business	Resident	Attraction	3,552	4,948	6,892	7,808	8,846	10,142	15,287
International	Non Business	Non Resident	Production	1,799	2,238	2,735	3,131	3,584	4,164	6,532
International	Non Business	Non Resident	Attraction	1,799	2,238	2,735	3,131	3,584	4,164	6,532
Domestic	Business	Resident	Production	4,813	5,434	6,136	6,672	7,255	8,286	12,347
Domestic	Business	Resident	Attraction	4,813	5,434	6,136	6,672	7,255	8,286	12,347
Domestic	Business	Non Resident	Production	4,822	6,008	7,486	8,107	8,779	9,965	14,575
Domestic	Business	Non Resident	Attraction	4,822	6,008	7,486	8,107	8,779	9,965	14,575
Domestic	Non Business	Resident	Production	10,804	12,199	13,773	14,976	16,285	18,600	27,716
Domestic	Non Business	Resident	Attraction	10,804	12,199	13,773	14,976	16,285	18,600	27,716
Domestic	Non Business	Non Resident	Production	6,875	8,640	10,857	11,655	12,511	14,206	20,799
Domestic	Non Business	Non Resident	Attraction	6,875	8,640	10,857	11,655	12,511	14,206	20,799
TOTAL				67,848	82,444	100,179	109,750	120,236	137,320	204,568

9 Appendix

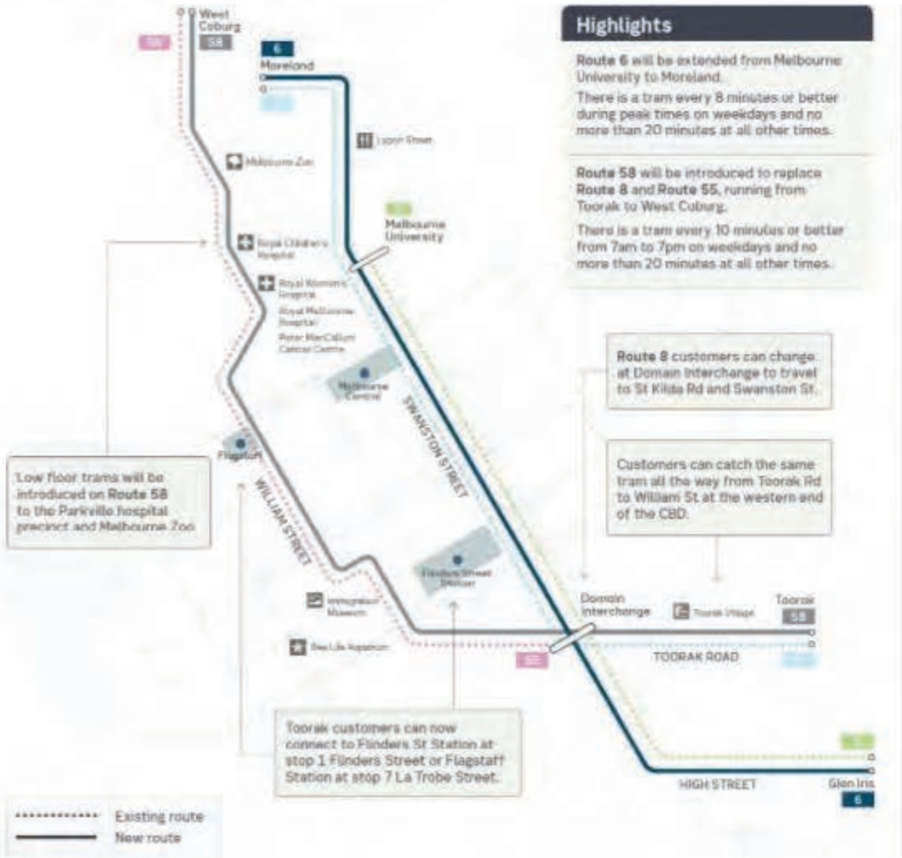
9.1 Network Development Plan Bus Route Hierarchy

Table 5: Network Development Plan Bus Route Hierarchy

Route Type	Description
Premium	These will operate along arterial roads serving high demand corridors, offering fast and direct routes to major activity centres and train stations. Service frequency will be a minimum of 10 minutes during peaks and during the day, with similar operating hours to trains. These services will cater primarily for longer trips across metropolitan Melbourne, although they may also be used for local/feeder trips to nearby activity centres and train stations. Due to the high service levels, it is anticipated that passengers will be willing to walk further to access Premium routes.
Connector	These will operate along lower demand (or secondary) corridors relative to premium routes. They will provide fast and direct services between major destinations, such as train stations or shopping centres. They will also operate similar hours to trains, with peak service frequency of 20 minutes or better. Connector routes will operate mostly on arterial roads, with only minor running in local streets, and may be upgraded to premium status if the demand warrants it. As for premium routes, it is expected that passengers will be willing to walk further to access connector routes.
Neighbourhood	These have been designed to support premium and connector routes by providing a service designed to maximise accessibility and coverage. As such, they have been designed to appeal to those users with limited mobility or tolerance for long walking distances. Neighbourhood routes offer a localised service, focusing on connections to local destinations such as shopping strips, medical precincts and nearby train stations. They will be less direct with low frequencies and slower journey times compared to connector or premium services, but provide much greater penetration into residential neighbourhoods. In some areas where the operation of a fixed route by a standard bus is not feasible or viable, taxis may be used to provide a public transport service, with Myki fares applying. This would free up buses to run higher frequency services on other busier routes.

9.2 Tram Route 58 Alignment

Figure 1: Tram Route 58 Alignment



9.3 Assumed bus projects for 2021/26/36 Reference Case years

Table 6: Assumed bus projects for 2021/26/36 Reference Case years

Year	Project
2021	**Starting point for modifications is the 2016 bus network with adjustments as per section Section 2.3 Bus 2021 above.** **Additions** • E011 - Add MM Base 2021 route • E011R - Add MM Base 2021 route • E014 - Add MM Base 2021 route • E014R - Add MM Base 2021 route • E016 - Add MM Base 2021 route • E016R - Add MM Base 2021 route • E019 - Add MM Base 2021 route • E019R - Add MM Base 2021 route • E02 - Add MM Base 2021 route • E024 - Add MM Base 2021 route • E024R - Add MM Base 2021 route • E02R - Add MM Base 2021 route • E04 - Add MM Base 2021 route • E04R - Add MM Base 2021 route • E07 - Add MM Base 2021 route • E07R - Add MM Base 2021 route • E09 - Add MM Base 2021 route • E09R - Add MM Base 2021 route • E105 - Add MM Base 2021 route • E105R - Add MM Base 2021 route • E118 - Add MM Base 2021 route • E118R - Add MM Base 2021 route • E119 - Add MM Base 2021 route • E119R - Add MM Base 2021 route • E367 - Add MM Base 2021 route • E367R - Add MM Base 2021 route • E677 - Add MM Base 2021 route • E677R - Add MM Base 2021 route • E680 - Add MM Base 2021 route • E680R - Add MM Base 2021 route • E681 - Add MM Base 2021 route • E681R - Add MM Base 2021 route • E682 - Add MM Base 2021 route • E682R - Add MM Base 2021 route

	• E684 - Add MM Base 2021 route • E684R - Add MM Base 2021 route • E687 - Add MM Base 2021 route • E687R - Add MM Base 2021 route • E697 - Add MM Base 2021 route • E697R - Add MM Base 2021 route • E707 - Add MM Base 2021 route • E707R - Add MM Base 2021 route • E746 - Add MM Base 2021 route • E746R - Add MM Base 2021 route • E747 - Add MM Base 2021 route • E747R - Add MM Base 2021 route • E757 - Add MM Base 2021 route • E757R - Add MM Base 2021 route • E772 - Add MM Base 2021 route • E772R - Add MM Base 2021 route • E776 - Add MM Base 2021 route • E776R - Add MM Base 2021 route • E778 - Add MM Base 2021 route • E778R - Add MM Base 2021 route • E779 - Add MM Base 2021 route • E779R - Add MM Base 2021 route • E780 - Add MM Base 2021 route • E780R - Add MM Base 2021 route • E786 - Add MM Base 2021 route • E786R - Add MM Base 2021 route • E790 - Add MM Base 2021 route • E790R - Add MM Base 2021 route • E792 - Add MM Base 2021 route • E792R - Add MM Base 2021 route • E795 - Add MM Base 2021 route • E795R - Add MM Base 2021 route • E797 - Add MM Base 2021 route • E797R - Add MM Base 2021 route • E798 - Add MM Base 2021 route • E798R - Add MM Base 2021 route • E799 - Add MM Base 2021 route • E799R - Add MM Base 2021 route • E813 - Add MM Base 2021 route • E813R - Add MM Base 2021 route • E814 - Add MM Base 2021 route • E814R - Add MM Base 2021 route • E816 - Add MM Base 2021 route • E816R - Add MM Base 2021 route

	• E827 - Add MM Base 2021 route • E827R - Add MM Base 2021 route • E833 - Add MM Base 2021 route • E833R - Add MM Base 2021 route • E834 - Add MM Base 2021 route • E834R - Add MM Base 2021 route • E836 - Add MM Base 2021 route • E836R - Add MM Base 2021 route • E837 - Add MM Base 2021 route • E837R - Add MM Base 2021 route • E839 - Add MM Base 2021 route • E839R - Add MM Base 2021 route • E845 - Add MM Base 2021 route • E845R - Add MM Base 2021 route • E846 - Add MM Base 2021 route • E846R - Add MM Base 2021 route • E858 - Add MM Base 2021 route • E858R - Add MM Base 2021 route • E893 - Add MM Base 2021 route • E893R - Add MM Base 2021 route • E894 - Add MM Base 2021 route • E894R - Add MM Base 2021 route • E897 - Add MM Base 2021 route • E897R - Add MM Base 2021 route • E920 - Add MM Base 2021 route • E920R - Add MM Base 2021 route • E921 - Add MM Base 2021 route • E921R - Add MM Base 2021 route • E922 - Add MM Base 2021 route • E922R - Add MM Base 2021 route • E923 - Add MM Base 2021 route • E923R - Add MM Base 2021 route • E924 - Add MM Base 2021 route • E924R - Add MM Base 2021 route • E925 - Add MM Base 2021 route • E925R - Add MM Base 2021 route • E926 - Add MM Base 2021 route • E926R - Add MM Base 2021 route • E928 - Add MM Base 2021 route • E928R - Add MM Base 2021 route • E929 - Add MM Base 2021 route • E929R - Add MM Base 2021 route • E931 - Add MM Base 2021 route • E931R - Add MM Base 2021 route

	• N001_TB - Add MM Base 2021 route • N001_TBR - Add MM Base 2021 route • N002_TB - Add MM Base 2021 route • N002_TBR - Add MM Base 2021 route • N003_TB - Add MM Base 2021 route • N003_TBR - Add MM Base 2021 route • N004_TB - Add MM Base 2021 route • N004_TBR - Add MM Base 2021 route • N311 - Add MM Base 2021 route • N311R - Add MM Base 2021 route • N312 - Add MM Base 2021 route • N312R - Add MM Base 2021 route • N313 - Add MM Base 2021 route • N313R - Add MM Base 2021 route • N322 - Add MM Base 2021 route • N322R - Add MM Base 2021 route • N323 - Add MM Base 2021 route • N323R - Add MM Base 2021 route • N351 - Add MM Base 2021 route • N351R - Add MM Base 2021 route • N357 - Add MM Base 2021 route • N357R - Add MM Base 2021 route • N358 - Add MM Base 2021 route • N358R - Add MM Base 2021 route • N361 - Add MM Base 2021 route • N361R - Add MM Base 2021 route • N398 - Add MM Base 2021 route • N398R - Add MM Base 2021 route • N511 - Add MM Base 2021 route • N511R - Add MM Base 2021 route • N528 - Add MM Base 2021 route • N528R - Add MM Base 2021 route • N529 - Add MM Base 2021 route • N529R - Add MM Base 2021 route • N533 - Add MM Base 2021 route • N533R - Add MM Base 2021 route • N537 - Add MM Base 2021 route • N537R - Add MM Base 2021 route • N538 - Add MM Base 2021 route • N538R - Add MM Base 2021 route • W101 - Add MM Base 2021 route • W101R - Add MM Base 2021 route • W105 - Add MM Base 2021 route • W105R - Add MM Base 2021 route

	• W113 - Add MM Base 2021 route • W113R - Add MM Base 2021 route • W116 - Add MM Base 2021 route • W116R - Add MM Base 2021 route • W117 - Add MM Base 2021 route • W117R - Add MM Base 2021 route • W119 - Add MM Base 2021 route • W119R - Add MM Base 2021 route • W121 - Add MM Base 2021 route • W121R - Add MM Base 2021 route • W400a - Add MM Base 2021 route • W400aR - Add MM Base 2021 route • W441 - Add MM Base 2021 route • W441R - Add MM Base 2021 route • W443 - Add MM Base 2021 route • W443R - Add MM Base 2021 route • W445 - Add MM Base 2021 route • W445R - Add MM Base 2021 route • W446 - Add MM Base 2021 route • W446R - Add MM Base 2021 route • W448 - Add MM Base 2021 route • W448R - Add MM Base 2021 route • W449 - Add MM Base 2021 route • W449R - Add MM Base 2021 route • W453 - Add MM Base 2021 route • W453R - Add MM Base 2021 route • W459 - Add MM Base 2021 route • W459R - Add MM Base 2021 route • W479a - Add MM Base 2021 route • W479aR - Add MM Base 2021 route • W481 - Add MM Base 2021 route • W481R - Add MM Base 2021 route • W483 - Add MM Base 2021 route • W483R - Add MM Base 2021 route • WDohertys - Add MM Base 2021 route • WDohertysR - Add MM Base 2021 route • WForsythRd - Add MM Base 2021 route • WForsythRdR - Add MM Base 2021 route • WMeltTax2 - Add MM Base 2021 route • WMeltTax2R - Add MM Base 2021 route
2026	**Starting point for modifications is the 'MM Base 2021' bus network** **Modifications**

	• N357 - Adopt MM Project 2031 route • N357R - Adopt MM Project 2031 route • N361 - Adopt MM Project 2031 route • N361R - Adopt MM Project 2031 route • N526 - Adopt MM Project 2031 route • N526R - Adopt MM Project 2031 route • N533 - Adopt MM Project 2031 route • N533R - Adopt MM Project 2031 route • W107 - Adopt MM Project 2031 route • W107R - Adopt MM Project 2031 route • W113 - Adopt MM Project 2031 route • W113R - Adopt MM Project 2031 route • W116 - Adopt MM Project 2031 route • W116R - Adopt MM Project 2031 route • W117 - Adopt MM Project 2031 route • W117R - Adopt MM Project 2031 route • W444 - Adopt MM Project 2031 route • W444R - Adopt MM Project 2031 route • W445 - Adopt MM Project 2031 route • W445R - Adopt MM Project 2031 route • W448 - Adopt MM Project 2031 route • W448R - Adopt MM Project 2031 route • W456 - Adopt MM Project 2031 route • W456R - Adopt MM Project 2031 route • W461 - Adopt MM Project 2031 route • W461R - Adopt MM Project 2031 route • W498 - Adopt MM Project 2031 route • W498R - Adopt MM Project 2031 route • W401 - Adopt MM Project 2031 Headways • W401R - Adopt MM Project 2031 Headways **Additions** • N583 - Add to MM Base 2021 network • N583R - Add to MM Base 2021 network • N584 - Add to MM Base 2021 network • N584R - Add to MM Base 2021 network • N585 - Add to MM Base 2021 network • N585R - Add to MM Base 2021 network • N589 - Add to MM Base 2021 network • N589R - Add to MM Base 2021 network • N590 - Add to MM Base 2021 network • W115 - Add to MM Base 2021 network • W115R - Add to MM Base 2021 network • N590R - Add to MM Base 2021 network

	• W135 - Add to MM Base 2021 network • W135R - Add to MM Base 2021 network • W144 - Add to MM Base 2021 network • W144R - Add to MM Base 2021 network • W179 - Add to MM Base 2021 network • W179R - Add to MM Base 2021 network • W183 - Add to MM Base 2021 network • W183R - Add to MM Base 2021 network • W185 - Add to MM Base 2021 network • W185R - Add to MM Base 2021 network • W466 - Add to MM Base 2021 network • W466R - Add to MM Base 2021 network • WHighSt - Add to MM Base 2021 network • WHighStR - Add to MM Base 2021 network •
2036	**Starting point for modifications is the 'MM Project 2031' bus network.** **Modifications** • E792 - Adopt MM Project 2046 route • E792R - Adopt MM Project 2046 route • E801 - Adopt MM Project 2046 route • E801R - Adopt MM Project 2046 route • E835 - Adopt MM Project 2046 route • E835R - Adopt MM Project 2046 route • W107 - Adopt MM Project 2046 route • W107R - Adopt MM Project 2046 route • W115 - Adopt MM Project 2046 route • W115R - Adopt MM Project 2046 route • W116 - Adopt MM Project 2046 route • W116R - Adopt MM Project 2046 route • W117 - Adopt MM Project 2046 route • W117R - Adopt MM Project 2046 route • W119 - Adopt MM Project 2046 route • W119R - Adopt MM Project 2046 route • W121 - Adopt MM Project 2046 route • W121R - Adopt MM Project 2046 route • W185 - Adopt MM Project 2046 route • W185R - Adopt MM Project 2046 route • W418 - Adopt MM Project 2046 route • W418R - Adopt MM Project 2046 route • W442 - Adopt MM Project 2046 route • W442R - Adopt MM Project 2046 route • W446 - Adopt MM Project 2046 route

	• W446R - Adopt MM Project 2046 route • W453 - Adopt MM Project 2046 route • W453R - Adopt MM Project 2046 route • W456 - Adopt MM Project 2046 route • W456R - Adopt MM Project 2046 route • W461 - Adopt MM Project 2046 route • W461R - Adopt MM Project 2046 route • W466 - Adopt MM Project 2046 route • W466R - Adopt MM Project 2046 route • W498 - Adopt MM Project 2046 route • W498R - Adopt MM Project 2046 route • WDohertys - Adopt MM Project 2046 route • WDohertysR - Adopt MM Project 2046 route **Additions** • E941 - Add to MM Project 2031 network • E941R - Add to MM Project 2031 network • E942 - Add to MM Project 2031 network • E942R - Add to MM Project 2031 network • N586 - Add to MM Project 2031 network • N586R - Add to MM Project 2031 network • W114 - Add to MM Project 2031 network • W114R - Add to MM Project 2031 network • W120 - Add to MM Project 2031 network • W120R - Add to MM Project 2031 network • W122 - Add to MM Project 2031 network • W122R - Add to MM Project 2031 network • W123 - Add to MM Project 2031 network • W123R - Add to MM Project 2031 network • W124 - Add to MM Project 2031 network • W124R - Add to MM Project 2031 network • W125 - Add to MM Project 2031 network • W125R - Add to MM Project 2031 network • W128 - Add to MM Project 2031 network • W128R - Add to MM Project 2031 network • W184 - Add to MM Project 2031 network • W184R - Add to MM Project 2031 network • W186 - Add to MM Project 2031 network • W186R - Add to MM Project 2031 network • W187 - Add to MM Project 2031 network • W187R - Add to MM Project 2031 network • W492 - Add to MM Project 2031 network • W492R - Add to MM Project 2031 network • W499 - Add to MM Project 2031 network

	• W499R - Add to MM Project 2031 network • WRockbankN - Add to MM Project 2031 network • WRockbankNR - Add to MM Project 2031 network • WRockbanks - Add to MM Project 2031 network • WRockbanksR - Add to MM Project 2031 network

Appendix Table C.10 - TfV transport modelling reference case, Road Networks (170710)

Number	Project	Scope	Year
2198	APAC Drive Extension - Melrose Dr to Tullamarine Fwy	New overpass (2 lane, 1-way)	2015
2164	Bridgewater Road - James Mirams Drive to Donald Cameron Drive	Duplication (4 lanes divided)	2015
2166	Brookfield Boulevard - Vantage Boulevard to Aitken Boulevard	New route (2 lanes)	2015
2154	Calder Freeway/Kings Rd Interchange, and Kings Rd duplication Calder Fwy - Melton Hwy	Interchange (full diamond) and duplication (4 lanes divided)	2015
2106	Clyde Road - Kangan Dr to High St (Princes Hwy)	Duplication (4 lanes divided), no grade separation	2015
2107	Cooper St - Hume Fwy to Edgars Rd	Widening (6 lanes divided)	2015
2151	Dandenong Valley Hwy (Stud Road) - Boronia Rd to Mountain Highway	Duplication (4 lanes divided)	2015
2001	Dingley Arterial East - Springvale Rd to Perry Rd	New route (6 lanes divided)	2015
2147	Hallam South Rd - Pound Rd to Ormond Rd	Duplication (4 lanes divided)	2015
2180	Harvest Home Road - Scanlon Dr to Edgars Rd	New route (2 lanes)	2015
2124	Koo Wee Rup Bypass - Manks Rd to South Gippsland Hwy	New route (2 lanes)	2015
2156	Kororoit Creek Rd - Grieve Pde to Millers Rd (4 lanes divided, includes grade separation)	Duplication (4 lanes divided) and grade separation	2015
2173	Linsell Blvd - Narre Warren-Cranbourne Rd to Berwick-Cranbourne Rd	New route (2 lanes)	2015
2008	M80 - Calder Fwy to Sydney Rd	Widening (to 6 or 8 lanes)	2015
2010	M80 - Edgars Rd to Plenty Rd	Widening (to 6 or 8 lanes)	2015
2203	M80 - Tullamarine Fwy to Pascoe Vale Rd	New exit ramp to Pascoe Vale Rd (2 lanes)	2015
2006	M80 - Western Hwy to Sunshine Av	Widening (to 6 or 8 lanes)	2015
1104	Marathon Bvd - Aitken Bvd to Windrock Av	New route (2 lanes)	2015
2201	Melrose Dr - Centre Rd to APAC Dr	Duplication (4 lanes divided)	2015
2199	Mercer Dr - Tullamarine Fwy to Melrose Dr	Widening (2 lanes)	2015
2153	Mitcham Rd - Whitehorse Rd to Brunswick Rd, and Rooks Rd - Whitehorse Rd to Station St	Rail grade separation	2015
2149	Palmers Rd - Connectors to new Williams Landing railway station	New PT connectors	2015
2157	Palmers Road - Extension beyond Princes Fwy across the Werribee rail line	New route (2 lanes)	2015
2004	Peninsula Link - Dandenong-Frankston Rd to Morn Pen Fwy	New route (4 lane freeway)	2015
2002	Peninsula Link (Frankston Bypass) - EastLink to Dandenong-Frankston Rd	New route (4 lane freeway)	2015
2155	Plenty Road - Gordons Rd to Riverdale Bvd	Duplication (4 lanes divided)	2015
2152	Springvale Rd - Virgina St to Balmoral Av	Rail grade separation	2015
2202	Tullamarine Fwy/M80 interchange - Tullamarine Fwy (S bd) to M80 (SW bd)	New elevated ramp (2 lanes) to replace current ramp	2015
2169	William Thwaites Boulevard - Glasscocks Rd to Thompsons Rd	New route (2 lanes)	2015
2158	Windrock Av/Main St - Marathon Bvd to Craigieburn Rd	New route (2 lanes)	2015
2200	Airport Dr Extension - Sharps Rd to Melrose Dr	New link (4 lane divided)	2016
3301	Burke Rd, Glen Iris	Grade separation	2016
2105	Cardinia Rd - Princes Hwy to Shearwater Dr	Duplication (4 lanes divided)	2016
2170	Casey Fields Boulevard - Linsell Av to Patterson Rd	New route (2 lanes)	2016
2172	Claret Ash Boulevard - Harkness Rd to Panorama Dr	New route (2 lanes)	2016
2999	Dingley Arterial West - Warrigal Rd to Westall Rd	New route (6 lanes divided); includes duplication of South Rd extension	2016
2192	Forsyth Road - Sayers Rd to Leakes Rd	New route (2 lanes)	2016
2196	Grassland Drive - Hacketts Rd to Point Cook Rd	New route (2 lanes)	2016
2159	Henry Rd - McCubbin Av to Cardinia Rd	New route (2 lanes)	2016
2123	High Street Rd - Stud Rd to Burwood Hwy	Duplication (4 lanes divided)	2016
2165	Marathon Bvd - Vantage Boulevard to Aitken Boulevard	New route (4 lanes divided)	2016
2311	McGregors Road - Henry Rd to Henty St	Duplication	2016
2312	McGregors Road - Level Crossing to Princes Hwy	Duplication (with exception of level crossing)	2016
2126	Narre Warren-Cranbourne Rd - Pound Rd to Thompsons Rd	Duplication (4 lanes divided)	2016
2168	Scanlon Drive Extension - Cooper St to Craigieburn Road	New route (2 lanes)	2016
2183	Shogaki Drive - Ferris Rd to Mount Cottrell Rd	New route (2 lanes)	2016
3099	2021 PT access		2021
3334	Abbotts Rd, Lyndhurst	Grade separation	2021
4183	Amaroo Road - Summerhill Rd to Donnybrook Rd	New route (2 lanes)	2021
2193	Armstrong Road - Black Forest Rd to Ballan Rd	New route (2 lanes)	2021
3206	Armstrong Road - Westbrook Dr to Black Forest Rd	New route (2 lanes)	2021
3362	Aviation Rd, Laverton	Grade separation	2021
3342	Balcombe Rd, Mentone	Grade separation	2021
2174	Ballarto Road - South Gippsland Hwy to Clyde-Five Ways Rd	Sealing (2 lanes)	2021
3354	Bell St, Coburg	Grade separation	2021
3358	Bell St, Preston	Grade separation	2021

Number	Project	Scope	Year
3300	Blackburn Rd, Blackburn	Grade separation	2021
4166	Boundary Rd - Derrimut to Palmers Rd	Sealing (2 lanes)	2021
2162	Bridge Road - Ferris Road to Exford Road	Sealing (2 lanes)	2021
3351	Buckley St, Essendon	Grade separation	2021
3355	Camp Rd, Campbellfield	Grade separation	2021
3302	Cardinia Rd, Shearwater Dr to Pakenham Bypass	Duplication	2021
3340	Centre Rd, Bentleigh	Grade separation	2021
3370	Centre Rd, Clayton	Grade separation	2021
9270	Chandler Highway - Eastern Fwy Off Ramp to Heidelberg Rd	Widening (6 lanes divided)	2021
3333	Chandler Rd, Noble Park	Grade separation	2021
3341	Charman Rd, Cheltenham	Grade separation	2021
3363	Cherry St, Werribee	Grade separation	2021
3309	Clayton Rd, Clayton	Grade separation	2021
3338	Clyde Rd, Berwick	Grade separation	2021
2184	Coburns Rd - Hume Av to Exford Rd	New route (2 lanes)	2021
3332	Corrigan Rd, Noble Park	Grade separation	2021
7994	Derrimut Road - Leakes Road to Dohertys Road	Duplication (4 lanes divided)	2021
3182	Derrimut Road - Sayers Rd to Leakes Rd	Duplication (4 lanes divided)	2021
8341	Dohertys Rd - Cherry La to Westgate Dr freeway overpass	Widening (4 lanes)	2021
2111	Dohertys Rd - Fitzgerald Rd to Grieve Pde	Duplication (4 lanes, divided except on freeway overpass)	2021
3379	Dohertys Rd - Foundation Rd to Fitzgerald Rd	Widening (4 lanes divided)	2021
3378	Dohertys Rd - Palmers Rd to Foundation Rd	Widening (4 lanes divided)	2021
3186	Donald Cameron Drive - Bridgewater Road to Southern Cross Drive	Duplication (4 lanes divided)	2021
6127	Dunnings Rd - Pt Cook Rd to Palmers Rd	Duplication (4 lanes divided)	2021
8316	E14 - Somerton Rd to Mt Ridley Rd	Widening (4 lanes divided)	2021
3179	E14 (Aitken Bvd) - Craigieburn Rd to Central Arterial	New route (2 lanes)	2021
3120	E14 (Aitken Bvd) - Mt Ridley Rd to Gunns Gully Rd	New route (2 lanes)	2021
3178	E14 (Aitken Bvd) - Somerton Rd to Craigieburn Rd	New route (2 lanes)	2021
2163	Edgars Rd - O'Herns Rd to Craigieburn Rd East	New route (2 lanes)	2021
3343	Edithvale Rd, Edithvale	Grade separation	2021
2197	Evans Road - Prichard Av to Thompsons Rd	Sealing (2 lanes)	2021
3368	Ferguson St, Williamstown	Grade separation	2021
2187	Ferris Rd - Abey Rd to Iramoo Rd	New route (2 lanes)	2021
6126	Forsyth Rd - Old Geelong Rd to Sayers Rd	Duplication (4 lanes divided)	2021
3184	Forsyth Road - K-Mart Entrance to Wallace Ave	Duplication (4 lanes divided)	2021
4185	Forsyth Road/Christies Road - Leakes Rd to Boundary Rd	New route (2 lanes)	2021
2114	Forsyth Road/Old Geelong Rd - Intersection improvements	Duplication (4 lanes divided)	2021
3360	Furlong Rd, St Albans	Grade separation	2021
2177	Glasscocks Road - South Gippsland Hwy to Berwick-Cranbourne Rd	New route (2 lanes)	2021
3352	Glenroy Rd, Glenroy	Grade separation	2021
3330	Grange Rd, Caulfield East	Grade separation	2021
3356	Grange Rd, Fairfield	Grade separation	2021
2175	Greenhills Road - McGregors Rd to Koo Wee Rup Rd	Sealing (2 lanes)	2021
2194	Greens Rd - Armstrong Rd to Ison Rd	Sealing (2 lanes)	2021
4138	Grices Rd - Berwick-Cranbourne Rd to Soldiers Rd	Sealing (2 lanes)	2021
2195	Hacketts Rd - Sneydes Rd to Aviation Rd	Sealing (2 lanes)	2021
2117	Hallam South Rd - Ormond Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2021
3337	Hallam South Road, Hallam	Grade separation	2021
3350	Heatherdale Rd, Ringwood	Grade separation	2021
3310	Heatherton Rd	Grade separation	2021
3359	High St, Reservoir	Grade separation	2021
3308	Koornang Rd	Grade separation	2021
3367	Kororoit Creek Rd, Altona	Grade separation	2021
2191	Leakes Rd - Davis Rd to Tarneit Rd	Sealing (2 lanes)	2021
5184	Leakes Rd - Derrimut Rd to Palmers Rd	Duplication (4 lanes divided)	2021
2150	Leakes Rd - Palmers Rd to Fitzgerald Rd	Duplication (4 lanes divided)	2021
3357	Lower Plenty Rd, Rosanna	Grade separation	2021
2011	M80 - Plenty Rd to Greensborough Hwy	Widening (6 lane freeway)	2021
1006	M80 - South bound, Deer Park Bypass to Boundary Rd	Widening (4 lanes S bd)	2021
2009	M80 - Sydney Rd to Edgars Rd	Widening (8 to 10 lane freeway)	2021
2005	M80 - WestGate Fwy to Western Hwy	Widening (8 to 10 lane freeway)	2021
3303	Main Rd, St Albans	Grade separation	2021
3365	Manchester Rd, Mooroolbark	Grade separation	2021
2161	Manor Lakes Bvd, Extension to Westbrook Dr	New route (2 lanes)	2021
3373	Maroondah Highway - Ringwood St to Warrandyte Rd	Speed reduction (40 kph)	2021
3366	Maroondah Hwy, Lilydale	Grade separation	2021
2176	McGregors Rd - Pakenham Bypass to Thompsons Rd Extension	Sealing (2 lanes)	2021

Number	Project	Scope	Year
3339	McKinnon Rd, McKinnon	Grade separation	2021
3361	Melton Hwy, Taylors Lakes	Grade separation	2021
3014	Monash Freeway - Eastlink to South Gippsland Fwy	Widening (10 lane freeway)	2021
3015	Monash Freeway - Springvale Rd to Eastlink	Widening (10 lane freeway)	2021
3013	Monash Freeway - South Gippsland Fwy to Clyde Rd	Widening (6 lanes freeway)	2021
3377	Mordialloc Bypass - Springvale Road to Dingley Freeway	New route (4 lanes divided)	2021
3353	Moreland Rd, Brunswick	Grade separation	2021
4184	Morris Rd - Leakes Rd to Boundary Rd	New route (2 lanes)	2021
3371	Mountain Hwy, Bayswater	Grade separation	2021
2181	Mt Cottrell Rd - Greigs Rd to Western Fwy	Sealing (2 lanes)	2021
3305	Murrumbeena Rd	Grade separation	2021
3209	Nicholson St - Blyth St to Holmes St	Speed reduction (40 kph)	2021
3306	North Rd	Grade separation	2021
2179	Officer South Rd - Railway line to Pakenham Bypass	Sealing (2 lanes)	2021
9233	O'Herns Rd - Edgars Road to Epping Road	Duplication (4 lanes divided)	2021
4163	O'Herns Rd - Hume Fwy interchange	Interchange (full diamond)	2021
3348	Overton Rd (Skye Rd), Seaford	Grade separation	2021
6130	Palmers Rd - Dohertys Rd to Boundary Rd	Widening (4 lanes divided)	2021
4161	Palmers Rd - Dunnings Rd to Princes Fwy	Duplication (4 lanes divided)	2021
4165	Palmers Rd - Princes Fwy to Sayers Rd	Duplication (4 lanes divided)	2021
4162	Palmers Rd - Sayers Rd to Dohertys Rd	Duplication (4 lanes divided)	2021
9395	Plenty Road - Development Bvd to Gordons Rd	Widening (6 lanes divided)	2021
9271	Plenty Road - Gordons Rd to Riverdale Bvd	Widening (6 lanes divided)	2021
2132	Plenty Road - McKimmies Rd to Development Bvd	Widening (6 lanes divided)	2021
5185	Plenty Road - Riverdale Bvd to Bridge Inn Rd	Duplication (4 lanes divided)	2021
3331	Poath Rd, Hughesdale	Grade separation	2021
5186	Princes Freeway West, Interchange - Duncans Rd	Interchange (westerly oriented ramps)	2021
9236	Princes Freeway West, Interchange - Sneydes Road	Interchange (full diamond)	2021
8434	Princes Fwy West - Forsyth Rd	Ramp widening	2021
6131	Robinsons Rd - Boundary Rd to Deer Park Bypass	Duplication (4 lanes divided)	2021
3191	Scanlon Drive Extension - Craigieburn Rd to Summerhill Rd	New route (2 lanes)	2021
3304	Scoresby Rd, Bayswater	Grade separation	2021
3347	Seaford Rd, Seaford	Grade separation	2021
3312	Sladen St - Narre Warren-Cranbourne Rd to South Gippsland Hwy	Duplication (4 lanes, not divided)	2021
4181	Soldiers Rd - Grices Rd to Pound Rd	New route (2 lanes)	2021
3336	South Gippsland Hwy, Dandenong South	Grade separation	2021
3344	Station St, Bonbeach	Grade separation	2021
3376	Swan St Bridge	Widening (3 lanes east bound)	2021
9206	Tarneit Rd - Hogans Rd to Sayers Rd	Duplication (4 lanes divided)	2021
3176	Thompsons Rd - Dandenong Valley Hwy to Western Port Hwy	Duplication (4 lanes divided)	2021
6139	Thompsons Rd - Narre Warren - Cranbourne Rd to Berwick-Cranbourne Rd	Duplication (4 lanes divided)	2021
3197	Thompsons Rd Extension - Berwick-Cranbourne Rd to Soldiers Rd	New route (2 lanes)	2021
3335	Thompsons Rd, Cranbourne West	Grade separation	2021
3349	Toorak Rd, Kooyong	Grade separation	2021
3177	Tullamarine Freeway - Mickleham Rd to Melbourne Airport	Widening (6 lanes)	2021
3158	Tullamarine Freeway - Western Ring Rd to Mickleham Road	Widening (6 lanes)	2021
4187	Tullamarine Freeway - WRR to Melbourne Airport (North bound only)	Widening (4 lanes one-way)	2021
8388	Tullamarine Fwy - Bulla Rd to Western Ring Rd	Widening (6 lane freeway)	2021
9016	Tullamarine Fwy - Calder Fwy to Western Ring Rd southerly ramps	Widening (8 lane freeway)	2021
1202	Tullamarine Fwy/Calder Fwy interchange - Calder Fwy east-bound ramp	Widening to 3 lanes	2021
1205	Tullamarine Fwy/Calder Fwy interchange - Tullamarine Fwy south-bound ramp	Widening to 3 lanes	2021
1201	Tullamarine Fwy/CityLink - Calder Fwy to Westgate Fwy	Widening (10 lanes Calder Fwy to Flemington Rd, 8 lanes to Westgate Fwy) and free speed decrease to 80 kph	2021
3364	Werribee St, Werribee	Grade separation	2021
8998	West Gate Distributor Shepherds Bridge and Moreland St Widening	Widening (4 lanes outbound)	2021
333	Western Distributor - West Gate Fwy to CityLink / North Melbourne	New freeway (4 lanes)	2021
7308	Western Freeway - Mt Cottrell Rd	Remove direct freeway access	2021
9211	Yan Yean Rd - Kurrak Road to Diamond Creek Road	Duplication (4 lanes divided)	2021
2310	ZEBRA West Gate Freeway - Western Link to Burnley Tunnel	Widening (4 lanes east bound only)	2021
3320	ZEBRA Western Link - Brunswick Rd to Bulla Rd	Widening (10/12 lane freeway)	2021
4156	Berwick-Cranbourne Rd - Pattersons Rd to Narre Warren-Cranbourne Rd	Duplication (4 lanes, not divided)	2026
9164	Bridge Inn Rd - Plenty Rd to Yan Yean Rd	Duplication (4 lanes divided)	2026

Number	Project	Scope	Year
8162	Bulla Bypass - Sunbury Rd to Somerton Rd	New route (4 lanes)	2026
8137	Calder Freeway, Interchange - Calder Park Dve	Interchange (full diamond)	2026
8138	Calder Park Dr - Calder Fwy to Melton Hwy	Duplication (4 lanes divided)	2026
5188	Craigieburn Rd - Dorchester St to Waterview Bvd	Duplication (4 lanes divided)	2026
4160	Craigieburn Rd - Hanson Rd to Dorchester St	Duplication (4 lanes divided)	2026
7996	Craigieburn Rd - Hanson Road to Hume Freeway	Duplication (4 lanes divided)	2026
8163	Craigieburn Rd - Mickleham Rd to E14	Duplication (4 lanes divided)	2026
8442	Craigieburn Road East - Hume Freeway to Epping Rd	Duplication (4 lanes divided)	2026
5006	Dandenong Bypass - South Gippsland Hwy to South Gippsland Fwy	New route (6 lanes divided)	2026
7995	Derrimut Road - Dohertys Road to Boundary Road	Duplication (4 lanes divided)	2026
4003	Eastern Freeway - Bulleen Rd to Doncaster Rd	Widening (10 lanes)	2026
4004	Eastern Freeway - Doncaster Rd to Springvale Rd	Widening (8 lanes)	2026
8385	Eastern Fwy - Chandler Hwy to Bulleen Rd	Widening (10 lane freeway)	2026
9450	Edgars Rd - Cooper St to O'Herns Rd	Widening (6 lanes divided)	2026
8168	Epping Rd - Findon Rd to Craigieburn Rd	Duplication (4 lanes divided)	2026
2146	Epping Rd - Memorial Av to Findon Rd	Duplication (4 lanes divided)	2026
8436	Glasscocks Road - Dandenong Valley Hwy to Western Port Hwy	Duplication (4 lanes divided)	2026
8204	Glasscocks Road - Evans Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2026
8188	Glasscocks Road - Western Port Hwy to Evans Rd	Duplication (4 lanes divided)	2026
9168	Grange Rd - Heidelberg Rd to Darebin Rd	Duplication (4 lanes divided)	2026
3173	Hallam South Rd - Princes Hwy to Pound Rd	Duplication (4 lanes divided) and grade separation	2026
4188	Hallam South Rd - At railway crossing	Duplication (4 lanes divided)	2026
3204	Hopkins Rd Extension - Neale Rd to Melton Hwy	New route (2 lanes)	2026
5130	Koo-Wee-Rup Rd - Ballarto Rd to Manks Rd	Duplication (4 lanes divided)	2026
5131	Koo-Wee-Rup Rd - Hall Rd to Ballarto Rd	Duplication (4 lanes divided)	2026
5132	Koo-Wee-Rup Rd - Pakenham Bypass to Hall Rd	Duplication (4 lanes divided)	2026
5308	M80 - Plenty Rd to Greensborough Hwy	Widening (8 lane freeway)	2026
4119	Mickleham Road - Somerton Road to Craigieburn Road	Duplication (4 lanes divided)	2026
4157	Narre Warren - Cranbourne Rd - Thompsons Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2026
4010	North East Link / Manningham Rd interchange	Full interchange	2026
4008	North-East Link -connection between Metropolitan Ring Road and Eastern Freeway at Bulleen	New route (6-8 lane freeway)	2026
3375	O'Shea Rd - Soldiers Rd to Princes Fwy including South-East facing ramps and bridge widening	New route (4 lanes)	2026
2182	Paynes Road - Western Fwy to Harrison Rd	New route (2 lanes)	2026
5183	Pound Rd - West to Remington Drive Extension	New route (4 lanes divided) and grade separation	2026
8152	Pound Rd/Greaves Rd/o'Shea Rd route - Berwick-Cranbourne Rd to Princes Freeway	Duplication (4 lanes divided)	2026
2135	Somerton Road - Mickleham Rd to Roxburgh Park Dr	Duplication (4 lanes divided)	2026
1991	Taylors Rd - Kurung Dr (west) to west of Shire boundary	Duplication (4 lanes divided)	2026
4180	Thompsons Rd Extension - Soldiers Rd to Officer South Rd	New route (2 lanes)	2026
2167	Vantage Boulevard - Craigieburn Rd to Mt Ridley Rd	New route (2 lanes)	2026
4158	Westall Road (Northern Extension) - Princes Hwy East to Monash Fwy	New route (4 lane divided)	2026
7309	Western Freeway - Paynes Rd	Remove direct freeway access	2026
7310	Western Freeway - Troupes Rd North	Remove direct freeway access	2026
3101	Armstrong Road - Ballan Rd to Sayers Rd	New route (2 lanes)	2031
4175	Bells Road - Pound Rd to Ballarto Rd	New route (2 lanes)	2031
4173	Bells Road/Yallambie Road - Ballarto Rd to Manks Rd	New route (2 lanes)	2031
4155	Berwick-Cranbourne Rd - Thompsons Rd to Pattersons Rd	Duplication (4 lanes not divided)	2031
5197	Beveridge-Darraweit Road Extension - Old Sydney Rd to Scanlon Drive Extension	New route (2 lanes)	2031
3199	Bodycoats Road - Craigieburn Rd to Summerhill Rd	New route (2 lanes)	2031
7302	Boundary Rd - Davis Rd to Derrimut Rd	Duplication (4 lanes divided)	2031
8338	Boundary Rd - Fitzgerald Rd to Western Ring Rd	Widening (6 lanes divided)	2031
3200	Boundary Road - Scanlon Dr to Epping Rd	New route (2 lanes)	2031
8143	Broadmeadows Rd - Mickleham Rd to Ripplebrook Dr	Duplication (4 lanes divided)	2031
4134	C21 North South Boulevard - Princes Fwy to Grices Rd	New route (4 lanes divided)	2031
6008	Calder Freeway - Vineyard Rd to Melton Hwy	Widening (6 lanes)	2031
7172	Calder Park Dr - Melton Hwy to Taylors Rd	Duplication (4 lanes divided)	2031
2206	Casey Fields Boulevard - Patterson Rd to South Gippsland Hwy	New route (2 lanes)	2031
2205	Casey Fields Boulevard - Thompsons Rd to Linsell Av	New route (2 lanes)	2031
7171	Childs Road - High St to Dalton Rd	Duplication (4 lanes divided)	2031
7169	Childs Road - High St to Edgars Rd	New route (4 lanes divided)	2031
9289	Christies Rd - Western Highway to Western Freeway	Duplication (4 lanes divided)	2031
5187	Cooper St - Hume Hwy to Hume Freeway	Widening (6 lanes divided)	2031
2190	Davis Rd - Boundary Rd to Dohertys Rd	Sealing (2 lanes)	2031

Number	Project	Scope	Year
2160	Davis Rd - Dohertys Rd to Hogans Rd	New route (2 lanes)	2031
9294	Derrimut Road - Hogans Rd to Sayers Rd	Widening (6 lanes divided)	2031
4159	Dorset Rd - Burwood Hwy to Lysterfield Rd	New route (2 lanes)	2031
3122	E14 (Aitken Bvd) - Broadmeadows Rd Deviation to Somerton Rd	New route (4 lanes divided)	2031
5195	E14 (Mandalay Road) - Camerons Lane to north of boundary	New route (2 lanes)	2031
5191	E14 (Mandalay Road) - Gunns Gully Rd to Camerons Lane	New route (2 lanes)	2031
8315	Epping Rd - Bridge Inn Rd to Craigieburn Rd	Widening (4 lanes divided)	2031
6110	Evans Road - South Gippsland Hwy to Hall Rd	Duplication (4 lanes divided) and railway grade separation	2031
7173	Fitzsimons La - Main Rd to Porter St	Widening (6 lanes divided)	2031
3190	Gunns Gully Road - Hume Fwy to Scanlon Drive Extension	New route (2 lanes)	2031
9114	Hall Rd - Western Port Hwy to Sladen St	Duplication (4 lanes divided)	2031
4178	Hardys Road - Pound Rd to Muddy Gates La	New route (2 lanes)	2031
6140	Harrison Rd - Downing St to Hopkins Rd	New route (2 lanes)	2031
2189	Harrison Rd - Mount Cottrell Rd to Downing St	New route (2 lanes)	2031
3180	Heaths Rd - Shaws Rd to Tarneit Rd	Duplication (4 lanes divided)	2031
3181	Heaths Rd/Bolton Rd - Ballan Rd to Shaws Rd	Duplication (4 lanes divided) and bridge widening	2031
8317	Hopkins Rd - Greigs Rd to Plumpton Rd	Widening (4 lanes divided)	2031
3202	Hume Drive - Plumpton Road to Gourlay Road	New route (2 lanes)	2031
8432	Hume Freeway - Western Ring Rd to Cooper St	Widening (6 lanes)	2031
2185	Iramoo Rd - Exford Rd to Ferris Rd	New route (2 lanes)	2031
2186	Iramoo Rd - Ferris Rd to Greigs Rd	New route (2 lanes)	2031
8193	McGregor Rd - South of Henty St to Pakenham Bypass	Duplication (4 lanes divided)	2031
8439	Melbourne Airport - New elevated ring road connecting to Tullamarine Fwy	New link (1-way, 1-3 lanes)	2031
9453	Melton Hwy - Banchory Av to The Regency	Widening (6 lanes divided)	2031
8135	Melton Hwy - The Regency to Ryans Lane	Widening (6 lanes divided)	2031
6116	Mickleham Road - Craigieburn Road to Donnybrook Road	Duplication (4 lanes divided)	2031
4174	Moores Road - South Gippsland Hwy to Bells Rd	New route (2 lanes)	2031
9216	Mornington-Tyabb Road - Nepean Hwy to Moorooduc Hwy	Duplication (4 lanes divided)	2031
5204	Mt Cottrell Rd - Western Fwy to Melton Hwy	New route (2 lanes)	2031
9010	Mt Cottrell Rd/Western Freeway Interchange	New interchange (half diamond, easterly ramps)	2031
4177	Muddy Gates Lane - Ballarto Rd to Hardys Rd	New route (2 lanes)	2031
5179	Narre Warren North Rd - Ernst Wanke Rd to Heatherton Rd	Duplication (4 lanes divided)	2031
5196	New east-west arterial north of Camerons Lane - Old Sydney Rd to Stewart St	New route (2 lanes)	2031
4170	New east-west arterial south of Camerons Lane (Rankin St) - Old Sydney Rd to Stewart St	New route (2 lanes)	2031
4171	New east-west route north of OMR - Mandalay Rd to Patterson St	New route (2 lanes)	2031
4172	New north-south route in Donnybrook - Gunns Gully Rd to Scanlon Dr Extension	New route (2 lanes)	2031
5192	Patterson Street - Beveridge to north of Beveridge	New route (2 lanes)	2031
3196	Pattersons Road - Berwick-Cranbourne Rd to Tuckers Rd	New route (2 lanes)	2031
4179	Pattersons Road - Tuckers Rd to Pound Rd	New route (2 lanes)	2031
5205	Paynes Road - Melton Hwy to Western Fwy	New route (2 lanes)	2031
8431	Plumpton Road - Hopkins Road Extension to Calder Freeway	Widening (4 lanes divided)	2031
6124	Point Cook Road - Pt Cook Homestead Road to Dunnings Road	Duplication (4 lanes divided)	2031
8335	Princes Fwy - Kororoit Creek Rd to Dohertys Rd	Widening (10 lanes freeway)	2031
4122	Racecourse Road - Princes Hwy to Princes Fwy	Duplication (4 lanes divided) and grade separation	2031
3098	Road adjustment around Melbourne Metro Stations		2031
7170	Robinsons Rd/Westwood Dve - Deer Park Bypass to Western Hwy	Duplication (4 lanes divided) and grade separation	2031
3203	Saric Road - Melton Highway to Taylors Rd	New route (2 lanes)	2031
9378	Scanlon Drive - O'Herns Rd to Craigieburn Rd	Duplication	2031
5194	Scanlon Drive Extension - Beveridge Rd to Wallan	New route (2 lanes)	2031
9228	Shrives/Centre/Fullard Rds - Pound Rd to Narre Warren-Cranbourne Rd	Widening (4 lanes not divided)	2031
8308	Soldiers Rd - Grices Rd to Pound Rd	Duplication (4 lanes divided)	2031
8355	Somerton Rd - Tullamarine Fwy extension to Oaklands Rd	Widening (4 lanes divided)	2031
8124	Somerton Road - Mickleham Rd to Oaklands Rd	Duplication (4 lanes divided)	2031
8440	Somerton Road - Wildwood Rd to Tullamarine Fwy extension	Widening (4 lanes divided)	2031
5193	Stewart Street - Beveridge to Northern Highway at Hume Interchange	New route (2 lanes)	2031
3201	Summerhill Rd/Masons Rd - Scanlon Dr to E6	New route (2 lanes)	2031
8139	Sunbury Rd - Melbourne-Lancefield Road to Powlett Street	Duplication (4 lanes divided)	2031
5201	Tarletons Road - Leakes Rd to Plumpton Rd	New route (2 lanes)	2031
8144	Taylors Rd - Calder Park Dve to Plumpton Rd	Duplication (4 lanes divided)	2031
7167	Taylors Rd - Kings Rd to Kurung Dr	Duplication (4 lanes divided)	2031

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8305	Taylors Road Extension - Melton Hwy to Plumpton Rd	Duplication (4 lanes divided)	2031
3157	Templestowe Rd - Bridge St to Thompsons Rd	Duplication (4 lanes divided)	2031
5198	Thompsons Rd Extension - Officer South Rd to Cardinia Rd	New route (2 lanes)	2031
3195	Tuckers Road - Pound Rd to Ballarto Rd	New route (2 lanes)	2031
4176	Tuckers Road/Derricks Rd - Ballarto Rd to Manks Rd	New route (2 lanes)	2031
5306	Tullamarine Freeway Extension - Melbourne Airport to Somerton Rd	New route (4 lane freeway)	2031
5176	Western Port Hwy - North Rd to Baxter Tooradin Rd	Duplication (4 lanes divided)	2031
6128	Westwood Drive - Western Hwy to Rockbank Middle Rd	Widening (4 lanes divided)	2031
8180	Boundary Rd- Derrimut Rd to Palmers Rd	Widening (6 lanes divided)	2036
8426	Boundary Rd- Palmers Rd to Fitzgerald Rd	Widening (6 lanes divided)	2036
9163	Bridge Inn Rd - Cravens Rd to Plenty Rd	Duplication (4 lanes divided)	2036
9161	Bridge Inn Rd - E6 to Cravens Rd	Duplication (4 lanes divided)	2036
9162	Bridge Inn Rd - Epping Rd to E6	Duplication (4 lanes divided)	2036
9005	Calder Freeway - M80 Ring Road to Melton Hwy	Widening (8 lanes divided)	2036
3185	Canterbury Avenue - Bundanoon Avenue to Albert Road	New route (2 lanes)	2036
3113	Canterbury Rd - Dorset Rd to Liverpool Rd	Widening (6 lanes divided)	2036
2171	Craig Road - new connection to South Gippsland Hwy	New route (2 lanes)	2036
7306	Dandenong Bypass - Perry Rd to South Gippsland Hwy	Widening (6 lanes divided)	2036
7311	Dohertys Rd - Derrimut Rd to Palmers Rd	Widening (4 lanes divided)	2036
2188	Downing Street - Greigs Rd to Harrison Rd	Sealing (2 lanes)	2036
8307	Duncans Rd - Princes Highway to Princes Freeway	Duplication (4 lanes divided)	2036
5008	Eastern Freeway - Doncaster Rd to Springvale Rd	Widening (8 lanes; and 10 lanes btn Tram Rd and Blackburn Rd)	2036
8345	Federation Dr - Centenary Av to Melton Hwy	Widening (4 lanes)	2036
3207	Greens Rd - Ison Rd to OMR	Sealing (2 lanes)	2036
8198	Hall Rd - McCormicks Rd to Western Port Hwy	Duplication (4 lanes divided)	2036
3194	Hardys Road - Berwick-Cranbourne Rd to Pound Rd	New route (2 lanes)	2036
8429	Hopkins Rd - Boundary Rd to Greigs Rd	Widening (6 lanes divided)	2036
8017	Hume Freeway - Cooper St to Craigieburn Rd	Widening (6 lanes)	2036
8414	Hume Fwy - Hume Hwy to Craigieburn Rd	Widening (6 lane freeway)	2036
8179	Leakes Rd - Davis Rd to Derrimut Rd	Duplication (4 lanes)	2036
8320	Leakes Rd - Davis Rd to Shanahans Rd	Widening (4 lanes divided)	2036
8344	Leakes Rd - Iramoo Rd to Taylors Rd	Widening (4 lanes)	2036
4167	Merrifield Road - north of Donnybrook Rd to Beveridge	New route (2 lanes)	2036
8430	Mt Cottrell Rd - Leakes Rd to Melton Hwy	Widening (4 lanes divided)	2036
9259	Narre Warren-Cranbourne Rd - Centre Rd to Pound Rd	Widening (6 lanes divided)	2036
9258	Narre Warren-Cranbourne Rd - Pound Rd to Thompsons Rd	Widening (6 lanes divided)	2036
5200	Officer South Rd - Pakenham Bypass to Patterson Rd	Sealing (2 lanes)	2036
4145	Officer South Rd - Rix Rd to Pakenham Bypass	Interchange (full diamond), duplication (4 lanes divided) and grade separation	2036
8153	Pound Rd/Greaves Rd/O'Shea Rd route - Hallam South Rd to Narre Warren-Cranbourne Rd	Duplication (4 lanes divided)	2036
4137	Pound Rd/Greaves Rd/O'Shea Rd route - Narre Warren-Cranbourne Rd to Berwick-Cranbourne Rd	Duplication (4 lanes divided)	2036
3193	Pound Road - Soldiers Rd Extension to Bells Rd	New route (2 lanes)	2036
2302	Princes Freeway East, Interchange - McGregor Rd	Interchange (easterly oriented ramps)	2036
3314	Princes Fwy / Clyde Road Interchange	Interchange Upgrade - improve capacity	2036
6143	Riding Boundary Rd - Mt Atkinson Rd to Hopkins Rd	New route (2 lanes)	2036
8334	Sayers Rd - Derrimut Rd to Palmers Rd	Widening (4 lanes)	2036
3192	Scanlon Drive Extension - Gunns Gully Rd to Beveridge Rd	New route (2 lanes)	2036
8330	Sneydes Rd - Hoppers La to Boardwalk Bvd	Widening (4 lanes)	2036
8378	South Gippsland Hwy - South Gippsland Fwy to Thompsons Rd	Widening (6 lanes divided)	2036
9286	Sunbury Rd - OMR to Melbourne-Lancefield Rd	Widening (6 lanes divided)	2036
8410	Thompsons Rd - Eastlink to McCormicks Rd	Widening (6 lanes divided)	2036
6141	Troups Road South - Greigs Rd to Harrison Rd	New route (2 lanes)	2036
7305	Westall Rd - Dingley Arterial to Springvale Rd	Widening (6 lanes divided)	2036
9438	William Thwaites Boulevard - Glasscocks Rd to Thompsons Rd	Duplication (4 lanes divided)	2036
9244	Yan Yean Road -Kurrak Road to Bridge Inn Road	Duplication (4 lanes divided)	2036
8318	Ballan Rd - OMR to Bulban Rd	Widening (4 lanes divided)	2041
9213	Ballarto Road - South Gippsland Hwy to Casey Fields Bvd	Duplication (4 lanes divided)	2041
8420	Barry Road - Malmsbury Dr to E14	New route (2 lanes)	2041
9253	Berwick-Cranbourne Rd - Pound Rd to Thompsons Rd	Widening (6 lanes divided)	2041
9254	Berwick-Cranbourne Rd - Thompsons Rd to Pattersons Rd	Widening (6 lanes divided)	2041
8339	Boundary Rd - WRR to Fairbairn Rd	Widening (6 lanes divided)	2041
8419	Brookville Dr - Amaroo Rd to Donnybrook Rd	Widening (4 lanes divided)	2041
6134	Burwood Highway - Scoresby Rd to Ferntree Gully Rd	Widening (6 lanes divided)	2041

Number	Project	Scope	Year
8136	Calder Freeway, Interchange - Sunshine Ave	Interchange (1/2 diamond, westerly oriented)	2041
6137	Canterbury Rd - Liverpool Rd to Mount Dandenong Tourist Rd	Widening (6 lanes divided)	2041
9440	Casey Fields Bvd/Craig Road - Ballarto Rd to Browns Rd	Duplication (4 lanes divided)	2041
6123	Childs Rd - Bowman Dr to Proposed E6	Duplication (4 lanes divided)	2041
8370	Clyde Road - Grices Rd to Moondarra Dr	Widening (6 lanes divided)	2041
6135	Clyde-Five Ways Rd - Pattersons Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2041
9104	Cranbourne Local Bypass/Linsell Blvd/Hardys Road - South Gippsland Hwy to Muddy Gates La	Duplication (4 lanes divided)	2041
9265	Cranbourne-Frankston Rd - Western Port Hwy to Hall Rd	Widening (6 lanes divided)	2041
8380	Dandenong-Frankston Rd - Thompsons Rd to Greens Rd	Widening (6 lanes divided)	2041
8358	Diamond Creek Rd - Greensborough Bypass to Yan Yean Rd	Widening (6 lanes divided)	2041
7001	E6 - Findon Rd to Bridge Inn Rd (includes sealing of Craigieburn Rd East from OMR to Epping Rd)	New route (4 lane freeway)	2041
8309	E6 - Hume Fwy to Scanlon Dr	New route (4 lane freeway)	2041
8014	E6 - Metropolitan Ring Rd to Findon Rd	New route (4 lane freeway)	2041
8012	E6 - Scanlon Dr to Bridge Inn Rd	New route (4 lane freeway)	2041
4005	Eastlink - Maroondah Hwy to Dingley Arterial	Widening (8 lanes)	2041
6138	Ferntree Gully Rd - Scoresby Rd to Burwood Hwy	Widening (6 lanes divided)	2041
9110	Glasscocks Road - South Gippsland Hwy to Berwick-Cranbourne Rd	Duplication (4 lanes divided)	2041
9226	Gorge Rd/ Kurrak Rd - Plenty Rd to Yan Yean Rd	Duplication (4 lanes divided)	2041
8343	Greigs Road - Troups Rd Sth to Hopkins Rd	Widening (4 lanes)	2041
9111	Grices Rd - Berwick-Cranbourne Rd to Soldiers Rd	Duplication (4 lanes divided)	2041
7159	Heatherton Rd - Hallam North Rd to Belgrave-Hallam Rd	Duplication (4 lanes divided)	2041
8408	Heatherton Rd - Monash Fwy to Power Rd	Widening (6 lanes divided)	2041
8415	Hume Fwy - Gunns Gully Rd to south of Donnybrook Rd	Widening (6 lane freeway)	2041
9514	Hume Fwy - south of Donnybrook Rd to Hume Hwy	Widening (8 lane freeway)	2041
8342	Iramoo Rd - Mt Cottrell Rd to Greigs Rd	Widening (4 lanes)	2041
6132	Leakes Rd - Palmers Rd to Fitzgerald Rd	Widening (6 lanes divided)	2041
8340	Little Boundary Rd - Fairbairn Rd to Princes Hwy	Widening (6 lanes divided)	2041
8185	Lysterfield Rd -Napoleon Rd to Wellington Rd	Duplication (4 lanes divided)	2041
8421	M80 - E6 to Greensborough Hwy	Widening (10 lane freeway)	2041
8192	McGregor Rd - Pakenham Bypass to Thompsons Rd Extension	Duplication (4 lanes divided)	2041
8381	Mornington Peninsula Fwy - Lower Dandenong Rd to Springvale Rd	Widening (6 lane freeway)	2041
8382	Mornington Peninsula Fwy - Springvale Rd to Eastlink	Widening (8 lane freeway)	2041
9130	Mount Dandenong Road - Liverpool Rd to Canterbury Rd	Duplication (4 lanes divided)	2041
6142	Mt Atkinson Rd - Boundary Rd to Greigs Rd	New route (2 lanes)	2041
9232	Officer South Rd - Princes Hwy to Rix Rd	Widening (4 lanes divided)	2041
8007	OMR - Princes Fwy to Ballan Rd	New route (4 lane freeway)	2041
8368	Princes Hwy - Old Princes Hwy to Officer South Rd	Widening (6 lanes divided)	2041
8016	Punt Road - Swan Street to St Kilda junction	Widening (6 lanes)	2041
9137	Remington Dve to Bangholme Rd (via Colemans and Taylors Rds)	New route (4 lanes divided)	2041
9522	Robinsons Rd - through Deer Park Bypass interchange	Widening (6 lanes divided)	2041
5994	Sayers Road/ Old Geelong Road - Palmers Road to Kororoit Creek Road	Duplication (4 lanes divided)	2041
9280	Somerton Road - Hume Hwy to Roxburgh Park Drive	Widening (6 lanes divided)	2041
9018	South Gippsland Freeway - Monash Fwy to South Gippsland Hwy	Widening (6 lanes)	2041
5182	Springvale Rd - Mitcham Rd to Old Warrandyte Rd	Duplication (4 lanes divided)	2041
4129	Springvale Rd - Old Warrandyte Rd to Reynolds Rd	Duplication (4 lanes divided)	2041
4108	Stud Road Extension (Bayswater Bypass) - Mountain Highway to Dorset Road	New route (4 lanes)	2041
8424	Surrey Rd - Eastern Fwy to Springfield Rd	Widening (4 lanes divided)	2041
8409	Swansea Rd - York Rd to Mt Dandenong Rd	Widening (6 lanes divided)	2041
8311	Thompsons Rd - Berwick-Cranbourne Rd to Officer South Rd	Widening (4 lanes divided)	2041
9145	Thompsons Rd - McCormicks Rd to Clyde Rd	Widening (6 lanes divided)	2041
3198	Thompsons Rd Extension - Cardinia Rd to McGregors Rd	New route (2 lanes)	2041
8190	Thompsons Rd Extension - Officer South Rd to McGregors Rd	Widening (4 lanes not divided)	2041
2140	Thompsons Rd/Western Port Hwy Interchange	Interchange (full diamond) and grade separation	2041
7175	Wantirna Road - Canterbury Road to Maroondah Hwy	Duplication (4 lanes divided)	2041
7176	Wellington Rd - Napoleon Rd to Kellett's Rd	Duplication (4 lanes divided)	2041
8993	Wellington Road- Kellets Road to Lysterfield Road	Duplication (4 lanes divided)	2041
6125	Westbrook Dr - Ballan Rd to Leakes Rd	Duplication (4 lanes)	2041
9007	Western Freeway - Deer Park Bypass	Widening (6 lane freeway)	2041
6007	Western Fwy - Hopkins Rd to Leakes Rd	Widening (6 lanes)	2041
5174	Western Port Hwy - Baxter Tooradin Rd to Frankston Flinders Rd	Duplication (4 lanes divided)	2041
5206	Western Port Hwy - South Gippsland Hwy to Cranbourne-Frankston Rd	Widening (6 lanes divided)	2041
8372	Ballarto Road - Casey Fields Bvd to Clyde-Five Ways Rd	Widening (4 lanes divided)	2051
8376	Baxter-Tooradin Rd - Western Port Hwy to South Gippsland Hwy	Widening (4 lanes divided)	2051
5180	Bayswater Rd - Canterbury Rd to Mt Dandenong Rd	Widening (4 lanes)	2051

Number	Project	Scope	Year
8187	Belgrave Hallam Road - New Wellington Road connection to Heatherton Rd	Duplication (4 lanes divided)	2051
9256	Berwick-Cranbourne Rd/Sladen St - Pattersons Rd to South Gippsland Hwy	Widening (6 lanes divided)	2051
4131	Boronia Rd - Mountain Hwy to Stud Rd	Widening (6 lanes divided)	2051
8375	Browns Rd - Western Port Hwy to Craig Rd	Widening (4 lanes divided)	2051
5181	Burwood Highway - Cathies Lane to Stud Road	Widening (6 lanes divided)	2051
9444	Cardinia Road - Henry Rd to Lecky Rd	Widening (6 lanes divided)	2051
9439	Casey Fields Boulevard - Thompsons Rd to Ballarto Rd	Duplication (4 lanes divided)	2051
8371	Clyde-Five Ways Rd - Ballarto Rd to Berwick-Cranbourne Rd	Widening (6 lanes divided)	2051
8412	Craigieburn Rd - Hanson Rd to Hardy Av	Widening (6 lanes divided)	2051
7178	Croydon Road/Wonga Road/Warranwood Road/Plymouth Road - Yarra Road to Ringwood-Warrandyte	Duplication (4 lanes divided)	2051
8147	Dandenong Valley Hwy (Stud Road) - High Street to Burwood Highway	Widening (3 lanes north bound)	2051
8146	Dandenong Valley Hwy (Stud Road) - Burwood Hwy to Boronia Rd	Widening (3 lanes north bound)	2051
8150	Dandenong Valley Hwy (Stud Road) - Ferntree Gully Road to High St Road	Widening (6 lanes divided)	2051
8148	Dandenong Valley Hwy (Stud Road) - Monash Fwy to Heatherton Road	Widening (3 lanes south bound)	2051
8149	Dandenong Valley Hwy (Stud Road) - Wellington Road to Kellets Road Rowville	Widening (6 lanes divided)	2051
8151	Dandenong Valley Hwy (Stud Road) - Wellington Road to Monash Freeway (Widen 4 to 6 Lanes Divided)	Widening (6 lanes divided)	2051
8435	Dandenong-Frankston Rd - Greens Rd to Dandenong Bypass	Widening (6 lanes divided)	2051
8427	Derrimut Road - Dohertys Road to Boundary Road	Widening (6 lanes divided)	2051
8428	Derrimut Road - Leakes Road to Dohertys Road	Widening (6 lanes divided)	2051
9293	Derrimut Road - Sayers Rd to Leakes Rd	Widening (6 lanes divided)	2051
7993	Diamond Creek Road- Aqueduct Road to Ryans Road	Duplication (4 lanes divided)	2051
9516	Dingley Freeway - Perry Rd to South Gippsland Fwy	Conversion to freeway (6 lanes)	2051
9524	Dingley Freeway - South Road to Cheltenham Rd	Conversion to freeway (6 lanes)	2051
9107	Dorset Rd - Boronia Rd to Burwood Hwy	Widening (6 lanes divided)	2051
8157	Dorset Rd - Hull Rd to Maroondah Highway	Duplication (4 lanes divided)	2051
8184	Dorset Road - Olive Grove to Rosella Grove	Duplication (4 lanes divided)	2051
4007	East-West Freeway - OMR to Deer Park Bypass	New route (4 lane freeway)	2051
8422	Elgar Rd - Eastern Fwy to Woodhouse Gr	Widening (6 lanes divided)	2051
5178	Ferntree Gully Rd - Stud Rd to Scoresby Rd	Widening (6 lanes divided)	2051
9503	Fitzgerald Road - Kororoit Creek Rd to Western Fwy ramp	Widening (6 lanes divided)	2051
9109	Glasscocks Road - Dandenong Valley Hwy to Evans Rd	Widening (6 lanes divided)	2051
4190	Golf Links Rd - Peninsula Link to Baxter-Tooradin Rd	Duplication (4 lanes divided)	2051
8312	Greenhills Rd - McGregor Rd to Koo Wee Rup Rd	Widening (4 lanes divided)	2051
9113	Hall Rd - Dandenong-Frankston Rd to Western Port Hwy	Widening (6 lanes divided)	2051
9298	Hobbs Rd/Sewells Rd - Ballan Rd to Sayers Rd	Duplication (4 lanes divided)	2051
8418	Hume Highway - Craigieburn Rd to Hume Freeway	Widening (6 lanes divided)	2051
6004	Koo Wee Rup Rd, new freeway - Princes Freeway at Pakenham to South Gippsland Highway at Koo Wee Rup	Conversion to freeway (4 lanes)	2051
9185	Leakes Rd - Mt Cottrell Rd to Palmers Rd	Widening (6 lanes divided)	2051
7174	Main Rd - Fitzsimons La to Bridge St	Widening (4 lanes not divided)	2051
9123	Maroondah Highway - Warburton Highway to Melba Highway	Duplication (4 lanes divided)	2051
8155	Maroondah Hwy Deviation at Lilydale - Maroondah Hwy to Anderson Rd	New route (4 lanes divided)	2051
9127	Melba Highway - Coldstream to north of Yarra Glen	Duplication and deviation (4 lanes divided)	2051
8353	Melbourne-Lancefield Rd - Sunbury Rd to north of Raes Rd	Widening (4 lanes divided)	2051
6002	Mornington Peninsula Fwy - Eastlink to Springvale Rd	Widening (6 lanes)	2051
8366	Mt Dandenong Rd - Whitehorse Rd to Dublin Rd	Widening (6 lanes divided)	2051
9432	Muddy Gates Lane - Ballarto Rd to Hardys Rd	Duplication (4 lanes divided)	2051
7177	Napoleon Rd - Kelletts Rd to Lysterfield Rd	Duplication (4 lanes divided)	2051
9389	New east-west arterial south of Donnybrook Road (includes half interchange with Hume Fwy) - Aitken Bvd to Brookville Dr	Duplication (4 lanes divided) + 1/2 diamond interchange, south facing ramps	2051
9134	Officer South Rd - Lecky Rd to Thompsons Rd	Widening (4 lanes not divided)	2051
8154	Officer South Rd - Pakenham Bypass to Lecky Rd	Widening (4 lanes not divided)	2051
4006	OMR - Ballan Rd to East-West Freeway	New route (4 lane freeway)	2051
7304	OMR - Calder Fwy to Sunbury Rd	New route (4 lane freeway)	2051
6014	OMR - Easterly oriented ramps at Sunbury Rd	New freeway ramps (1 lane)	2051
8008	OMR - East-West Freeway to Calder Fwy	New route (4 lane freeway)	2051
6009	OMR - Sunbury Rd to Hume Fwy	New route (4 lane freeway)	2051
8336	Palmers Rd - Leakes Rd to Middle Rd	Widening (6 lanes divided)	2051
9428	Pattersons Road - Bells Rd to Pound Rd	Duplication (4 lanes divided)	2051
8407	Peninsula Link (Frankston Bypass) - EastLink to Frankston-Flinders Rd	Widening (6 lane freeway)	2051

Number	Project	Scope	Year
8433	Princes Fwy West - Heaths Rd	New interchange	2051
4169	Scanlon Drive Extension - Summerhill Rd to Gunns Gully Rd	New route (2 lanes)	2051
9199	Somerton Road - Mickleham Rd to Roxburgh Park Dr	Widening (6 lanes divided)	2051
6010	Tullamarine Freeway Extension - Melbourne Airport to Somerton Rd	New route (6 lane freeway)	2051
5300	Tullamarine Freeway Extension - Somerton Rd to OMR	New route (4 lane freeway)	2051
9418	Victoria Road - Maroondah Hwy to Paynes Rd Extension	Duplication (4 lanes divided)	2051
8995	Victoria St - Doncaster Road to King St	Widening (4 lanes not divided)	2051
8186	Wellington Rd - Lysterfield Rd to Belgrave-Hallam Rd	Duplication (4 lanes divided)	2051
9009	Western Freeway - Leakes Rd to Coburns Rd	Widening (6 lanes)	2051
9011	Western Freeway - Western Highway to Hopkins Rd	Widening (6 lanes)	2051
6001	Western Port Hwy - South Gippsland Hwy to Cranbourne-Frankston Rd (excludes Wedge Rd interchange)	Conversion to freeway (4 lanes)	2051
8363	Williamsons Rd - Eucalypt Av to Foote St	Widening (6 lanes divided)	2051
8364	Williamsons Rd/Fitzsimons La - Foote St to Main Rd	Widening (8 lanes divided)	2051

Source: TfV transport modelling reference case

New projects

Provisional No	Project	Scope	Year	Comment
NW006	Abey Road - New bridge - Ferris Rd to Station Rd	New route 2 lanes	2021	
NW055	Arena Boulevard (James Mirriams Drive to Silvester Parade)	New route (2 lanes)	2021	
NW028	Armstrong Road - Ballan Road to 1.2km north of Ballan Road	Sealing (2 lanes)	2021	Replaces part of 3101
NW083	Auxiliary lane from Craigieburn Bypass to Edgars Rd	New Link (2 lanes)	2021	
NW044	Blosson Boulevard	New route (2 lanes)	2021	
SE007	Bridge Road Duplication from Cardinia Road to west of Viridian Way	Duplication (4 lanes divided)	2021	
SE008	Bridge Road Duplication from Shaw Road to east of Gum Scrub Creek	Duplication (4 lanes divided)	2021	
NW036	Brookfield Boulevard (Highlander Blvd. to Craigieburn West PSP connector road)	New route (2 lanes)	2021	
NW025	Bulban Road deviation to intersect with Ison Road (Existing road for 1.7km west from McGrath Road is deviated off the current alignment)	New route (2 lanes)	2021	
SE012	Cardinia Road South of Princes Freeway to western arterial (Glasscocks Rd extension)	Extension	2021	Replaces part of 6136
NW007	City Vista - Aspire Blvd - Taylors Rd to Beattys Rd	New route 2 lanes	2021	
NW058	Civic Drive - Bush Bld to Morang Drive	New route (2 lanes)	2021	
NW030	Cloverton Boulevard (south of Cameron Street)	New route (2 lanes)	2021	Replaces part of 3188
NW106	Davis Rd - Hogans Rd to Leakes Rd	Sealing (2 lanes)	2021	
NW056	East - West Connector - Edgars Road to Epping Central	New route (2 lanes)	2021	
SE002	Eel Race Road, Carrum	Closing/truncating road	2021	Replaces 3346
NW039	Elevation Boulevard (Waterview Blvd. to Vantage Blvd.)	New route (2 lanes)	2021	
NW050	Elizabeth Drive (Mitchells Lane to Vineyard Rd)	New route (2 lanes)	2021	
NW051	Elizabeth Drive (Racecourse to Dunrossil Drive)	New route (2 lanes)	2021	Part of 8167
NW049	Elizabeth Drive (Racecourse to Jacksons Creek)	New route (2 lanes)	2021	Part of 8167
NW015	Foundation Road - Dohertys Road to Leakes Road	New route (4 lanes)	2021	
NW035	Grand Boulevard (Highlander Blvd. to Craigieburn West PSP connector road)	New route (2 lanes)	2021	
NW072	Hayes Hill Blvd- Donnybrook Road to Merriang Road	New route (2 lanes)	2021	
NW046	Hillview Road	New route (2 lanes)	2021	
NW019	Hogans Road - Davis Creek to Davis Road	Sealing (2 lanes)	2021	
NW042	Horizon Boulevard	New route (2 lanes)	2021	
NW005	Hume Drive - Calder Park Drive to Overton Lea Bvd	Duplication to 4 lanes	2021	
NW110	Ison Road (Westbrook Dr) - Armstrong Rd to Ballan Rd	New route (2 lanes)	2021	
NW024	Ison Road (Westbrook Dr) - Ballan Road to 1km north of Ballan Road	New route (2 lanes)	2021	Replaces part of 4186
NW109	Ison Road (Westbrook Dr) - Princes Fwy to Armstrong Rd	New route (4 lanes)	2021	
NW074	Lehmans Road - Bindts Road to North South Connector	New route (2 lanes)	2021	
NW082	M80 - South of EJ Whitten Bridge to Calder Fwy	Widening (10 lane freeway)	2021	Replaces part of 2007
NW081	M80 - Sunshine Av to south of EJ Whitten Bridge	Widening (8 lane freeway)	2021	Replaces part of 2007
NW037	Marathon Boulevard (Waterview Boulevard to Whites Lane)	New route (2 lanes)	2021	
SE003	Mascot Avenue, Carrum	Closing/truncating road	2021	
SE004	McLeod Road, Carrum	Extension with Grade Separation	2021	
SE021	Monash Freeway - Clyde Rd to Cardinia Road	Widening (6 lanes freeway)	2021	Replaces part of 3016 (together with SE22)
NW016	Morris Rd - Dohertys Rd to 800m north of Dohertys Road	New route (2 lanes)	2021	
NW004	Mt Cottrell Rd - Greigs Rd to Boundary Road	Sealing 2 lanes	2021	
NW057	North- South Connector - Cooper Street to Deveny Road	New route (2 lanes)	2021	
NW107	O'Herns Rd - Hume Fwy to Edgars Rd	Duplication (4 lanes divided)	2021	
SE006	Park Road, Cheltenham	Grade Separation	2021	
NW069	Pattersons Drive- Donnybrook Road to Merri Creek	New route (2 lanes) (interim)	2021	

Provisional No	Project	Scope	Year	Comment
NW062	Regent Street- west of Cravens Road	New route (2 lanes)	2021	
NW061	Riversdale Boulevard - Berry Lane to Bridge Inn Road	New route (2 lanes)	2021	
NW008	Rockbank Middle Road - Caroline Springs Blvd to Westwood Dr	Duplication to 4 lanes	2021	
NW047	Roxburgh Park Drive	Upgrade (4 lanes) divided	2021	
NW066	Salt Lake Boulevard- Lehmans Road - Edgars Road	New route (2 lanes)	2021	
NW045	Section Road	New route (2 lanes)	2021	
SE001	Station Street, Carrum	Closing/truncating road	2021	Replaces 3345
SE005	Station Street, Carrum	Extension across Patterson River	2021	
SE011	Thewlis Road extension from Princes Highway to Kenneth Road	Extension	2021	
SE018	Thompsons Rd, Marriott Boulevard to South Gippsland Hwy	Widening (6 lanes)	2021	Replaces part of 3174
SE019	Thompsons Rd, Western Port Hwy to Marriott Boulevard	Duplication (4 lanes divided)	2021	Replaces part of 3174.
NW075	Vearings Road- Cooper Street to O'Herns	New route (2 lanes)	2021	
SE013	Western Arterial road (Cardinia Rd to Gum Scrum Creek)	Extension	2021	Replaces part of 5199
NW003	Westwood Drive - Rockbank Middle Rd to Taylors Rd	New route 2 lanes	2021	
NW013	Beattys Road - Melton Hwy to Hopkins Rd extension	New route 2 lanes	2026	
NW012	Boundary Road - Mt Cottrell Rd to Davis Rd	Sealing 2 lanes	2026	
NW032	Cameron Street (east of Cloverton Boulevard)	New route (2 lanes)	2026	Replaces part of 4168
NW077	Childs Road - Beaumont Cr to west of Prince of Wales Ave (existing duplicated section)	Duplication (4 land divided)	2026	
NW100	Craigieburn Road, Overpass - Craigieburn Road East to Craigieburn Road West	New route (4 lanes)	2026	
NW043	Craigieburn West PSP connector road	New route (2 lanes)	2026	
NW101	Donnybrook Rd - OMR to Hume Fwy	Widening (4 lanes)	2026	
NW040	Elevation Boulevard (Vantage Blvd. to Mickleham Rd)	New route (2 lanes)	2026	
NW079	Findon Road - Williamsons Rd to Plenty Rd	New route (4 lane divided)	2026	Part of 9179
NW059	Grange Drive Extension	New route (2 lanes)	2026	
NW084	Gunns Gully Road Southern Half Connection to Hume Freeway	Interchange (1/2 diamond, southerly oriented)	2026	Replaces part of 3183
NW108	Ison Road (Westbrook Dr) - 1km north of Ballan Road to Dohertys Rd	New route (2 lanes)	2026	
NW052	Jacksons Hill Link	New route (2 lanes)	2026	
NW070	Kokoura Drive- Donnybrook Road to Gunns Gully Road	New route (2 lanes) (interim)	2026	Part of 4169
NW041	Marathon Boulevard (Craigieburn West PSP connector road to Mickleham Rd)	New route (2 lanes)	2026	
NW038	Marathon Boulevard (Whites Lane to Craigieburn West PSP connector road)	New route (2 lanes)	2026	
SE063	McGregors Rd - at Level Crossing	Duplication (4 lanes without grade separation)	2026	
NW103	Melton Hwy - The Regency to Leakes Rd	Duplication (4 lanes divided)	2026	
NW053	Polaris Road (Donnybrook Rd to English St)	New route (2 lanes)	2026	
NW010	Taylors Road - Plumpton Rd to Leakes Rd	New route 2 lanes	2026	
NW002	Wallan-Whittlesea Rd (Watson St) - Hume Fwy Interchange	Southerly ramps and duplication of overpass	2026	
NW065	Andrew Road - Craigieburn Road to Summerhill Road	New route (2 lanes)	2031	
SE027	Brunt Rd - Rix Rd to Princes Hwy	Duplication (4 lanes)	2031	
NW033	Cameron Street (west of Hume Fwy)	New route (2 lanes)	2031	Replaces 3189
NW068	Cameron Street- Sydney Melb railway overpass to Merriang Road	New route (2 lanes) (interim)	2031	Replaces and realigns part of 4168
SE028	Cardinia Rd - South of Western Arterial to Thompsons Rd	upgrade to 2 lanes	2031	
NW105	Christies Rd - Western Fwy to Caroline Springs Station	Duplication (4 lanes divided)	2031	
NW031	Cloverton Boulevard (north of Cameron Street)	New route (2 lanes)	2031	Replaces part of 3188
SE035	East west road (north of Princes Freeway) - O Neill Road to Timbertop Blvd.	New route (2 lane bvd)	2031	
NW064	Edgars Road- Craigieburn Road to Summerhill Road	New route (2 lanes)	2031	
SE032	Grices Rd - Soldiers Rd to west of Cardinia Creek	New route (2 lanes)	2031	Replaces part of 5199
NW085	Gunns Gully Road Northern Half Connection to Hume Freeway	Interchange (1/2 diamond, northerly oriented)	2031	Replaces part of 3183

Provisional No	Project	Scope	Year	Comment
NW071	Gunns Gully Road- Sydney Melb railway overpass to E6	New route (2 lanes) (interim)	2031	Connects to interchange at E6
NW073	Harvest Home Road - Epping Road to Bindts Road	New route (2 lanes)	2031	
NW001	Kilmore Wallan Bypass, Northern Hwy at Boundary Road to Hume Fwy at Wandong	New Link	2031	
NW104	Melton Hwy - Leakes Rd to Federation Dr	Duplication (4 lanes divided)	2031	
SE022	Monash Freeway - Cardinia Road to Koo Wee Rup Rd	Widening (6 lanes freeway)	2031	Replaces part of 3016 (together with SE21)
SE024	Monash Freeway - Warrigal Rd to Springvale Rd (outbound	Widening (5 lanes outbound, no change to inbound)	2031	Replaces 3017 (partially)
SE048	New East-West road (north of Princes Freeway) - Timbertop Bvd to Gum Scrub Creek	New route (2 lane bvd)	2031	
SE037	North South Collector	New route (2 lanes)	2031	
SE034	northern east west road (west of Cardinia Road extension)	upgrade to final 2 lane boulevard standard	2031	
SE036	Rix Rd - Officer South Rd to Brunt Rd	Duplication (4 lanes)	2031	
SE030	Southern Collector Rd - Ryan Rd to Princes Hwy	4 lane boulevard	2031	
NW011	Taylors Road - Leakes Rd to Melton Hwy (Federation Dr)	New route 2 lanes	2031	
SE031	Western Arterial Rd - Gum Scrub Creek to east of Cardinia Creek	New route (2 lanes)	2031	Replaces part of 5199
NW102	Donnybrook Rd - Hume Fwy to E6	Widening (4 lanes)	2036	
SE023	Monash Freeway - South Gippsland Fwy Interchange	New ramp (south to east) and additional lane on Monash Fwy E bd to Tinks Rd	2036	Replaces 5007 with extension of freeway widening from Belgrave-Hallam Rd to Tinks Rd
SE050	Cardinia Road South of Princes Freeway to western arterial	Widening (6 lanes)	2041	Overlaps partially with 9251 and 9444
SE051	Cardinia Road South of western arterial to Thompsons Rd	Duplication (4 lanes)	2041	Replaces part of 6136
NW111	Ison Road (Westbrook Dr) - Armstrong Rd to Ballan Rd	Duplication (4 lanes divided)	2041	
NW009	Tarletons Road - Leakes Rd to Mt Cottrell Rd	New route 2 lanes	2041	
SE064	Healesville Freeway - Stud Rd to Canterbury Rd	New route (4 lane freeway)	2051	
SE049	Western Arterial road (Cardinia Road to Soldiers Road)	Duplication (4 lanes)	2051	Replaces 9215 with slightly different route

Source: TfV transport modelling reference case

Appendix C2: Demographic and land use assumptions

Appendix Table C.11 - Population assumptions by LGA (MSD)

LGA	2016 Population	2026 Population	2036 Population
Banyule (C)	127,430	137,092	149,958
Bayside (C)	101,852	109,248	116,642
Boroondara (C)	177,915	189,445	203,824
Brimbank (C)	200,144	215,030	230,753
Cardinia (S)	95,604	142,790	171,955
Casey (C)	300,169	388,686	468,013
Darebin (C)	153,638	176,960	202,924
Frankston (C)	137,554	148,137	161,947
Glen Eira (C)	148,050	158,499	171,142
Greater Dandenong (C)	155,913	178,895	202,771
Hobsons Bay (C)	93,377	103,374	113,291
Hume (C)	199,220	258,923	321,242
Kingston (C)	155,995	171,706	190,451
Knox (C)	158,017	171,791	187,238
Manningham (C)	121,184	133,192	145,194
Maribyrnong (C)	86,877	113,093	131,367
Maroondah (C)	112,971	122,778	138,558
Melbourne (C)	137,340	197,995	245,937
Melton (S)	136,539	211,632	307,228
Monash (C)	189,236	201,721	218,903
Moonee Valley (C)	121,382	136,792	156,982
Moreland (C)	170,178	200,457	228,115
Mornington Peninsula (S)	157,787	179,726	199,340
Nillumbik (S)	63,090	66,289	70,548
Port Phillip (C)	108,049	130,396	159,086
Stonnington (C)	112,119	128,031	140,956
Whitehorse (C)	168,949	183,692	199,179
Whittlesea (C)	200,894	279,315	342,821
Wyndham (C)	218,553	314,047	402,725
Yarra (C)	92,225	111,357	126,481
Grand Total	4,402,248	5,261,091	6,105,569

Source: TfV transport modelling reference case, based on VIF2015

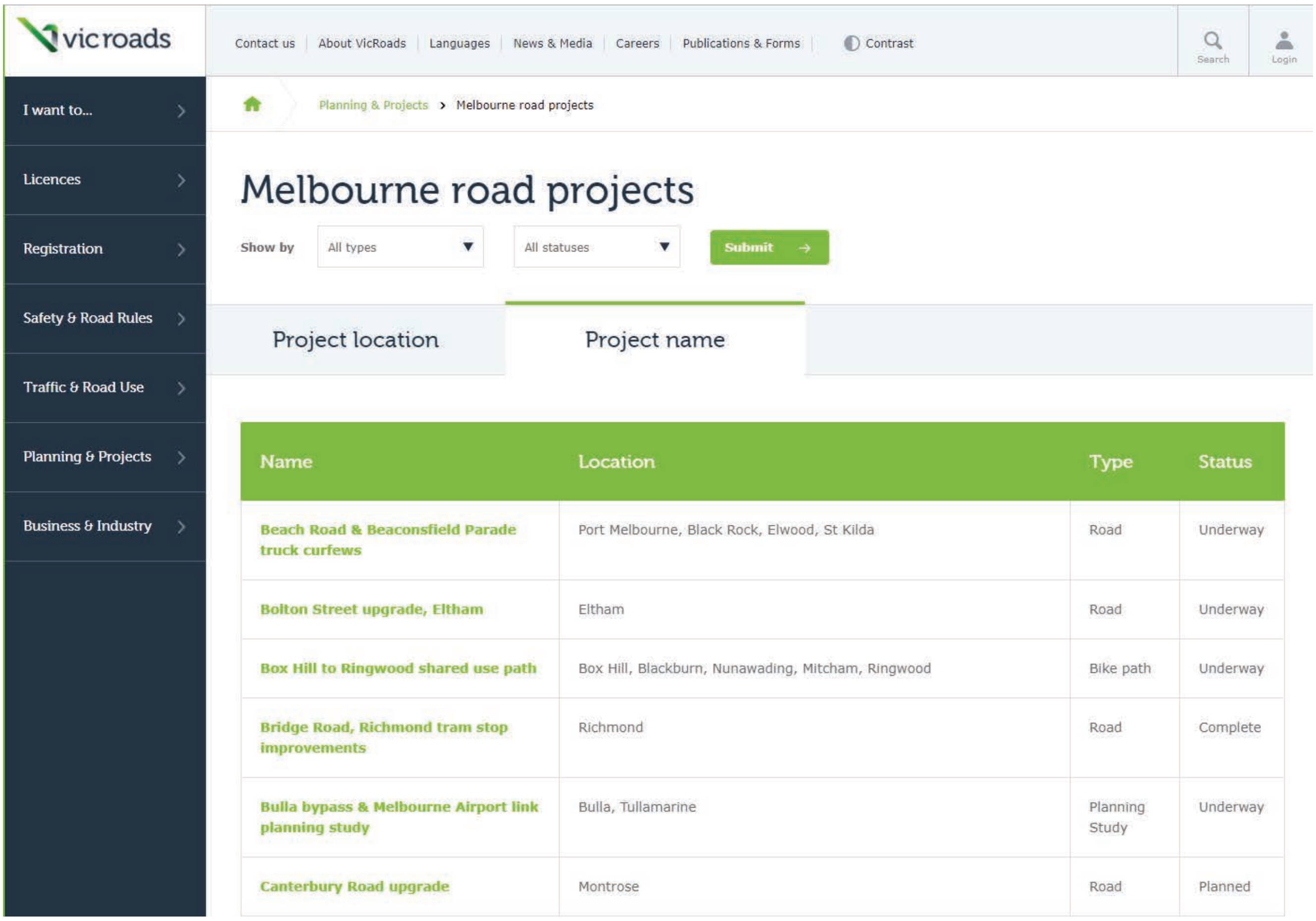
Appendix Table C.12 - Employment assumptions by LGA (MSD)

LGA	2016 Employment	2026 Employment	2036 Employment
Banyule (C)	49,243	59,214	71,104
Bayside (C)	33,742	38,787	45,174
Boroondara (C)	81,762	94,793	111,663
Brimbank (C)	73,414	95,754	110,587
Cardinia (S)	24,866	32,643	37,804
Casey (C)	69,730	88,229	102,220
Darebin (C)	55,025	67,105	76,848
Frankston (C)	53,150	66,915	78,614
Glen Eira (C)	45,216	50,876	58,351
Greater Dandenong (C)	101,296	122,941	144,183
Hobsons Bay (C)	39,168	41,134	46,680
Hume (C)	99,013	119,523	139,646
Kingston (C)	88,797	105,083	121,517
Knox (C)	72,770	80,131	90,369
Manningham (C)	34,329	41,192	47,716
Maribyrnong (C)	41,154	52,689	60,528
Maroondah (C)	49,654	62,141	72,908
Melbourne (C)	503,672	632,255	782,116
Melton (S)	26,449	37,793	43,970
Monash (C)	123,554	148,812	172,150
Moonee Valley (C)	42,009	45,414	53,415
Moreland (C)	44,179	54,651	63,877
Mornington Peninsula (S)	58,236	65,894	74,707
Nillumbik (S)	15,739	19,156	22,262
Port Phillip (C)	85,220	94,872	112,963
Stonnington (C)	62,871	71,573	84,517
Whitehorse (C)	84,944	102,924	120,703
Whittlesea (C)	57,676	77,806	89,973
Wyndham (C)	65,118	84,826	97,114
Yarra (C)	93,960	114,107	131,775
Grand Total	2,275,955	2,769,231	3,265,457

Source: TfV transport modelling reference case, based on VIF2015

Appendix C3: VicRoads Melbourne road projects road list

Appendix Table C.13 - Road project assumptions – VicRoads Melbourne road projects road list



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Melbourne road projects

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Project location | Project name

Name	Location	Type	Status
Beach Road & Beaconsfield Parade truck curfews	Port Melbourne, Black Rock, Elwood, St Kilda	Road	Underway
Bolton Street upgrade, Eltham	Eltham	Road	Underway
Box Hill to Ringwood shared use path	Box Hill, Blackburn, Nunawading, Mitcham, Ringwood	Bike path	Underway
Bridge Road, Richmond tram stop improvements	Richmond	Road	Complete
Bulla bypass & Melbourne Airport link planning study	Bulla, Tullamarine	Planning Study	Underway
Canterbury Road upgrade	Montrose	Road	Planned

Cardinia Road upgrade, Officer	Cardinia, Officer	Road	Complete
Carrum to Warburton trail, Bayswater to Lilydale link	Bayswater, Carrum, Lilydale	Bike path	Underway
Chandler Highway upgrade	Kew, Alphington	Road, Highway, Bridge	Underway
Chute Street Diamond Creek	Diamond Creek	Road	Planned
City of Whittlesea Road Safety Review	Whittlesea	Road	Planned
CityLink Tulla Widening	Tullamarine, Flemington, Port Melbourne	Freeway	Underway
Dalton Road and Childs Road intersection upgrade	Lalor	Road	Underway
Dandenong to Warrigal Road initiative	Dandenong, Clayton, Oakleigh South, Springvale, Noble Park	Road, Planning Study	Underway
Darebin Yarra Trail link	Alphington, Kew East	Bike path	Underway
Derrimut Road and Leakes Road intersection upgrade	Tarneit	Road	Underway
Dingley Bypass - Warrigal Road to Westall Road	Moorabbin, Clarinda, Heatherton, Dingley Village, Springvale South	Road	Complete
East Werribee Transport Improvement project	Werribee	Road	Complete
Eltham-Yarra Glen Road upgrade	Eltham, Yarra Glen	Road	Underway
Ferrars Street City Road intersection upgrade	South Melbourne	Road	Underway
Footscray Road upgrade	West Melbourne	Road	Underway
Forsyth Road exit ramp widening at Point Cook	Point Cook	Road	Planned
Gowanbrae and Glenroy noise walls	Glenroy	Road	Planned
Grimshaw & Flintoff streets intersection upgrade	Greensborough	Road	Underway
Hallam Road upgrade, Hampton Park	Hampton Park	Road	Complete
Heatherdale Road, Mitcham level crossing removal	Mitcham	Level crossing	Underway
High Street Road upgrade, Wantirna South	Wantirna South	Road	Complete
Hoddle Street - Punt Road investigations	Clifton Hill, St Kilda, Richmond, Abbotsford, Collingwood, East Melbourne	Planning Study, Road	Underway
Improving Arterial Roads in Melbourne's outer west	Point Cook, Truganina, Tarneit, Laverton North, Hoppers Crossing, Werribee	Road	Planned

Improving road safety in Coburg	Coburg	Road	Underway
Kangaroo Ground - St Andrews Road upgrade	Kangaroo Ground, St Andrews	Road	Underway
Keilor Road Grange Road Newman Street intersection Niddrie	Niddrie	Road	Planned
Kings Road and Taylors Road intersection upgrade, Delahey	Delahey	Road	Underway
M80 Ring Road upgrade	Laverton North, Greensborough	Freeway	Underway
Maroondah Highway, Croydon intersection upgrade	Croydon	Highway	Planned
Mickleham Road Safety Improvements	Mickleham, Greenvale, Donnybrook	Road	Underway
Mitcham level crossing removal	Mitcham	Level crossing	Complete
Monash Freeway bridge strengthening	Mulgrave, Dandenong North	Bridge	Complete
Monash Freeway upgrade	Chadstone, Berwick, Dandenong North, Endeavour Hills, Hallam, Mulgrave, Narre Warren, Noble Park North, Officer, Pakenham	Freeway	Underway
Monash speed trial	Mount Waverley, Noble Park	Freeway, Road	Underway
Mordialloc Bypass	Aspendale Gardens, Braeside, Dingley Village	Road	Planned
Mornington Peninsula Freeway, Mount Martha to Rosebud	Mount Martha, Rosebud	Road	Planned
Motorcycle trial on Hoddle Street	Collingwood, Abbotsford	Road	Complete
Narre Warren North Road intersection upgrades, Narre Warren North	Narre Warren North	Road	Underway
Narre Warren-Cranbourne Road Upgrade, Cranbourne	Cranbourne	Road	Complete
Nepean corridor improvements	Frankston, St Kilda	Planning Study	Underway
Nicholson Street speed limit change	Carlton	Road	Planned
North east truck curfew trial	Eltham, Montmorency, Viewbank	Road	Complete
O'Herns Road, Epping upgrade	Epping	Road	Planned
Outer metropolitan ring/E6 transport corridor	Melbourne	Road	Planned
Palmers Road and Robinsons Road Truganina	Deer Park, Ravenhall, Derrimut, Truganina	Planning Study	Planned
Palmers Road Corridor (Western Freeway to Calder Freeway)	Calder Park, Taylors Hill, Sydenham, Hillside, Caroline Springs, Burnside, Burnside Heights, Deer Park, Ravenhall, Derrimut	Planning Study	Planned
Palmers Road upgrade at Point Cook	Hoppers Crossing	Road	Planned

Plenty Road, Mill Park upgrade	Mill Park	Road	Planned
Princes Highway & Robinson Street, Dandenong intersection upgrade	Dandenong	Road	Planned
Rosanna Road Safety Improvement Project	Heidelberg, Greensborough, Rosanna	Road	Complete
Route 96 Upgrade Project – Nicholson Street	Brunswick East, Fitzroy North	Road	Planned
Sladen Street upgrade, Cranbourne	Cranbourne	Road	Complete
Smith Street part-time tram lane improvements trial	Fitzroy	Road, Planning Study	Underway
South Gippsland Highway Road Safety Review	Cranbourne	Road, Highway	Planned
South Road traffic study	Moorabbin, Bentleigh, Bentleigh East, Hampton East	Planning Study	Underway
Springvale Junction improvement project	Springvale	Planning Study	Underway
Springvale level crossing removal	Springvale	Level crossing	Complete
St George's Road, Northcote median opening review	Northcote, Thornbury	Road	Underway
St Kilda Rd Safety Improvement Study	St Kilda, St Kilda East, St Kilda Road	Road	Planned
Strategic Cycling Corridors Melbourne's East and South East	Box Hill, Nunawading, Glen Waverley, Clayton, Chadstone	Bike path, Road	Planned
Stud Road upgrade, Wantirna	Wantirna	Road	Complete
Swan Street Bridge upgrade	Melbourne	Bridge	Underway
Sydney Road safety improvements	Brunswick	Road	Underway
Thompsons Road Upgrade, Cranbourne	Cranbourne	Road	Underway
Victoria Parade Bus Upgrade Project	Melbourne	Road	Complete
Victoria Street Richmond Easy Access Stop tram upgrades	Richmond, Richmond North	Road	Complete
Wantirna Road bridge over Dandenong Creek	Ringwood	Bridge	Complete
Warrandyte Bridge upgrade	Warrandyte	Bridge	Planned
Wedge Road intersection upgrade, Carrum Downs	Carrum Downs, Carrum[redacted]	Road	Complete
West Gate Distributor - Stage 1	Footscray	Road, Bridge, Bike path	Underway

West Gate Freeway managed motorway project	Spotswood, Yarraville, South Kingsville, Altona North, Brooklyn, Laverton North	Freeway	Complete
Westall Road Extension	Clayton, Mulgrave, Clayton South, Springvale, Springvale South, Notting Hill, Glen Waverley, Wheelers Hill, Mount Waverley, Dingley Village	Road	Planned
Western Port Highway - Lynbrook to Langwarrin	Dandenong South, Lynbrook, Lyndhurst, Skye, Cranbourne West, Cranbourne South, Langwarrin	Planning Study	Complete
Western Port Highway & Robinsons Road, Langwarrin intersection upgrade	Langwarrin	Highway, Road	Planned
Williamsons Road & Porter Street, Templestowe	Templestowe	Road	Complete
Yan Yean Road - Plenty	Plenty	Road	Planned
Young St improvements project, Frankston	Frankston	Road	Underway

Source: VicRoads, https://www.vicroads.vic.gov.au/planning-and-projects/melbourne-road-projects?active=name, accessed 22 September 2017

Appendix C4: Future road network for modelling purposes only

Please note that the future road network assumptions outlined below have been created for transport modelling and planning purposes, and do not necessarily represent future commitments regarding capital spending or infrastructure works:

- Appendix Table C.14 - Road project assumptions – unchanged from transport modelling reference case
- Appendix Table C.15 - Road Project Assumptions – Edited Road Projects
- Appendix Table C.16 - Road Project Assumptions – Additional Road Projects Implemented by NELP
- Appendix Table C.17 - Road Project Assumptions – Excluded Road Projects.

Appendix Table C.14 - Road project assumptions – unchanged from transport modelling reference case

VLC Ref	Project Ref	Project	Scope	Year
215	2151	Dandenong Valley Hwy (Stud Road) - Boronia Rd to Mountain Highway	Duplication (4 lanes divided)	2015
17	2147	Hallam South Rd - Pound Rd to Ormond Rd	Duplication (4 lanes divided)	2015
66	2124	Koo Wee Rup Bypass - Manks Rd to South Gippsland Hwy	New route (2 lanes)	2015
51	2107	Cooper St - Hume Fwy to Edgars Rd	Widening (6 lanes divided)	2015
440	2200	Airport Dr Extension - Sharps Rd to Melrose Dr	New link (4 lane divided)	2016
445	2172	Claret Ash Boulevard - Harkness Rd to Panorama Dr	New route (2 lanes)	2016
127	2192	Forsyth Road - Sayers Rd to Leakes Rd	New route (2 lanes)	2016
444	2165	Marathon Bvd - Vantage Boulevard to Aitken Boulevard	New route (4 lanes divided)	2016
665	2999	Dingley Arterial West - Warrigal Rd to Westall Rd	New route (6 lanes divided); includes duplication	2016
65	2123	High Street Rd - Stud Rd to Burwood Hwy	Duplication (4 lanes divided)	2016
68	2126	Narre Warren-Cranbourne Rd - Pound Rd to Thompsons Rd	Duplication (4 lanes divided)	2016
659	4181	Soldiers Rd - Grices Rd to Pound Rd	New route (2 lanes)	2021
243	3377	Mordialloc Bypass - Springvale Road to Dingley Freeway	New route (4 lanes divided)	2021
493	7308	Western Freeway - Mt Cottrell Rd	Remove direct freeway access	2021
770	3378	Dohertys Rd - Palmers Rd to Foundation Rd	Widening (4 lanes divided)	2021
743	3013	Monash Freeway - South Gippsland Fwy to Clyde Rd	Widening (6 lanes freeway)	2021
743	3014	Monash Freeway - Eastlink to South Gippsland Fwy	Widening (10 lane freeway)	2021
727	1202	Tullamarine Fwy/Calder Fwy interchange - Calder Fwy east-bound ramp	Widening to 3 lanes	2021
727	1205	Tullamarine Fwy/Calder Fwy interchange - Tullamarine Fwy south-bound ramp	Widening to 3 lanes	2021
727	2310	ZEBRA West Gate Freeway - Western Link to Burnley Tunnel	Widening (4 lanes east bound only)	2021
727	3158	Tullamarine Freeway - Western Ring Rd to Mickleham Road	Widening (6 lanes)	2021
727	3177	Tullamarine Freeway - Mickleham Rd to Melbourne Airport	Widening (6 lanes)	2021
727	3320	ZEBRA Western Link - Brunswick Rd to Bulla Rd	Widening (10/12 lane freeway)	2021
727	4187	Tullamarine Freeway - WRR to Melbourne Airport (North bound only)	Widening (4 lanes one-way)	2021
727	8388	Tullamarine Fwy - Bulla Rd to Western Ring Rd	Widening (6 lane freeway)	2021
727	9016	Tullamarine Fwy - Calder Fwy to Western Ring Rd southerly ramps	Widening (8 lane freeway)	2021
153	4183	Amaroo Road - Summerhill Rd to Donnybrook Rd	New route (2 lanes)	2021
448	2193	Armstrong Road - Black Forest Rd to Ballan Rd	New route (2 lanes)	2021
494	2174	Ballarto Road - South Gippsland Hwy to Clyde-Five Ways Rd	Sealing (2 lanes)	2021
656	4166	Boundary Rd - Derrimut to Palmers Rd	Sealing (2 lanes)	2021
496	2162	Bridge Road - Ferris Road to Exford Road	Sealing (2 lanes)	2021
664	2184	Coburns Rd - Hume Av to Exford Rd	New route (2 lanes)	2021
222	3120	E14 (Aitken Bvd) - Mt Ridley Rd to Gunns Gully Rd	New route (2 lanes)	2021
58	3178	E14 (Aitken Bvd) - Somerton Rd to Craigieburn Rd	New route (2 lanes)	2021
161	2163	Edgars Rd - O'Herns Rd to Craigieburn Rd East	New route (2 lanes)	2021
417	2175	Greenhills Road - McGregors Rd to Koo Wee Rup Rd	Sealing (2 lanes)	2021
457	2194	Greens Rd - Armstrong Rd to Ison Rd	Sealing (2 lanes)	2021
492	2195	Hacketts Rd - Sneydes Rd to Aviation Rd	Sealing (2 lanes)	2021
495	2191	Leakes Rd - Davis Rd to Tarneit Rd	Sealing (2 lanes)	2021
449	2161	Manor Lakes Bvd, Extension to Westbrook Dr	New route (2 lanes)	2021
493	2181	Mt Cottrell Rd - Greigs Rd to Western Fwy	Sealing (2 lanes)	2021
137	2179	Officer South Rd - Railway line to Pakenham Bypass	Sealing (2 lanes)	2021
356	9270	Chandler Highway - Eastern Fwy Off Ramp to Heidelberg Rd	Widening (6 lanes divided)	2021
498	7994	Derrimut Road - Leakes Road to Dohertys Road	Duplication (4 lanes divided)	2021
54	3182	Derrimut Road - Sayers Rd to Leakes Rd	Duplication (4 lanes divided)	2021

VLC Ref	Project Ref	Project	Scope	Year
538	8341	Dohertys Rd - Cherry La to Westgate Dr freeway overpass	Widening (4 lanes)	2021
56	2111	Dohertys Rd - Fitzgerald Rd to Grieve Pde	Duplication (4 lanes, divided except on freeway	2021
770	3379	Dohertys Rd - Foundation Rd to Fitzgerald Rd	Widening (4 lanes divided)	2021
503	3186	Donald Cameron Drive - Bridgewater Road to Southern Cross Drive	Duplication (4 lanes divided)	2021
118	6127	Dunnings Rd - Pt Cook Rd to Palmers Rd	Duplication (4 lanes divided)	2021
121	8316	E14 - Somerton Rd to Mt Ridley Rd	Widening (4 lanes divided)	2021
853	SE002	Eel Race Road, Carrum	Closing/truncating road	2021
164	6126	Forsyth Rd - Old Geelong Rd to Sayers Rd	Duplication (4 lanes divided)	2021
59	3184	Forsyth Road - K-Mart Entrance to Wallace Ave	Duplication (4 lanes divided)	2021
649	2114	Forsyth Road/Old Geelong Rd - Intersection improvements	Duplication (4 lanes divided)	2021
849	NW015	Foundation Road - Dohertys Road to Leakes Road	New route (4 lanes)	2021
497	5184	Leakes Rd - Derrimut Rd to Palmers Rd	Duplication (4 lanes divided)	2021
132	2150	Leakes Rd - Palmers Rd to Fitzgerald Rd	Duplication (4 lanes divided)	2021
72	6130	Palmers Rd - Dohertys Rd to Boundary Rd	Widening (4 lanes divided)	2021
70	4161	Palmers Rd - Dunnings Rd to Princes Fwy	Duplication (4 lanes divided)	2021
653	4165	Palmers Rd - Princes Fwy to Sayers Rd	Duplication (4 lanes divided)	2021
71	4162	Palmers Rd - Sayers Rd to Dohertys Rd	Duplication (4 lanes divided)	2021
652	8434	Princes Fwy West - Forsyth Rd	Ramp widening	2021
690	6131	Robinsons Rd - Boundary Rd to Deer Park Bypass	Duplication (4 lanes divided)	2021
360	NW051	Elizabeth Drive (Racecourse to Dunrossil Drive)	New route (2 lanes)	2021
771	3376	Swan St Bridge	Widening (3 lanes east bound)	2021
78	3176	Thompsons Rd - Dandenong Valley Hwy to Western Port Hwy	Duplication (4 lanes divided)	2021
150	6139	Thompsons Rd - Narre Warren - Cranbourne Rd to Berwick-Cranbourne Rd	Duplication (4 lanes divided)	2021
645	3309	Clayton Rd, Clayton	Grade separation	2021
646	3310	Heatherton Rd	Grade separation	2021
743	333	Western Distributor - West Gate Fwy to Citylink / North Melbourne	New freeway (4 lanes)	2021
44	2005	M80 - WestGate Fwy to Western Hwy	Widening (8 to 10 lane freeway)	2021
44	1006	M80 - South bound, Deer Park Bypass to Boundary Rd	Widening (4 lanes S bd)	2021
727	1201	Tullamarine Fwy/Citylink - Calder Fwy to Westgate Fwy	Widening (10 lanes Calder Fwy to Flemington	2021
75	5186	Princes Freeway West, Interchange - Duncans Rd	Interchange (westerly oriented ramps)	2021
407	2177	Glasscocks Rd from South Gippsland Hwy to Berwick-Cranbourne Rd	New	2021
447	2187	Ferris Rd from Abey Rd to Iramoo Rd	New	2021
308	2197	Evans Road - Prichard Av to Thompsons Rd	Sealing (2 lanes)	2021
362	4185	Forsyth Road/Christies Road - Leakes Rd to Boundary Rd	New route (2 lanes)	2021
478	4184	Morris Rd - Leakes Rd to Boundary Rd	New route (2 lanes)	2021
613	3015	Monash Freeway - Springvale Rd to Eastlink	Widening (10 lane freeway)	2021
47	2011	M80 - Plenty Rd to Greensborough Hwy	Widening (6 lane freeway)	2021
PT037	NW006	Abey Road - New bridge - Ferris Rd to Station Rd	New route 2 lanes	2021
780	NW036	Brookfield Boulevard (Highlander Blv to Craigieburn West PSP connector road)	New route (2 lanes)	2021
PT037	NW007	City Vista - Aspire Blvd - Taylors Rd to Beattys Rd	New route 2 lanes	2021
46	2009	M80 - Sydney Rd to Edgars Rd	Widening (8 to 10 lane freeway)	2021
PT035	NW039	Elevation Boulevard (Waterview Blv to Vantage Blv)	New route (2 lanes)	2021
PT060	NW050	Elizabeth Drive (Mitchells Lane to Vineyard Rd)	New route (2 lanes)	2021
73	2132	Plenty Road - McKimmies Rd to Development Bvd	Widening (6 lanes divided)	2021
260	9211	Yan Yean Rd - Kurrak Road to Diamond Creek Road	Duplication (4 lanes divided)	2021
139	NW107	O'Herns Rd - Hume Fwy to Edgars Rd	Duplication (4 lanes divided)	2021
139	4163	O'Herns Rd - Hume Fwy interchange	Interchange (full diamond)	2021
501	9395	Plenty Road - Development Bvd to Gordons Rd	Widening (6 lanes divided)	2021
170	5185	Plenty Road - Riverdale Bvd to Bridge Inn Rd	Duplication (4 lanes divided)	2021
PT035	NW035	Grand Boulevard (Highlander Blv to Craigieburn West PSP connector road)	New route (2 lanes)	2021
PT061	NW046	Hillview Road	New route (2 lanes)	2021
PT036	NW069	Pattersons Drive- Donnybrook Road to Merri Creek	New route (2 lanes) (interim)	2021

VLC Ref	Project Ref	Project	Scope	Year
45	NW082	M80 - South of EJ Whitten Bridge to Calder Fwy	Widening (10 lane freeway)	2021
42	NW081	M80 - Sunshine Av to south of EJ Whitten Bridge	Widening (8 lane freeway)	2021
773	9271	Plenty Rd - Gordon Rd to Riversdale Bvd	Widening (6 lanes divided)	2021
708	3332	Corrigan Rd, Noble Park	Grade separation	2021
709	3330	Grange Rd, Caulfield East	Grade separation	2021
710	3331	Poath Rd, Hughesdale	Grade separation	2021
784	3355	Camp Rd, Campbellfield	Grade separation	2021
801	NW047	Roxburgh Park Drive	Upgrade (4 lanes) divided	2021
597	3206	Armstrong Road - Westbrook Dr to Black Forest Rd	New route (2 lanes)	2021
60	4138	Grices Rd - Berwick-Cranbourne Rd to Soldiers Rd	Sealing (2 lanes)	2021
240	2176	McGregors Rd - Pakenham Bypass to Thompsons Rd Extension	Sealing (2 lanes)	2021
77	SE019	Thompsons Rd, Western Port Hwy to Marriott Boulevard	Duplication (4 lanes divided)	2021
444, PT035	NW037	Marathon Boulevard (Waterview Boulevard to Whites Lane)	New route (2 lanes)	2021
478	NW016	Morris Rd - Dohertys Rd to 800m north of Dohertys Road	New route (2 lanes)	2021
547	SE021	Monash Freeway - Clyde Rd to Cardinia Road	Widening (6 lanes freeway)	2021
466	NW028	Armstrong Road - Ballan Road to 1.2km north of Ballan Road	Sealing (2 lanes)	2021
829	NW003	Westwood Drive - Rockbank Middle Rd to Taylors Rd	New route 2 lanes	2021
833	NW055	Arena Boulevard (James Mirriams Drive to Silvester Parade)	New route (2 lanes)	2021
797	SE007	Bridge Road Duplication from Cardinia Road to west of Viridian Way	Duplication (4 lanes divided)	2021
841	NW058	Civic Drive - Bush Bld to Morang Drive	New route (2 lanes)	2021
842	NW072	Hayes Hill Blvd- Donnybrook Road to Merriang Road	New route (2 lanes)	2021
843	NW005	Hume Drive - Calder Park Drive to Overton Lea Bvd	Duplication to 4 lanes	2021
834	NW004	Mt Cottrell Rd - Greigs Rd to Boundary Road	Sealing 2 lanes	2021
845	NW008	Rockbank Middle Road - Caroline Springs Blvd to Westwood Dr	Duplication to 4 lanes	2021
844	SE005	Station Street, Carrum	Extension across Patterson River	2021
830	9206	Tarneit Rd - Hogans Rd to Sayers Rd	Duplication (4 lanes divided)	2021
797	SE008	Bridge Road Duplication from Shaw Road to east of Gum Scrub Creek	Duplication (4 lanes divided)	2021
793	NW109	Ison Road (Westbrook Dr) - Princes Fwy to Armstrong Rd	New route (4 lanes)	2021
592	NW110	Ison Road (Westbrook Dr) - Armstrong Rd to Ballan Rd	New route (2 lanes)	2021
792	NW062	Regent Street- west of Cravens Road	New route (2 lanes)	2021
850	NW061	Riversdale Boulevard - Berry Lane to Bridge Inn Road	New route (2 lanes)	2021
529	3191	Scanlon Drive Extension - Craigieburn Rd to Summerhill Rd	New route (2 lanes)	2021
851	NW075	Vearings Road- Cooper Street to O'Herns	New route (2 lanes)	2021
852	SE004	McLeod Road, Carrum	Extension with Grade Separation	2021
672	3204	Hopkins Rd Extension - Neale Rd to Melton Hwy	New route (2 lanes)	2026
357	9168	Grange Rd - Heidelberg Rd to Darebin Rd	Duplication (4 lanes divided)	2026
606	7309	Western Freeway - Paynes Rd	Remove direct freeway access	2026
642	7310	Western Freeway - Troupes Rd North	Remove direct freeway access	2026
540	8162	Bulla Bypass - Sunbury Rd to Somerton Rd	New route (4 lanes)	2026
458	2167	Vantage Boulevard - Craigieburn Rd to Mt Ridley Rd	New route (2 lanes)	2026
306	8138	Calder Park Dr - Calder Fwy to Melton Hwy	Duplication (4 lanes divided)	2026
148	1991	Taylors Rd - Kurung Dr (west) to west of Shire boundary	Duplication (4 lanes divided)	2026
203	4158	Westall Road (Nothern Extension) - Princes Hwy East to Monash Fwy	New route (4 lanes divided)	2026
697	8137	Calder Freeway, Interchange - Calder Park Dve	Interchange (full diamond)	2026
530	NW108	Ison Road (Westbrook Dr) - 1km north of Ballan Road to Dohertys Rd	New route (2 lanes)	2026
305	9164	Bridge Inn Rd - Plenty Rd to Yan Yean Rd	Duplication (4 lanes divided)	2026
52	5188	Craigieburn Rd - Dorchester St to Waterview Bvd	Duplication (4 lanes divided)	2026
53	4160	Craigieburn Rd - Hanson Rd to Dorchester St	Duplication (4 lanes divided)	2026
158	8163	Craigieburn Rd from Mickleham Rd to Aitken Bvd (E14)	Duplication (4 lanes divided)	2026

VLC Ref	Project Ref	Project	Scope	Year
212	8442	Craigieburn Road East - Hume Freeway to Epping Rd	Duplication (4 lanes divided)	2026
160	9450	Edgars Rd - Cooper St to O'Herns Rd	Widening (6 lanes divided)	2026
162	8168	Epping Rd - Findon Rd to Craigieburn Rd	Duplication (4 lanes divided)	2026
125	2146	Epping Rd - Memorial Av to Findon Rd	Duplication (4 lanes divided)	2026
854	NW040	Elevation Boulevard (Vantage Blv to Mickleham Rd)	New route (2 lanes)	2026
117	NW077	Childs Road - Beaumont Cr to west of Prince of Wales Ave (existing duplicated section)	Duplication (4 land divided)	2026
676	NW100	Craigieburn Road, Overpass - Craigieburn Road East to Craigieburn Road West	New route (4 lanes)	2026
608	NW101	Donnybrook Rd - OMR to Hume Fwy	Widening (4 lanes)	2026
225	NW079	Findon Road - Williamsons Rd to Plenty Rd	New route (4 lane divided)	2026
101	5006	Dandenong Bypass - South Gippsland Hwy to South Gippsland Fwy	New route (6 lanes divided)	2026
61	3173	Hallam South Rd - Princes Hwy to Pound Rd	Duplication (4 lanes divided) and grade separation	2026
168	4119	Mickleham Road - Somerton Road to Craigieburn Road	Duplication (4 lanes divided)	2026
134	4157	Narre Warren - Cranbourne Rd - Thompsons Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2026
69	3375	O'Shea Rd - Soldiers Rd to Princes Fwy including South-East facing ramps and bridge widening	New route (4 lanes)	2026
76	2135	Somerton Road - Mickleham Rd to Roxburgh Park Dr	Duplication (4 lanes divided)	2026
140	5183	Pound Rd - West to Remington Drive Extension	New route (4 lanes divided) and	2026
108	4156	Berwick-Cranbourne Rd - Pattersons Rd to Narre Warren-Cranbourne Rd	Duplication (4 lanes, not divided	2026
777	5131	Koo-Wee-Rup Rd - Hall Rd to Ballarto Rd	Duplication (4 lanes divided)	2026
776	5130	Koo-Wee-Rup Rd - Ballarto Rd to Manks Rd	Duplication (4 lanes divided)	2026
246	8152	Pound Rd/Greaves Rd/o'Shea Rd route - Berwick-Cranbourne Rd to Princes Freeway	Duplication (4 lanes divided)	2026
233	5132	Koo-Wee-Rup Rd - Pakenham Bypass to Hall Rd	Duplication (4 lanes divided)	2026
641	NW013	Beattys Road - Melton Hwy to Hopkins Rd extension	New route 2 lanes	2026
676	7996	Craigieburn Rd - Hanson Road to Hume Freeway	Duplication (4 lanes divided)	2026
673	NW010	Taylors Road - Plumpton Rd to Leakes Rd	New route 2 lanes	2026
464	2182	Paynes Road - Western Fwy to Harrison Rd	New route (2 lanes)	2026
658	7995	Derrimut Road - Dohertys Road to Boundary Road	Duplication (4 lanes divided)	2026
451	8188	Glasscocks Road - Western Port Hwy to Evans Rd	Duplication (4 lanes divided)	2026
451	8204	Glasscocks Road - Evans Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2026
838	SE063	McGregors Rd - at Level Crossing	Duplication (4 lanes without grade separation)	2026
840	NW002	Wallan-Whittlesea Rd (Watson St) - Hume Fwy Interchange	Southerly ramps and duplication of overpass	2026
795	NW032	Cameron Street (east of Cloverton Boulevard)	New route (2 lanes)	2026
666	NW084	Gunns Gully Road Southern Half Connection to Hume Freeway	Interchange (1/2 diamond, southerly oriented)	2026
825	8436	Glasscocks Road - Dandenong Valley Hwy to Western Port Hwy	Duplication (4 lanes divided)	2026
836	NW103	Melton Hwy - The Regency to Leakes Rd	Duplication (4 lanes divided)	2026
669	4180	Thompsons Rd Extension - Soldiers Rd to Officer South Rd	New route (2 lanes)	2026
846	NW070	Kokoura Drive- Donnybrook Road to Gunns Gully Road	New route (2 lanes) (interim)	2026
769	2205	Casey Fields Boulevard - Thompsons Rd to Linsell Av	New route (2 lanes)	2031
120	3122	E14 (Aitken Bvd) - Broadmeadows Rd Deviation to Somerton Rd	New route (4 lanes divided)	2031
414	5187	Cooper St - Hume Hwy to Hume Freeway	Widening (6 lanes divided)	2031
63	3180	Heaths Rd - Shaws Rd to Tarneit Rd	Duplication (4 lanes divided)	2031
64	3181	Heaths Rd/Bolton Rd - Ballan Rd to Shaws Rd	Duplication (4 lanes divided) and bridge widening	2031
314	6116	Mickleham Road - Craigieburn Road to Donnybrook Road	Duplication (4 lanes divided)	2031
114	6128	Westwood Drive - Western Hwy to Rockbank Middle Rd	Widening (4 lanes divided)	2031
598	8335	Princes Fwy - Kororoit Creek Rd to Dohertys Rd	Widening (10 lanes freeway)	2031
307	7169	Childs Road - High St to Edgars Rd	New route (4 lanes divided)	2031

VLC Ref	Project Ref	Project	Scope	Year
595	5191	E14 (Mandalay Road) - Gunns Gully Rd to Camerons Lane	New route (2 lanes)	2031
666	3190	Gunns Gully Road - Hume Fwy to Scanlon Drive Extension	New route (2 lanes)	2031
848	NW085	Gunns Gully Road Northern Half Connection to Hume Freeway	Interchange (1/2 diamond, northerly oriented)	2031
680	5196	New east-west arterial north of Camerons Lane - Old Sydney Rd to Stewart St	New route (2 lanes)	2031
677	4170	New east-west arterial south of Camerons Lane (Rankin St) - Old Sydney Rd to Stewart St	New route (2 lanes)	2031
402	5193	Stewart Street - Beveridge to Northern Highway at Hume Interchange	New route (2 lanes)	2031
156	7171	Childs Road - High St to Dalton Rd	Duplication (4 lanes divided)	2031
173	8124	Somerton Road - Mickleham Rd to Oaklands Rd	Duplication (4 lanes divided)	2031
509	8355	Somerton Rd - Tullamarine Fwy extension to Oaklands Rd	Widening (4 lanes divided)	2031
511	8440	Somerton Road - Wildwood Rd to Tullamarine Fwy extension	Widening (4 lanes divided)	2031
466	3101	Armstrong Road - Ballan Rd to Sayers Rd	New route (2 lanes)	2031
462	4175	Bells Road - Pound Rd to Ballarto Rd	New route (2 lanes)	2031
471	4173	Bells Road/Yallambie Road - Ballarto Rd to Manks Rd	New route (2 lanes)	2031
681	5197	Beveridge-Darraweit Road Extension - Old Sydney Rd to Scanlon Drive Extension	New route (2 lanes)	2031
472	3199	Bodycoats Road - Craigieburn Rd to Summerhill Rd	New route (2 lanes)	2031
112	4134	C21 North South Boulevard - Princes Fwy to Grices Rd	New route (4 lanes divided)	2031
769	2206	Casey Fields Boulevard - Patterson Rd to South Gippsland Hwy	New route (2 lanes)	2031
514	2160	Davis Rd - Dohertys Rd to Hogans Rd	New route (2 lanes)	2031
221	4159	Dorset Rd - Burwood Hwy to Lysterfield Rd	New route (2 lanes)	2031
605	5195	E14 (Mandalay Road) - Camerons Lane to north of boundary	New route (2 lanes)	2031
456	4178	Hardys Road - Pound Rd to Muddy Gates La	New route (2 lanes)	2031
475	6140	Harrison Rd - Downing St to Hopkins Rd	New route (2 lanes)	2031
481	2189	Harrison Rd - Mount Cottrell Rd to Downing St	New route (2 lanes)	2031
463	3202	Hume Drive - Plumpton Road to Gourlay Road	New route (2 lanes)	2031
460	2186	Iramoo Rd - Ferris Rd to Greigs Rd	New route (2 lanes)	2031
470	4174	Moores Road - South Gippsland Hwy to Bells Rd	New route (2 lanes)	2031
486	4177	Muddy Gates Lane - Ballarto Rd to Hardys Rd	New route (2 lanes)	2031
476	5205	Paynes Road - Melton Hwy to Western Fwy	New route (2 lanes)	2031
454	3203	Saric Road - Melton Highway to Taylors Rd	New route (2 lanes)	2031
593	5194	Scanlon Drive Extension - Beveridge Rd to Wallan	New route (2 lanes)	2031
482	5201	Tarletons Road - Leakes Rd to Plumpton Rd	New route (2 lanes)	2031
479	3195	Tuckers Road - Pound Rd to Ballarto Rd	New route (2 lanes)	2031
485	4176	Tuckers Road/Derricks Rd - Ballarto Rd to Manks Rd	New route (2 lanes)	2031
522	7302	Boundary Rd - Davis Rd to Derrimut Rd	Duplication (4 lanes divided)	2031
507	8338	Boundary Rd - Fitzgerald Rd to Western Ring Rd	Widening (6 lanes divided)	2031
207	7172	Calder Park Dr - Melton Hwy to Taylors Rd	Duplication (4 lanes divided)	2031
512	2190	Davis Rd - Boundary Rd to Dohertys Rd	Sealing (2 lanes)	2031
508	9294	Derrimut Road - Hogans Rd to Sayers Rd	Widening (6 lanes divided)	2031
309	6110	Evans Road - South Gippsland Hwy to Hall Rd	Duplication (4 lanes divided) and	2031
459	8317	Hopkins Rd - Greigs Rd to Plumpton Rd	Widening (4 lanes divided)	2031
504	9453	Melton Hwy - Banchory Av to The Regency	Widening (6 lanes divided)	2031
135	5179	Narre Warren North Rd - Ernst Wanke Rd to Heatherton Rd	Duplication (4 lanes divided)	2031
609	8431	Plumpton Road - Hopkins Road Extension to Calder Freeway	Widening (4 lanes divided)	2031
74	6124	Point Cook Road - Pt Cook Homestead Road to Dunnings Road	Duplication (4 lanes divided)	2031
531	4122	Racecourse Road - Princes Hwy to Princes Fwy	Duplication (4 lanes divided) and	2031
142	7170	Robinsons Rd/Westwood Dve - Deer Park Bypass to Western Hwy	Duplication (4 lanes divided) and	2031
146 , 520	8144	Taylors Rd - Calder Park Dve to Plumpton Rd	Duplication (4 lanes divided)	2031
675	8305	Taylors Road Extension - Melton Hwy to Plumpton Rd	Duplication (4 lanes divided)	2031

VLC Ref	Project Ref	Project	Scope	Year
149	3157	Templestowe Rd - Bridge St to Thompsons Rd	Duplication (4 lanes divided)	2031
527	6008	Calder Freeway - Vineyard Rd to Melton Hwy	Widening (6 lanes)	2031
636	8315	Epping Rd - Bridge Inn Rd to Craigieburn Rd	Widening (4 lanes divided)	2031
175	9114	Hall Rd - Western Port Hwy to Sladen St	Duplication (4 lanes divided)	2031
241	8193	McGregor Rd - South of Henty St to Pakenham Bypass	Duplication (4 lanes divided)	2031
480	3201	Summerhill Rd/Masons Rd - Scanlon Dr to E6	New route (2 lanes)	2031
PT022	NW071	Gunns Gully Road- Sydney Melb railway overpass to E6	New route (2 lanes) (interim)	2031
589	3196	Pattersons Road - Berwick-Cranbourne Rd to Tuckers Rd	New route (2 lanes)	2031
590	4179	Pattersons Road - Tuckers Rd to Pound Rd	New route (2 lanes)	2031
109	4155	Berwick-Cranbourne Rd - Thompsons Rd to Pattersons Rd	Duplication (4 lanes not divided)	2031
452	SE032	Grices Rd - Soldiers Rd to west of Cardinia Creek	New route (2 lanes)	2031
352	5306	Tullamarine Freeway Extension - Melbourne Airport to Somerton Rd	New route (4 lane freeway)	2031
172	8308	Soldiers Rd - Grices Rd to Pound Rd	Duplication (4 lanes divided)	2031
474	3200	Boundary Road - Scanlon Dr to Epping Rd	New route (2 lanes)	2031
620	8439	Melbourne Airport - New elevated ring road connecting to Tullamarine Fwy	New link (1-way, 1-3 lanes)	2031
594	5192	Patterson Street - Beveridge to north of Beveridge	New route (2 lanes)	2031
110	8143	Broadmeadows Rd - Mickleham Rd to Ripplebrook Dr	Duplication (4 lanes divided)	2031
523	8139	Sunbury Rd - Melbourne-Lancefield Road to Powlett Street	Duplication (4 lanes divided)	2031
147	7167	Taylors Rd - Kings Rd to Kurung Dr	Duplication (4 lanes divided)	2031
596	9010	Mt Cottrell Rd/Western Freeway Interchange	New interchange (half diamond,	2031
774	SE024	Monash Freeway - Warrigal Rd to Springvale Rd (outbound	Widening (5 lanes outbound, no change to inbound)	2031
802	SE027	Brunt Rd - Rix Rd to Princes Hwy	Duplication (4 lanes)	2031
839	NW105	Christies Rd - Western Fwy to Caroline Springs Station	Duplication (4 lanes divided)	2031
794	NW033	Cameron Street (west of Hume Fwy)	New route (2 lanes)	2031
796	NW068	Cameron Street- Sydney Melb railway overpass to Merriang Road	New route (2 lanes) (interim)	2031
804	9289	Christies Rd - Western Highway to Western Freeway	Duplication (4 lanes divided)	2031
805	9216	Mornington-Tyabb Road - Nepean Hwy to Moorooduc Hwy	Duplication (4 lanes divided)	2031
806	9228	Shrives/Centre/Fullard Rds - Pound Rd to Narre Warren-Cranbourne Rd	Widening (4 lanes not divided)	2031
837	NW104	Melton Hwy - Leakes Rd to Federation Dr	Duplication (4 lanes divided)	2031
468	5204	Mt Cottrell Rd - Western Fwy to Melton Hwy	New route (2 lanes)	2031
174	5176	Western Port Hwy - North Rd to Baxter Tooradin Rd	Duplication (4 lanes divided)	2031
799	SE022	Monash Freeway - Cardinia Road to Koo Wee Rup Rd	Widening (6 lanes freeway)	2031
524	9378	Scanlon Drive - O'Herns Rd to Craigieburn Rd	Duplication	2031
242	8135	Melton Hwy - The Regency to Ryans Lane	Widening (6 lanes divided)	2031
670	5198	Thompsons Rd Extension - Officer South Rd to Cardinia Rd	New route (2 lanes)	2031
847	SE036	Rix Rd - Officer South Rd to Brunt Rd	Duplication (4 lanes)	2031
667	3194	Hardys Road - Berwick-Cranbourne Rd to Pound Rd	New route (2 lanes)	2036
650	2171	Craig Road - new connection to South Gippsland Hwy	New route (2 lanes)	2036
505	8180	Boundary Rd- Derrimut Rd to Palmers Rd	Widening (6 lanes divided)	2036
506	8426	Boundary Rd- Palmers Rd to Fitzgerald Rd	Widening (6 lanes divided)	2036
518	8429	Hopkins Rd - Boundary Rd to Greigs Rd	Widening (6 lanes divided)	2036
525	8320	Leakes Rd - Davis Rd to Shanahans Rd	Widening (4 lanes divided)	2036
691	8430	Mt Cottrell Rd - Leakes Rd to Melton Hwy	Widening (4 lanes divided)	2036
526	5200	Officer South Rd - Pakenham Bypass to Patterson Rd	Sealing (2 lanes)	2036
688	8410	Thompsons Rd - Eastlink to McCormicks Rd	Widening (6 lanes divided)	2036
632	4145	Officer South Rd - Rix Rd to Pakenham Bypass	Interchange (full diamond), duplication	2036
779	2302	Princes Freeway East, Interchange - McGregor Rd	Interchange (easterly oriented ramps)	2036
516	9005	Calder Freeway - M80 Ring Road to Melton Hwy	Widening (8 lanes divided)	2036
487	3185	Canterbury Avenue - Bundanoon Avenue to Albert Road	New route (2 lanes)	2036
621	4167	Merrifield Road - north of Donnybrook Rd to Beveridge	New route (2 lanes)	2036

VLC Ref	Project Ref	Project	Scope	Year
304	9163	Bridge Inn Rd - Cravens Rd to Plenty Rd	Duplication (4 lanes divided)	2036
303	9161	Bridge Inn Rd - E6 to Cravens Rd	Duplication (4 lanes divided)	2036
302	9162	Bridge Inn Rd - Epping Rd to E6	Duplication (4 lanes divided)	2036
250	8334	Sayers Rd - Derrimut Rd to Palmers Rd	Widening (4 lanes)	2036
617	3314	Princes Fwy / Clyde Road Interchange	Upgrade - improve c	2036
693	9286	Sunbury Rd - OMR to Melbourne-Lancefield Rd	Widening (6 lanes divided)	2036
634	3193	Pound Road - Soldiers Rd Extension to Bells Rd	New route (2 lanes)	2036
489	6143	Riding Boundary Rd - Mt Atkinson Rd to Hopkins Rd	New route (2 lanes)	2036
635	6141	Troups Road South - Greigs Rd to Harrison Rd	New route (2 lanes)	2036
696	7306	Dandenong Bypass - Perry Rd to South Gippsland Hwy	Widening (6 lanes divided)	2036
488	2188	Downing Street - Greigs Rd to Harrison Rd	Sealing (2 lanes)	2036
570	8307	Duncans Rd - Princes Highway to Princes Freeway	Duplication (4 lanes divided)	2036
568	8345	Federation Dr - Centenary Av to Melton Hwy	Widening (4 lanes)	2036
569	8344	Leakes Rd - Iramoo Rd to Taylors Rd	Widening (4 lanes)	2036
247	8153	Pound Rd/Greaves Rd/O'Shea Rd route - Hallam South Rd to Narre Warren-Cranbourne Rd	Duplication (4 lanes divided)	2036
141	4137	Pound Rd/Greaves Rd/O'Shea Rd route - Narre Warren-Cranbourne Rd to Berwick-Cranbourne Rd	Duplication (4 lanes divided)	2036
580	8330	Sneydes Rd - Hoppers La to Boardwalk Bvd	Widening (4 lanes)	2036
251	8378	South Gippsland Hwy - South Gippsland Fwy to Thompsons Rd	Widening (6 lanes divided)	2036
695	7305	Westall Rd - Dingley Arterial to Springvale Rd	Widening (6 lanes divided)	2036
534	3207	Greens Rd - Ison Rd to OMR	Sealing (2 lanes)	2036
832	8179	Leakes Rd - Davis Rd to Derrimut Rd	Duplication (4 lanes)	2036
807	3113	Canterbury Rd - Dorset Rd to Liverpool Rd	Widening (6 lanes divided)	2036
808	9259	Narre Warren-Cranbourne Rd - Centre Rd to Pound Rd	Widening (6 lanes divided)	2036
809	9258	Narre Warren-Cranbourne Rd - Pound Rd to Thompsons Rd	Widening (6 lanes divided)	2036
810	9438	William Thwaites Boulevard - Glasscocks Rd to Thompsons Rd	Duplication (4 lanes divided)	2036
359	7311	Dohertys Rd - Derrimut Rd to Palmers Rd	Widening (4 lanes divided)	2036
791	NW102	Donnybrook Rd - Hume Fwy to E6	Widening (4 lanes)	2036
628	SE023	Monash Freeway - South Gippsland Fwy Interchange	New ramp (south to east) and additional lane on Monash Fwy E bd to Tinks Rd	2036
129	8198	Hall Rd - McCormicks Rd to Western Port Hwy	Duplication (4 lanes divided)	2036
467	3192	Scanlon Drive Extension - Gunns Gully Rd to Beveridge Rd	New route (2 lanes)	2036
687	8420	Barry Road - Malmsbury Dr to E14	New route (2 lanes)	2041
455	6142	Mt Atkinson Rd - Boundary Rd to Greigs Rd	New route (2 lanes)	2041
519	9253	Berwick-Cranbourne Rd - Pound Rd to Thompsons Rd	Widening (6 lanes divided)	2041
536	8339	Boundary Rd - WRR to Fairbairn Rd	Widening (6 lanes divided)	2041
588	8419	Brookville Dr - Amaroo Rd to Donnybrook Rd	Widening (4 lanes divided)	2041
116	6137	Canterbury Rd - Liverpool Rd to Mount Dandenong Tourist Rd	Widening (6 lanes divided)	2041
567	9440	Casey Fields Bvd/Craig Road - Ballarto Rd to Browns Rd	Duplication (4 lanes divided)	2041
581	8370	Clyde Road - Grices Rd to Moondarra Dr	Widening (6 lanes divided)	2041
521	6135	Clyde-Five Ways Rd - Pattersons Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2041
557	8380	Dandenong-Frankston Rd - Thompsons Rd to Greens Rd	Widening (6 lanes divided)	2041
163	6138	Ferntree Gully Rd - Scoresby Rd to Burwood Hwy	Widening (6 lanes divided)	2041
619	9110	Glasscocks Road - South Gippsland Hwy to Berwick-Cranbourne Rd	Duplication (4 lanes divided)	2041
578	8343	Greigs Road - Troups Rd Sth to Hopkins Rd	Widening (4 lanes)	2041
230	9111	Grices Rd - Berwick-Cranbourne Rd to Soldiers Rd	Duplication (4 lanes divided)	2041
166	7159	Heatherton Rd - Hallam North Rd to Belgrave-Hallam Rd	Duplication (4 lanes divided)	2041
545	8408	Heatherton Rd - Monash Fwy to Power Rd	Widening (6 lanes divided)	2041
575	8342	Iramoo Rd - Mt Cottrell Rd to Greigs Rd	Widening (4 lanes)	2041
630	6132	Leakes Rd - Palmers Rd to Fitzgerald Rd	Widening (6 lanes divided)	2041
563	8340	Little Boundary Rd - Fairbairn Rd to Princes Hwy	Widening (6 lanes divided)	2041
633	9232	Officer South Rd - Princes Hwy to Rix Rd	Widening (4 lanes divided)	2041

VLC Ref	Project Ref	Project	Scope	Year
599	8368	Princes Hwy - Old Princes Hwy to Officer South Rd	Widening (6 lanes divided)	2041
249	9522	Robinsons Rd - through Deer Park Bypass interchange	Widening (6 lanes divided)	2041
551	5994	Sayers Road/ Old Geelong Road - Palmers Road to Kororoit Creek Road	Duplication (4 lanes divided)	2041
571	8409	Swansea Rd - York Rd to Mt Dandenong Rd	Widening (6 lanes divided)	2041
387	8311	Thompsons Rd - Berwick-Cranbourne Rd to Officer South Rd	Widening (4 lanes divided)	2041
318	9145	Thompsons Rd - McCormicks Rd to Clyde Rd	Widening (6 lanes divided)	2041
388	8190	Thompsons Rd Extension - Officer South Rd to McGregors Rd	Widening (4 lanes not divided)	2041
626	7175	Wantirna Road - Canterbury Road to Maroondah Hwy	Duplication (4 lanes divided)	2041
528	8993	Wellington Road- Kellets Road to Lysterfield Road	Duplication (4 lanes divided)	2041
554	6125	Westbrook Dr - Ballan Rd to Leakes Rd	Duplication (4 lanes)	2041
591	9018	South Gippsland Freeway - Monash Fwy to South Gippsland Hwy	Widening (6 lanes)	2041
603	8382	Mornington Peninsula Fwy - Springvale Rd to Eastlink	Widening (8 lane freeway)	2041
154	8136	Calder Freeway, Interchange - Sunshine Ave	Interchange (1/2 diamond, west	2041
611	9007	Western Freeway - Deer Park Bypass	Widening (6 lane freeway)	2041
616	6007	Western Fwy - Hopkins Rd to Leakes Rd	Widening (6 lanes)	2041
683	8014	E6 - Metropolitan Ring Rd to Findon Rd	New route (4 lane freeway)	2041
638	7001	E6 - Findon Rd to Bridge Inn Rd (includes sealing of Craigieburn Rd East from OMR to Epping Rd)	New route (4 lane freeway)	2041
383	8012	E6 - Scanlon Dr to Bridge Inn Rd	New route (4 lane freeway)	2041
684	8309	E6 - Hume Fwy to Scanlon Dr	New route (4 lane freeway)	2041
381	8007	OMR - Princes Fwy to Ballan Rd	New route (4 lane freeway)	2041
532	8318	Ballan Rd - OMR to Bulban Rd	Widening (4 lanes divided)	2041
582	9226	Gorge Rd/ Kurrak Rd - Plenty Rd to Yan Yean Rd	Duplication (4 lanes divided)	2041
625	9254	Berwick-Cranbourne Rd - Thompsons Rd to Pattersons Rd	Widening (6 lanes divided)	2041
209	SE051	Cardinia Road South of western arterial to Thompsons Rd	Duplication (4 lanes)	2041
655	NW111	Ison Road (Westbrook Dr) - Armstrong Rd to Ballan Rd	Duplication (4 lanes divided)	2041
679	5206	Western Port Hwy - South Gippsland Hwy to Cranbourne-Frankston Rd	Widening (6 lanes divided)	2041
499	9280	Somerton Road - Hume Hwy to Roxburgh Park Drive	Widening (6 lanes divided)	2041
82	6134	Burwood Highway - Scoresby Rd to Ferntree Gully Rd	Widening (6 lanes divided)	2041
144	5182	Springvale Rd - Mitcham Rd to Old Warrandyte Rd	Duplication (4 lanes divided)	2041
152	7176	Wellington Rd - Napoleon Rd to Kelletts Rd	Duplication (4 lanes divided)	2041
556	8016	Punt Road - Swan Street to St Kilda junction	Widening (6 lanes)	2041
811	9213	Ballarto Road - South Gippsland Hwy to Casey Fields Bvd	Duplication (4 lanes divided)	2041
813	9265	Cranbourne-Frankston Rd - Western Port Hwy to Hall Rd	Widening (6 lanes divided)	2041
814	8185	Lysterfield Rd -Napoleon Rd to Wellington Rd	Duplication (4 lanes divided)	2041
815	8192	McGregor Rd - Pakenham Bypass to Thompsons Rd Extension	Duplication (4 lanes divided)	2041
817	9137	Remington Dve to Bangholme Rd (via Colemans and Taylors Rds)	New route (4 lanes divided)	2041
818	4129	Springvale Rd - Old Warrandyte Rd to Reynolds Rd	Duplication (4 lanes divided)	2041
541	8424	Surrey Rd - Eastern Fwy to Springfield Rd	Widening (4 lanes divided)	2041
812	9104	Cranbourne Local Bypass/Linsell Blvd/Hardys Road - South Gippsland Hwy to Muddy Gates La	Duplication (4 lanes divided)	2041
816	9130	Mount Dandenong Road - Liverpool Rd to Canterbury Rd	Duplication (4 lanes divided)	2041
262	5174	Western Port Hwy - Baxter Tooradin Rd to Frankston Flinders Rd	Duplication (4 lanes divided)	2041
602	8381	Mornington Peninsula Fwy - Lower Dandenong Rd to Springvale Rd	Widening (6 lane freeway)	2041
822	9516	Dingley Freeway - Perry Rd to South Gippsland Fwy	Conversion to freeway (6 lanes)	2051
566	8372	Ballarto Road - Casey Fields Bvd to Clyde-Five Ways Rd	Widening (4 lanes divided)	2051
461	4169	Scanlon Drive Extension - Summerhill Rd to Gunns Gully Rd	New route (2 lanes)	2051

VLC Ref	Project Ref	Project	Scope	Year
107	5180	Bayswater Rd - Canterbury Rd to Mt Dandenong Rd	Widening (4 lanes)	2051
500	7174	Main Rd - Fitzsimons La to Bridge St	Widening (4 lanes not divided)	2051
572	8376	Baxter-Tooradin Rd - Western Port Hwy to South Gippsland Hwy	Widening (4 lanes divided)	2051
623	8187	Belgrave Hallam Road - New Wellington Road connection to Heatherton Rd	Duplication (4 lanes divided)	2051
565	8375	Browns Rd - Western Port Hwy to Craig Rd	Widening (4 lanes divided)	2051
549	8371	Clyde-Five Ways Rd - Ballarto Rd to Berwick-Cranbourne Rd	Widening (6 lanes divided)	2051
574	8412	Craigieburn Rd - Hanson Rd to Hardy Av	Widening (6 lanes divided)	2051
694	7178	Croydon Road/Wonga Road/Warranwood Road/Plymouth Road - Yarra Road to Ringwood-Warrandyte	Duplication (4 lanes divided)	2051
213	8435	Dandenong-Frankston Rd - Greens Rd to Dandenong Bypass	Widening (6 lanes divided)	2051
657	8428	Derrimut Road - Leakes Road to Dohertys Road	Widening (6 lanes divided)	2051
654	9293	Derrimut Road - Sayers Rd to Leakes Rd	Widening (6 lanes divided)	2051
405	8184	Dorset Road - Olive Grove to Rosella Grove	Duplication (4 lanes divided)	2051
562	9503	Fitzgerald Road - Kororoit Creek Rd to Western Fwy ramp	Widening (6 lanes divided)	2051
584	9298	Hobbs Rd/Sewells Rd - Ballan Rd to Sayers Rd	Duplication (4 lanes divided)	2051
558 and 698	9185	Leakes Rd - Mt Cottrell Rd to Palmers Rd	Widening (6 lanes divided)	2051
539	8353	Melbourne-Lancefield Rd - Sunbury Rd to north of Raes Rd	Widening (4 lanes divided)	2051
535	8366	Mt Dandenong Rd - Whitehorse Rd to Dublin Rd	Widening (6 lanes divided)	2051
316	9134	Officer South Rd - Lecky Rd to Thompsons Rd	Widening (4 lanes not divided)	2051
631	8154	Officer South Rd - Pakenham Bypass to Lecky Rd	Widening (4 lanes not divided)	2051
553	8336	Palmers Rd - Leakes Rd to Middle Rd	Widening (6 lanes divided)	2051
601	8407	Peninsula Link (Frankston Bypass) - EastLink to Frankston-Flinders Rd	Widening (6 lane freeway)	2051
651	8433	Princes Fwy West - Heaths Rd	New interchange	2051
618	9009	Western Freeway - Leakes Rd to Coburns Rd	Widening (6 lanes)	2051
610	9011	Western Freeway - Western Highway to Hopkins Rd	Widening (6 lanes)	2051
380	4006	OMR - Ballan Rd to East-West Freeway	New route (4 lane freeway)	2051
379	8008	OMR - East-West Freeway to Calder Fwy	New route (4 lane freeway)	2051
378	7304	OMR - Calder Fwy to Sunbury Rd	New route (4 lane freeway)	2051
382	6009	OMR - Sunbury Rd to Hume Fwy	New route (4 lane freeway)	2051
689	6014	OMR - Easterly oriented ramps at Sunbury Rd	New freeway ramps (1 lane)	2051
396	4007	East-West Freeway - OMR to Deer Park Bypass	New route (4 lane freeway)	2051
682	5300	Tullamarine Freeway Extension - Somerton Rd to OMR	New route (4 lane freeway)	2051
401	6004	Koo Wee Rup Rd, new freeway - Princes Freeway at Pakenham to South Gippsland Highway at Koo Wee R	Conversion to freeway (4 lanes)	2051
219	8147	Dandenong Valley Hwy (Stud Road) - High Street to Burwood Highway	Widening (3 lanes north bound)	2051
217	8146	Dandenong Valley Hwy (Stud Road) - Burwood Hwy to Boronia Rd	Widening (3 lanes north bound)	2051
216	8150	Dandenong Valley Hwy (Stud Road) - Ferntree Gully Road to High St Road	Widening (6 lanes divided)	2051
220	8148	Dandenong Valley Hwy (Stud Road) - Monash Fwy to Heatherton Road	Widening (3 lanes south bound)	2051
218	8149	Dandenong Valley Hwy (Stud Road) - Wellington Road to Kellets Road Rowville	Widening (6 lanes divided)	2051
214	8151	Dandenong Valley Hwy (Stud Road) - Wellington Road to Monash Freeway (Widen 4 to 6 Lanes Divided)	Widening (6 lanes divided)	2051
564	7993	Diamond Creek Road- Aqueduct Road to Ryans Road	Duplication (4 lanes divided)	2051
788	9123	Maroondah Highway - Warburton Highway to Melba Highway	Duplication (4 lanes divided)	2051
237	8155	Maroondah Hwy from Lilydale Deviation to Anderson Rd	New	2051
789	9418	Victoria Road - Maroondah Hwy to Paynes Rd Extension	Duplication (4 lanes divided)	2051
790	8995	Victoria St - Doncaster Road to King St	Widening (4 lanes not divided)	2051
604	6010	Tullamarine Freeway Extension - Melbourne Airport to Somerton Rd	New route (6 lane freeway)	2051

VLC Ref	Project Ref	Project	Scope	Year
515	8427	Derrimut Road - Dohertys Road to Boundary Road	Widening (6 lanes divided)	2051
111	5181	Burwood Highway - Cathies Lane to Stud Road	Widening (6 lanes divided)	2051
126	5178	Ferntree Gully Rd - Stud Rd to Scoresby Rd	Widening (6 lanes divided)	2051
510	8312	Greenhills Rd - McGregor Rd to Koo Wee Rup Rd	Widening (4 lanes divided)	2051
244	7177	Napoleon Rd - Kelletts Rd to Lysterfield Rd	Duplication (4 lanes divided)	2051
415	9199	Somerton Road - Mickleham Rd to Roxburgh Park Dr	Widening (6 lanes divided)	2051
204	6001	Western Port Hwy - South Gippsland Hwy to Cranbourne-Frankston Rd (excludes Wedge Rd interchange)	Conversion to freeway (4 lanes)	2051
258	8186	Wellington Rd - Lysterfield Rd to Belgrave-Hallam Rd	Duplication (4 lanes divided)	2051
561	8422	Elgar Rd - Eastern Fwy to Woodhouse Gr	Widening (6 lanes divided)	2051
819	9256	Berwick-Cranbourne Rd/Sladen St - Pattersons Rd to South Gippsland Hwy	Widening (6 lanes divided)	2051
820	4131	Boronia Rd - Mountain Hwy to Stud Rd	Widening (6 lanes divided)	2051
821	9439	Casey Fields Boulevard - Thompsons Rd to Ballarto Rd	Duplication (4 lanes divided)	2051
824	8157	Dorset Rd - Hull Rd to Maroondah Highway	Duplication (4 lanes divided)	2051
826	9109	Glasscocks Road - Dandenong Valley Hwy to Evans Rd	Widening (6 lanes divided)	2051
827	9113	Hall Rd - Dandenong-Frankston Rd to Western Port Hwy	Widening (6 lanes divided)	2051
828	9127	Melba Highway - Coldstream to north of Yarra Glen	Duplication and deviation (4 lanes divided)	2051
835	9428	Pattersons Road - Bells Rd to Pound Rd	Duplication (4 lanes divided)	2051
803	9444	Cardinia Road - Henry Rd to Lecky Rd	Widening (6 lanes divided)	2051
823	9107	Dorset Rd - Boronia Rd to Burwood Hwy	Widening (6 lanes divided)	2051
831	9432	Muddy Gates Lane - Ballarto Rd to Hardys Rd	Duplication (4 lanes divided)	2051
775	4190	Golf Links Rd - Peninsula Link to Baxter-Tooradin Rd	Duplication (4 lanes divided)	2051
800	9524	Dingley Freeway - South Road to Cheltenham Rd	Conversion to freeway (6 lanes)	2051

Appendix Table C.15 - Road Project Assumptions – Edited Road Projects

VLC Ref	Project Ref	Project	Scope	Year	NELP Modelled Assumption
92	2198	APAC Drive Extension - Melrose Dr to Tullamarine Fwy	New overpass (2 lane, 1-way)	2015	NELP year: 2013 (from observations)
87	2154	Calder Freeway/Kings Rd Interchange, and Kings Rd duplication Calder Fwy - Melton Hwy	Interchange (full diamond) and duplication (	2015	NELP year: 2012 (from observations)
50	2106	Clyde Road - Kangan Dr to High St (Princes Hwy)	Duplication (4 lanes divided), no grade separ	2015	NELP year: 2014 (from observations)
39	2001	Dingley Arterial East - Springvale Rd to Perry Rd	New route (6 lanes divided)	2015	NELP year: 2013 (from observations)
131	2156	Kororoit Creek Rd - Grieve Pde to Millers Rd (4 lanes divided, includes grade separation)	Duplication (4 lanes divided) and grade separation	2015	NELP year: 2012 (from observations)
67	2173	Linsell Blvd - Narre Warren-Cranbourne Rd to Berwick-Cranbourne Rd	New route (2 lanes)	2015	NELP year: 2013 (from observations)
43	2010	M80 - Edgars Rd to Plenty Rd	Widening (to 6 or 8 lanes)	2015	NELP year: 2014 (from observations)
41	2008	M80 - Calder Fwy to Sydney Rd	Widening (to 6 or 8 lanes)	2015	NELP year: 2013 (from observations)
41	2202	Tullamarine Fwy/M80 interchange - Tullamarine Fwy (S bd) to M80 (SW bd)	New elevated ramp (2 lanes)	2015	NELP year: 2013 (from observations)
41	2203	M80 - Tullamarine Fwy to Pascoe Vale Rd	New exit ramp to Pascoe Vale Rd (2 lanes)	2015	NELP year: 2013 (from observations)
42	2006	M80 - Western Hwy to Sunshine Av	Widening (to 6 or 8 lanes)	2015	NELP year: 2014 (from observations)
10	1104	Marathon Bvd - Aitken Bvd to Windrock Av	New route (2 lanes)	2015	NELP year: 2014 (from observations)
491	2201	Melrose Dr - Centre Rd to APAC Dr	Duplication (4 lanes divided)	2015	NELP year: 2016 (from observations)
647	2153	Mitcham Rd - Whitehorse Rd to Brunswick Rd, and Rooks Rd - Whitehorse Rd to Station St	Rail grade separation	2015	NELP year: 2016 (from observations)
660	2157	Palmers Road - Extension beyond Princes Fwy across the Werribee rail line	New route (2 lanes)	2015	NELP year: 2013 (from observations)
085 , 086	2004	Peninsula Link - Dandenong-Frankston Rd to Morn Pen Fwy	New route (4 lane freeway)	2015	NELP year: 2013 (from observations)
40	2002	Peninsula Link (Frankston Bypass) - EastLink to Dandenong-Frankston Rd	New route (4 lane freeway)	2015	NELP year: 2013 (from observations)
20	2155	Plenty Road - Gordons Rd to Riverdale Bvd	Duplication (4 lanes divided)	2015	NELP year: 2013 (from observations)
443	2166	Brookfield Boulevard - Vantage Boulevard to Aitken Boulevard	New route (2 lanes)	2015	NELP year: 2014 (from observations). Project 443 includes the section from Aitken Boulevard to Waterview Boulevard.
442	2180	Harvest Home Road - Scanlon Dr to Edgars Rd	New route (2 lanes)	2015	NELP year: 2016 (from observations)
PT068	2149	Palmers Rd - Connectors to new Williams Landing railway station New P	T connectors	2015	NELP year: 2013 (from observations)
29	2158	Windrock Av/Main St - Marathon Bvd to Craigieburn Rd	New route (2 lanes)	2015	NELP year: 2014 (from observations)
base	2164	Bridgewater Road - James Mirams Drive to Donald Cameron Drive	Duplication (4 lanes divided)	2015	Exists in 2011, is in NELP base.
base	2199	Mercer Dr - Tullamarine Fwy to Melrose Dr	Widening (2 lanes)	2015	Exists in 2011, is in NELP base.
base	2169	William Thwaites Boulevard - Glasscocks Rd to Thompsons Rd	New route (2 lanes)	2015	Exists in 2011, is in NELP base.
640	2196	Grassland Drive - Hacketts Rd to Point Cook Rd	New route (2 lanes)	2016	NELP year: 2021 (from observations)
627	2105	Cardinia Rd - Princes Hwy to Shearwater Dr	Duplication (4 lanes divided)	2016	NELP year: 2015 (from observations)
446	2159	Henry Rd - McCubbin Av to Cardinia Rd	New route (2 lanes)	2016	NELP year: 2014 (from observations)
313	2312	McGregors Road - Level Crossing to Princes Hwy	Duplication (with exception of level crossing	2016	NELP year: 2015 (from observations)
469	2170	Casey Fields Boulevard - Linsell Av to Patterson Rd	New route (2 lanes)	2016	NELP year: 2015 (from observations)
663	2183	Shogaki Drive - Ferris Rd to Mount Cottrell Rd	New route (2 lanes)	2016	NELP year: 2021 (from observations)
base	2311	McGregors Road - Henry Rd to Henty St	Duplication	2016	Exists in 2011, is in NELP base.
453	2168	Scanlon Drive Extension - Cooper St to Craigieburn Road	New route (2 lanes)	2016	NELP year: 2021 (from observations)
644	3303	Main Rd, St Albans	Grade separation	2021	NELP year: 2016 (from observations)
424	9236	Princes Freeway West, Interchange - Sneydes Road	Interchange (full diamond)	2021	NELP year: 2016 (from observations)

VLC Ref	Project Ref	Project	Scope	Year	NELP Modelled Assumption
648	3304	Scoresby Rd, Bayswater	Grade separation	2021	NELP year: 2017 (from observations)
648	3371	Mountain Hwy, Bayswater	Grade separation	2021	NELP year: 2017 (from observations)
685	3312	Sladen St - Narre Warren-Cranbourne Rd to South Gippsland Hwy	Duplication (4 lanes, not divided)	2021	NELP year: 2017 (from observations)
57	3179	E14 (Aitken Bvd) - Craigieburn Rd to Central Arterial	New route (2 lanes)	2021	NELP year: 2014 (from observations)
48	3302	Cardinia Rd, Shearwater Dr to Pakenham Bypass	Duplication	2021	NELP year: 2017 (from observations)
772	3373	Maroondah Highway - Ringwood St to Warrandyte Rd	Speed reduction (40 kph)	2021	NELP year: 2016 (from observations)
728	8998	West Gate Distributor Shepherds Bridge and Moreland St Widening	Widening (4 lanes outbound)	2021	NELP year: 2017 (from observations)
62	2117	Hallam South Rd - Ormond Rd to South Gippsland Hwy	Duplication (4 lanes divided)	2021	On advice of NELP this project has been given year 2026 for modelling purposes (OSARs).
138	9233	O'Herns Rd from Edgars Rd to Epping Rd	Duplication (4 lanes divided)	2021	NELP year: 2014 (from observations)
668	3197	Thompsons Rd Extension - Berwick-Cranbourne Rd to Soldiers Rd	New route (2 lanes)	2021	NELP year: 2031
514	NW106	Davis Rd - Hogans Rd to Leakes Rd	Sealing (2 lanes)	2021	NELP year: 2031
base	NW019	Hogans Road - Davis Creek to Davis Road	Sealing (2 lanes)	2021	Exists in 2011, is in NELP base.
base	NW074	Lehmans Road - Bindts Road to North South Connector	New route (2 lanes)	2021	In NELP base
base	3209	Nicholson St - Blyth St to Holmes St	Speed reduction (40 kph)	2021	In NELP base
PT036	NW066	Salt Lake Boulevard- Lehmans Road - Edgars Road	New route (2 lanes)	2021	PT036 covers this in year 2016.
base	NW045	Section Road	New route (2 lanes)	2021	Exists in 2011, is in NELP base.
base	SE011	Thewlis Road extension from Princes Highway to Kenneth Road	Extension	2021	Exists in 2014, is in NELP base.
PT035	NW049	Elizabeth Drive (Racecourse to Jacksons Creek)	New route (2 lanes)	2021	NELP year: 2016
318	SE018	Thompsons Rd, Marriott Boulevard to South Gippsland Hwy	Widening (6 lanes)	2021	NELP year: 2041
PT025	NW024	Ison Road (Westbrook Dr) - Ballan Road to 1km north of Ballan Road	New route (2 lanes)	2021	NELP year: 2046
452	SE013	Western Arterial road (Cardinia Rd to Gum Scrum Creek)	Extension	2021	Alignment may be slightly different and NELP year is 2031.
base	SE012	Cardinia Road South of Princes Freeway to western arterial (Glasscocks Rd extension)	Extension	2021	In NELP base
263	NW030	Cloverton Boulevard (south of Cameron Street)	New route (2 lanes)	2021	Former Amaroo Rd extension used.
base	NW012	Boundary Road - Mt Cottrell Rd to Davis Rd	Sealing 2 lanes	2026	In NELP base
PT052	NW052	Jacksons Hill Link	New route (2 lanes)	2026	NELP year: 2046
444	NW038	Marathon Boulevard (Whites Lane to Craigieburn West PSP connector road)	New route (2 lanes)	2026	NELP year: 2016
PT051	NW053	Polaris Road (Donnybrook Rd to English St)	New route (2 lanes)	2026	NELP year:2046
PT035	NW041	Marathon Boulevard (Craigieburn West PSP connector road to Micklehma Rd)	New route (2 lanes)	2026	Covered by PT035 in year 2016.
465	2185	Iramoo Rd - Exford Rd to Ferris Rd	New route (2 lanes)	2031	NELP year:204618 (from observations)
base	NW073	Harvest Home Road - Epping Road to Bindts Road	New route (2 lanes)	2031	Exists in 2011, is in NELP base.
PT036	NW065	Andrew Road - Craigieburn Road to Summerhill Road	New route (2 lanes)	2031	NELP year: 2016
base	SE028	Cardinia Rd - South of Western Arterial to Thompsons Rd	upgrade to 2 lanes	2031	2 lane upgrade is present in 2014
PT034	SE048	New East-West road (north of Princes Freeway) - Timbertop Bvd to Gum Scrub Creek	New route (2 lane bvd)	2031	Partially covered by PT034 in year 2016
673 and 674	NW011	Taylors Road - Leakes Rd to Melton Hwy (Federation Dr)	New route 2 lanes	2031	NELP year:2026 as comes in with 773.
452	SE031	Western Arterial Rd - Gum Scrub Creek to east of Cardinia Creek	New route (2 lanes)	2031	Alignment may be slightly different
263	NW031	Cloverton Boulevard (north of Cameron Street)	New route (2 lanes)	2031	NELP year: 2021 and Former Amaroo Rd extension used.
PT036	NW064	Edgars Road- Craigieburn Road to Summerhill Road	New route (2 lanes)	2031	Covered by PT036 in year 2016.
PT036	4172	New north-south route in Donnybrook - Gunns Gully Rd to Scanlon Dr Extension	New route (2 lanes)	2031	NELP year for PT036 is 2016

VLC Ref	Project Ref	Project	Scope	Year	NELP Modelled Assumption
533	9244	Yan Yean Road -Kurrak Road to Bridge Inn Road	Duplication (4 lanes divided)	2036	On advice of NELP this project has been given year 2026 for modelling purposes (OSARs).
PT034	3194	Hardys Road - Berwick-Cranbourne Rd to Pound Rd	New route (2 lanes)	2036	NELP year is 2016, and a slightly different alignment.
117	6123	Childs Rd - Bowman Dr to Proposed E6	Duplication (4 lanes divided)	2041	On advice of NELP this project has been given year 2026 for modelling purposes (OSARs).
803	SE050	Cardinia Road South of Princes Freeway to western arterial	Widening (6 lanes)	2041	NELP year 2051
PT037	NW009	Tarletons Road - Leakes Rd to Mt Cottrell Rd	New route 2 lanes	2041	Small section of this is covered by PT037 in year 2021
585	SE049	Western Arterial road (Cardinia Road to Soldiers Road)	Duplication (4 lanes)	2051	Alignment may be slightly different
204	2140	Thompsons Rd/Western Port Hwy Interchange	Interchange (full diamond) and g	2041	NELP year 2051 with the freeway standard.

Appendix Table C.16 - Road Project Assumptions – Additional Road Projects Implemented by NELP

VLC Ref	Project Ref	Project	Scope	NELP Year	Comments
38	N/A	Grand Bvd from Mt Ridley Rd to Winrock Ave	Upgrade	2012	Existing – in base year
83	N/A	Sayers Rd from Derrimut Rd to Tarneit Rd=> 4 lane Divided	Upgrade	2012	Existing – in base year
84	N/A	Shearwater Dr from Cardinia Rd to Princes Hwy	New	2012	Existing – in base year
91	N/A	M1 at WGB	Upgrade	2012	Existing – in base year
423	N/A	Bush Bvd from Plenty Rd to McDonalds Rd	New	2012	Existing – in base year
427	N/A	Breakwater Rd from Tucker Rd to Barwon Heads Rd	Upgrade	2012	Existing – in base year
238	N/A	McGrath Rd from Bulban Rd to Black Forest Rd	New	2013	Existing – in base year
419	N/A	Geelong Ring Rd Stages 4A 4B & 4C from to	New	2013	Existing – in base year
429	N/A	Nagambie Bypass from Mitchellstown Rd to Moss Rd	New	2013	Existing – in base year
434	N/A	Bass Hwy from Lang Lang to Anderson	Upgrade	2013	Existing – in base year
435	N/A	Western Hwy from Beaufort to Ballarat	Upgrade	2013	Existing – in base year
436	N/A	Extra Rds for the 2013 PT network	Growth Areas	2013	Existing – in base year
766	N/A	Growth area road improvements	New	2013	Existing – in base year
421	N/A	Princes Fwy East from Melbourne to Sale	Upgrade	2014	Existing – in base year
428	N/A	Midland Hwy from Florence St to Doyles Rd	Upgrade	2014	Existing – in base year
430	N/A	Princes Hwy from Reid Dr (Wurruk) to Reeve St (Sale)	Upgrade	2014	Existing – in base year
433	N/A	Warragul Rail Precinct Upgrade from Howitt St to Normanby Place	New	2014	Existing – in base year
662	N/A	Extra Rds for the 2014 PT network	0	2014	Existing – in base year
768	N/A	Growth area road improvements	New	2014	Existing – in base year
420	N/A	Princes Hwy from Waurn Ponds to Winchelsea	Upgrade	2015	Existing – in base year
702	N/A	Ballarat Western Link Rd from Remembrance Dr to Learmonth Rd	New	2015	Existing – in base year
725	N/A	Inner West Truck Curfews from Moore St to Francis St	Turn bans	2015	Existing – in base year
764	N/A	North-East Truck curfew (Greensborough) from Waterdale Rd to Ryans Rd	Turn bans	2015	Existing – in base year
767	N/A	Growth area road improvements	New	2015	Existing – in base year
699	N/A	Western Hwy from Beaufort to Buangor	Upgrade	2016	Existing – in base year
700	N/A	Western Hwy from Buangor to Ararat	Upgrade	2016	Existing – in base year
703	N/A	Pioneer Rd from Church St to Waurn Ponds Creek	Upgrade	2016	Existing – in base year
704	N/A	Sneydes Rd from Princes Hwy to South Rd	Upgrade	2016	Existing – in base year
721	N/A	Princes Hwy from Denison Rd to Nambrock Rd	Upgrade	2016	Existing – in base year
722	N/A	Princes Hwy from Sale-Heyfield Rd to Reid Dr (Wuruck)	Upgrade	2016	Existing – in base year
724	N/A	Webb Dock Dr from Williamstown Rd to Cook St	New	2016	Existing – in base year
765	N/A	Growth area road improvements	New	2016	Existing – in base year
PT018	N/A	Growth Area Bus Infrastructure- Outer SW (Werribee/Hoppers Crossing)	Growth Areas	2016	Existing – in base year
PT034	N/A	Growth Area Bus Infrastructure- Outer SE (Cranbourne/Pakenham)	Growth Areas	2016	Existing – in base year
PT035	N/A	Growth Area Bus Infrastructure- Outer NW (Craigieburn/Sunbury)	Growth Areas	2016	Existing – in base year
PT036	N/A	Growth Area Bus Infrastructure- Outer North (South Morang/Epping)	Growth Areas	2016	Existing – in base year
PT038	N/A	Growth Area Bus Infrastructure- Outer SW (Point Cook)	Growth Areas	2016	Existing – in base year
PT069	N/A	Growth area infrastructure for 2016 bus network	Growth Areas	2016	Existing – in base year
705	N/A	Princes Hwy East/Sand Rd Interchange	New	2017	Rural road not in reference case
706	N/A	Calder Hwy/Ravenswood	New	2017	Rural road not in reference case
701	N/A	Western Hwy from Ararat to Stawell	Upgrade	2019	Rural road not in reference case
785	N/A	Warrandyte Bridge upgrade	Upgrade	2019	Planning underway according to VicRoads Projects website
714	N/A	Princes Hwy from Winchelsea to Colac	Upgrade	2019	Rural road not in reference case
707	N/A	Clayton Rd - Haughton Rd to Carinish Rd	Grade separation	2021	
360	N/A	Elizabeth Dr Extension (Sunbury) from existing urban area. Northwards to line of future ring route (new link)	New	2021	Construction completed late 2017 (satellite imagery)
PT026	N/A	Growth Area Bus Infrastructure- Outer North (Epping/South Morang/Wallan)	Growth Areas	2021	Growth area links to accommodate bus service plans
PT037	N/A	Growth Area Bus Infrastructure- Outer West (Caroline Springs/Melton)	Growth Areas	2021	Growth area links to accommodate bus service plans
PT055	N/A	Growth Area Bus Infrastructure- Outer SE (Pakenham)	Growth Areas	2021	Growth area links to accommodate bus service plans
PT056	N/A	Growth Area Bus Infrastructure- Outer SE (Dandenong/Cranbourne/Warneet)	Growth Areas	2021	Growth area links to accommodate bus service plans
PT058	N/A	Growth Area Bus Infrastructure- Outer SW (Werribee/Hoppers Crossing)	Growth Areas	2021	Growth area links to accommodate bus service plans
PT059	N/A	Growth Area Bus Infrastructure- Outer West (Melton)	Growth Areas	2021	Growth area links to accommodate bus service plans

VLC Ref	Project Ref	Project	Scope	NELP Year	Comments
PT060	N/A	Growth Area Bus Infrastructure- Outer NW (Sunbury)	Growth Areas	2021	Growth area links to accommodate bus service plans
PT061	N/A	Hillview Rd from Mickleham Rd	Growth Areas	2021	Construction commenced 2015 (still ongoing)
308	N/A	Evans Rd from South Gippsland Hwy to Thompsons Rd	Upgrade	2021	
124	N/A	Edgars Rd - Cooper St to O'Herns Rd	New route (2 lanes)	2021	From reference case 1.08a (id=3124). 2 lane inclusion to come before 6 lanes upgrade.
450	N/A	Glasscocks Road - Western Port Hwy to South Gippsland Hwy	New route (2 lanes)	2021	From reference case 1.08a (id=2178)
483	N/A	Grants Road Extension - Hume Fwy to Merriang Rd	New route (2 lanes)	2026	From reference case 1.08a (id=4168)
PT022	N/A	Growth Area Bus Infrastructure- Outer NW (Craigieburn/Sunbury/Kalkallo)	Growth Areas	2026	Growth area links to accommodate bus service plans
PT040	N/A	Growth Area Bus Infrastructure- Mornington Pen. (Mount Martha)	Growth Areas	2026	Growth area links to accommodate bus service plans
PT041	N/A	Growth Area Bus Infrastructure- Outer SW (Werribee/Hoppers Crossing)	Growth Areas	2026	Growth area links to accommodate bus service plans
622	N/A	Beveridge-Darraweit Rd from Romsey Rd to Old Sydney Rd	New	2031	Rural road not in reference case
477	N/A	Federation Dr - Melton Hwy to Beattys Rd	New	2031	From reference case 1.08a (id=5307)
119	N/A	E14 (Aitken Bvd) from MRR to Broadmeadows Rd	New	2031	
229	N/A	Governor Rd from Boundary Rd to Springvale Rd	New	2031	
257	N/A	Wedge Rd from Western Port Hwy to Evans Rd	New	2031	
711	N/A	Beaufort Bypass	New	2031	Rural road not in reference case
712	N/A	Ararat Bypass	New	2031	Rural road not in reference case
713	N/A	Horsham bypass	New	2031	Rural road not in reference case
715	N/A	Drysdale Bypass	New	2031	Rural road not in reference case
PT039	N/A	Growth Area Bus Infrastructure- Outer SE (Cranbourne/Pakenham/Dandenong)	Growth Areas	2031	Growth area links to accommodate bus service plans
PT042	N/A	Growth Area Bus Infrastructure- Outer West (Melton)	Growth Areas	2031	Growth area links to accommodate bus service plans
484	N/A	Troups Road North - Melton Hwy to Taylors Rd	New route (2 lanes)	2031	From reference case 1.08a (id=5202)
422	N/A	Westwood Drive - Rockbank Middle Rd to Taylors Rd	New route (4 lanes divided)	2031	From reference case 1.08a (id=6129)
133	N/A	Mornington Peninsula Fwy from Jetty Rd to Melbourne Rd	New	2046	
151	N/A	Wedge Rd from Taylors Rd to Western Port Hwy	New	2046	
211	N/A	Craigieburn Rd from Outer Ring Rd to Mickleham Rd	New	2046	
226	N/A	Findon Rd from Plenty Rd to Gorge Rd	New	2026	On advice of NELP this project has been given year 2026 for modelling purposes (OSARs).
PT025	N/A	Growth Area Bus Infrastructure- Outer SW (Werribee/Hoppers Crossing)	Growth Areas	2036	Growth area links to accommodate bus service plans
PT053	N/A	Growth Area Bus Infrastructure- Outer West (Caroline Springs/Melton)	Growth Areas	2036	Growth area links to accommodate bus service plans
PT054	N/A	Growth Area Bus Infrastructure- Outer SW (Point Cook)	Growth Areas	2036	Growth area links to accommodate bus service plans
384	N/A	South Gippsland Hwy from Koo Wee Rup Rd to Bass Hwy turnoff	Upgrade	2046	
403	N/A	Barry Rd Extension from E14 to Tullamarine Fwy	New	2046	
PT050	N/A	Growth Area Bus Infrastructure- Outer SE (Cranbourne)	Growth Areas	2046	Growth area links to accommodate bus service plans
PT051	N/A	Growth Area Bus Infrastructure- Outer North (Craigieburn/Wallan/Whittlesea)	Growth Areas	2046	Growth area links to accommodate bus service plans
PT052	N/A	Growth Area Bus Infrastructure- Outer NW (Sunbury)	Growth Areas	2046	Growth area links to accommodate bus service plans
224	N/A	Findon Rd from Epping Rd to Glendale Ave	New	2046	On advice of NELP this project has been given year 2026 for modelling purposes (OSARs).
310	N/A	Golf Links Rd/Baxter-Tooradin Rd, Peninsula Link to Western Port Highway connection	New route (4 lanes divided)	2046	Covers section from Frankston-Flinders Rd to Western Port Highway. Informed from reference case 1.08a (id=8201)
537	N/A	Cheddar Rd West - Hickford St to Keon Pde	Widening (4 lanes divided)	2046	From reference case 1.08a (id=8359)

Appendix Table C.17 - Road Project Assumptions – Excluded Road Projects

VLC Ref	Project Ref	Project	Scope	Year	Description
N/A	2152	Springvale Rd - Virgina St to Balmoral Av	Grade separation	2015	Not relevant for strategic modelling
N/A	3301	Burke Rd, Glen Iris	Grade separation	2016	Not relevant for strategic modelling
N/A	3300	Blackburn Rd, Blackburn	Grade separation	2021	Not relevant for strategic modelling
N/A	3340	Centre Rd, Bentleigh	Grade separation	2021	Not relevant for strategic modelling
N/A	3360	Furlong Rd, St Albans	Grade separation	2021	Not relevant for strategic modelling
N/A	3339	McKinnon Rd, McKinnon	Grade separation	2021	Not relevant for strategic modelling
N/A	3306	North Rd	Grade separation	2021	Not relevant for strategic modelling
N/A	3305	Murrumbeena Rd	Grade separation	2021	Not relevant for strategic modelling
N/A	3308	Koornang Rd	Grade separation	2021	Not relevant for strategic modelling
N/A	3333	Chandler Rd, Noble Park	Grade separation	2021	Not relevant for strategic modelling
N/A	3334	Abbotts Rd, Lyndhurst	Grade separation	2021	Not relevant for strategic modelling
N/A	3335	Thompsons Rd, Cranbourne West	Grade separation	2021	Not relevant for strategic modelling
N/A	3336	South Gippsland Hwy, Dandenong South	Grade separation	2021	Not relevant for strategic modelling
N/A	3337	Hallam South Road, Hallam	Grade separation	2021	Not relevant for strategic modelling
N/A	3338	Clyde Rd, Berwick	Grade separation	2021	Not relevant for strategic modelling
N/A	3341	Charman Rd, Cheltenham	Grade separation	2021	Not relevant for strategic modelling
N/A	3342	Balcombe Rd, Mentone	Grade separation	2021	Not relevant for strategic modelling
N/A	3343	Edithvale Rd, Edithvale	Grade separation	2021	Not relevant for strategic modelling
N/A	3344	Station St, Bonbeach	Grade separation	2021	Not relevant for strategic modelling
N/A	3347	Seaford Rd, Seaford	Grade separation	2021	Not relevant for strategic modelling
N/A	3348	Overton Rd (Skye Rd), Seaford	Grade separation	2021	Not relevant for strategic modelling
N/A	3349	Toorak Rd, Kooyong	Grade separation	2021	Not relevant for strategic modelling
N/A	3350	Heatherdale Rd, Ringwood	Grade separation	2021	Not relevant for strategic modelling
N/A	3351	Buckley St, Essendon	Grade separation	2021	Not relevant for strategic modelling
N/A	3352	Glenroy Rd, Glenroy	Grade separation	2021	Not relevant for strategic modelling
N/A	3353	Moreland Rd, Brunswick	Grade separation	2021	Not relevant for strategic modelling
N/A	3354	Bell St, Coburg	Grade separation	2021	Not relevant for strategic modelling
N/A	3356	Grange Rd, Fairfield	Grade separation	2021	Not relevant for strategic modelling
N/A	3357	Lower Plenty Rd, Rosanna	Grade separation	2021	Not relevant for strategic modelling
N/A	3358	Bell St, Preston	Grade separation	2021	Not relevant for strategic modelling
N/A	3359	High St, Reservoir	Grade separation	2021	Not relevant for strategic modelling
N/A	3361	Melton Hwy, Taylors Lakes	Grade separation	2021	Not relevant for strategic modelling
N/A	3362	Aviation Rd, Laverton	Grade separation	2021	Not relevant for strategic modelling
N/A	3363	Cherry St, Werribee	Grade separation	2021	Not relevant for strategic modelling
N/A	3364	Werribee St, Werribee	Grade separation	2021	Not relevant for strategic modelling
N/A	3365	Manchester Rd, Mooroolbark	Grade separation	2021	Not relevant for strategic modelling
N/A	3366	Maroondah Hwy, Lilydale	Grade separation	2021	Not relevant for strategic modelling
N/A	3367	Kororoit Creek Rd, Altona	Grade separation	2021	Not relevant for strategic modelling

VLC Ref	Project Ref	Project	Scope	Year	Description
N/A	3368	Ferguson St, Williamstown	Grade separation	2021	Not relevant for strategic modelling
N/A	3370	Centre Rd, Clayton	Grade separation	2021	Not relevant for strategic modelling
N/A	SE006	Park Road, Cheltemham	Grade Separation	2021	Not relevant for strategic modelling
N/A	3099	2021 PT access		2021	VITM specific
N/A	NW056	East - West Connector - Edgars Road to Epping Central	New route (2 lanes)	2021	Not enough information to code this up.
N/A	NW044	Blosson Boulevard	New route (2 lanes)	2021	Not enough information to code this up.
N/A	NW025	Bulban Road deviation to intersect with Ison Road (Existing road for 1.7km west from McGrath Road is deviated off the current alignment)	New route (2 lanes)	2021	Not enough information to code this up.
N/A	NW042	Horizon Boulevard	New route (2 lanes)	2021	Not enough information to code this up.
N/A	NW083	Auxilary lane from Craigieburn Bypass to Edgars Rd	New Link (2 lanes)	2021	Not relevant for strategic modelling
N/A	NW057	North- South Connector - Cooper Street to Deveny Road	New route (2 lanes)	2021	Not enough information to code this up.
N/A	SE003	Mascot Avenue, Carrum	Closing/truncating road	2021	Not relevant for strategic modelling
N/A	SE001	Station Street, Carrum	Closing/truncating road	2021	Not relevant for strategic modelling
N/A	4010	North East Link / Manningham Rd interchange	Full interchange	2026	Project case
N/A	5308	M80 - Plenty Rd to Greensborough Hwy	Widening (8 lane freeway)	2026	Project case
136	4008	North-East Link -connection between Metropolitan Ring Road and Eastern Freeway at Bulleen	New route (6-8 lane freeway)	2026	Project case
N/A	4003	Eastern Freeway - Bulleen Rd to Doncaster Rd	Widening (10 lanes)	2026	Project case
N/A	4004	Eastern Freeway - Doncaster Rd to Springvale Rd	Widening (8 lanes)	2026	Project case
N/A	8385	Eastern Fwy - Chandler Hwy to Bulleen Rd	Widening (10 lane freeway)	2026	Project case
N/A	NW043	Craigieburn West PSP connector road	New route (2 lanes)	2026	Not enough information to code this up.
N/A	4188	Hallam South Rd - At railway crossing	Duplication (4 lanes divided)	2026	Is covered by 3173 (CS061)
N/A	NW059	Grange Drive Extension	New route (2 lanes)	2026	Not enough information to code this up.
502	7173	Fitzsimons La - Main Rd to Porter St	Widening (6 lanes divided)	2031	Excluded
N/A	4171	New east-west route north of OMR - Mandalay Rd to Patterson St	New route (2 lanes)	2031	Not enough information to code this up.
N/A	3098	Road adjustment around Melbourne Metro Stations		2031	Not enough information to code this up.
N/A	SE035	East west road (north of Princes Freeway) - O Neill Road to Timbertop Blvrd	New route (2 lane bvd)	2031	Not enough information to code this up.
N/A	SE037	North South Collector	New route (2 lanes)	2031	Not enough information to code this up.
N/A	SE034	northern east west road (west of Cardinia Road extension)	upgrade to final 2 lane boulevard standard	2031	Not enough information to code this up.
N/A	NW001	Kilmore Wallan Bypass, Nothern Hwy at Boundary Road to Hume Fwy at Wandong	New Link	2031	Excluded
N/A	SE030	Southern Collector Rd - Ryan Rd to Princes Hwy	4 lane boulevard	2031	Excluded
517	8432	Hume Freeway - Western Ring Rd to Cooper St	Widening (6 lanes)	2031	Excluded
787	8414	Hume Fwy - Hume Hwy to Craigieburn Rd	Widening (6 lane freeway)	2036	Excluded
N/A	5008	Eastern Freeway - Doncaster Rd to Springvale Rd	Widening (8 lanes; and 10 lanes btn Tram Rd and Blackburn Rd)	2036	Project case
786	8017	Hume Freeway - Cooper St to Craigieburn Rd	Widening (6 lanes)	2036	Excluded
555	8358	Diamond Creek Rd - Greensborough Bypass to Yan Yean Rd	Widening (6 lanes divided)	2041	Project case
612	4005	Eastlink - Maroondah Hwy to Dingley Arterial	Widening (8 lanes)	2041	Excluded

VLC Ref	Project Ref	Project	Scope	Year	Description
587	8415	Hume Fwy - Gunns Gully Rd to south of Donnybrook Rd	Widening (6 lane freeway)	2041	Excluded
586	9514	Hume Fwy - south of Donnybrook Rd to Hume Hwy	Widening (8 lane freeway)	2041	Excluded
614 , 778	8421	M80 - E6 to Greensborough Hwy	Widening (10 lane freeway)	2041	Project case
N/A	4108	Stud Road Extension (Bayswater Bypass) - Mountain Highway to Dorset Road	New route (4 lanes)	2041	Excluded
671	3198	Thompsons Rd Extension - Cardinia Rd to McGregors Rd	New route (2 lanes)	2041	This project has been superseded due to project 8190 which widens the same section in the same year.
607	NA	Greensborough Bypass - Metropolitan Ring Rd to Diamond Creek Rd	Conversion to freeway (4 lanes)	2046	Project case
544	8364	Williamsons Rd/Fitzsimons La - Foote St to Main Rd	Widening (8 lanes divided)	2051	Excluded
573	8418	Hume Highway - Craigieburn Rd to Hume Freeway	Widening (6 lanes divided)	2051	Excluded
542	8363	Williamsons Rd - Eucalypt Av to Foote St	Widening (6 lanes divided)	2051	Excluded
N/A	9389	New east-west arterial south of Donnybrook Road (includes half interchange with Hume Fwy) - Aitken Bvd	Duplication (4 lanes divided) + 1/	2051	Not enough information to code this up.
N/A	SE064	Healesville Freeway - Stud Rd to Canterbury Rd	New route (4 lane freeway)	2051	Not enough information to code this up.
603	6002	Mornington Peninsula Fwy - Eastlink to Springvale Rd	Widening (6 lanes)	2051	There are 2 entries in reference case for this section of road. As 8382 occurs before this and is a higher standard (8 lanes) this entry (id 6002) has been excluded.

Appendix C5: Commercial vehicle bans

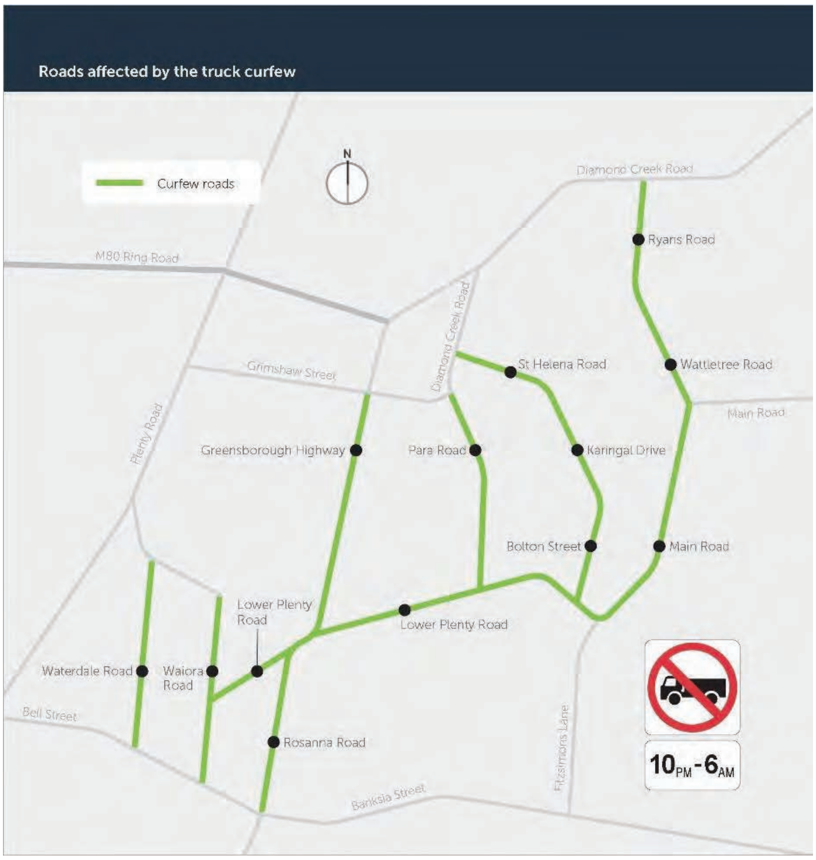
Appendix Table C.18 - Modelled Commercial vehicle bans and curfews (Base Year)

Road	Suburb / Town	Location	Time of Curfew
Henry Street	Boronia		24 hours a day, 7 days a week
Power Road	Boronia	Woodmason Road to William Street	24 hours a day, 7 days a week
Rankin Road	Boronia		24 hours a day, 7 days a week
Clyde-Fiveways Road	Clyde		24 hours a day, 7 days a week
Pascoe Vale Road	Essendon & Strathmore	Dean Street to Western Ring Road	8pm to 6am, Monday to Saturday, 1pm to 6am, Saturday to Monday
Blackwood Park Road	Ferntree Gully		24 hours a day, 7 days a week
Commercial Road	Ferntree Gully		24 hours a day, 7 days a week
Francis Crescent	Ferntree Gully		24 hours a day, 7 days a week
Napoleon Road	Ferntree Gully	Kellets Road to Wellington Road	8am to 9.30am, 2.30pm to 4pm, School days
Underwood Rd	Ferntree Gully		24 hours a day, 7 days a week
Barkly St / Hopkins St	Footscray	Moore St to Geelong Rd	24 hours a day, 7 days a week
Irving St	Footscray	Hopkins St to Nicholson St	24 hours a day, 7 days a week
Nicholson St	Footscray	Barkly St to Ballarat Rd	24 hours a day, 7 days a week
Victoria St	Footscray	Barkly St to Buckley St	24 hours a day, 7 days a week
Church Street	Geelong	Vines Road to the Midland Highway	8:30am to 9:30am & 3:30pm to 5:30pm, School days
Station Street	Geelong	St Georges Road to North Shore Road	9pm to 6am, 7 days a week
Jika & Dora Streets,	Heidelberg	Between Rosanna Road and Banksia Street	8:00pm and 6:00am, 7 days a week
Macaulay Road	Kensington	Epsom Road to Stubbs Street	7am to 7pm, Monday to Friday, 7am to 1pm, Saturday
Allister Avenue	Knoxfield		24 hours a day, 7 days a week
Victoria Road	Lilydale		24 hours a day, 7 days a week
Malvern Road	Malvern	Burke Road to Waverley Road	8pm to 6am, Monday to Saturday, 1pm to 6am, Saturday to Monday
Wattletree Road	Malvern	Dandenong Road to Burke Road	8pm to 6am, Monday to Saturday, 1pm to 6am, Saturday to Monday
Waverley Road	Malvern	Dandenong Road to Warrigal Road	8pm to 6am, Monday to Saturday, 1pm to 6am, Saturday to Monday
Gatehouse Street	North Melbourne	Flemington Road to Royal Parade	24 hours a day, 7 days a week
Haughton Road	Oakleigh	Oakleigh to Huntingdale stations	24 hours a day, 7 days a week
Bergins Road	Rowville		24 hours a day, 7 days a week
Kellets Road	Rowville	Stud Road to Wellington Road	8am to 9.30am, 2.30pm to 4pm, School days
Taylors Lane	Rowville		24 hours a day, 7 days a week
George Street	Scoresby		24 hours a day, 7 days a week
Hyde Street/Douglas Parade	Spotswood	South of Francis St, from Francis St through to Hobsons St	8pm to 6am, Monday to Saturday, 1pm Saturday to 6am Monday
Lewis Road	Studfield	Boronia Road to Wadhurst Drive	24 hours a day, 7 days a week
Fairnbairn Road	Sunshine		24 hours a day, 7 days a week
Cathies Lane	Wantirna South	Burwood Highway to High Street Road	24 hours a day, 7 days a week
Francis Street	Yarraville		8pm to 6am, Monday to Saturday, 1pm Saturday to 6am Monday
Hyde Street	Yarraville	North of Francis St	24 hours a day, 7 days a week
Somerville Road	Yarraville	Geelong Road to Hyde Street	8pm to 6am, Monday to Saturday, 1pm Saturday to 6am Monday
Ascot Vale Road		Epsom Road to Western Ring Road	8pm to 6am, Monday to Saturday, 1pm to 6am, Saturday to Monday
Beaconsfield Pde, Jacka Blvd, Marine Pde, Ormond Esplanade, St Kilda Espl and Beach Road		Bay Street to Nepean Highway	8pm to 6am, Monday to Saturday, 1pm to 6am, Saturday to Monday

Appendix Table C.19 - Modelled commercial vehicle bans and curfews (assumed from 2015 onwards)

Road	Suburb / Town	Location	Time of Curfew
Moore Street	Footscray	Hopkins St to Princes Hwy	8pm and 6am weeknights and from 1pm Saturday to 6am Monday
Somerville Road	Yarraville	Geelong Road to Whitehall Street	8pm and 6am weeknights and from 1pm Saturday to 6am Monday. 8am and 9.30am weekdays and 2.30pm and 4pm Monday to Friday. (Applied in modelled AM Peak and Evening Off Peak periods).
North East Truck Curfews (2016 onwards), see Appendix Figure C.16	Rosanna, Eltham, Montmorency, Viewbank	Various	10pm – 6am, 7 days a week

Appendix Figure C.16 - VicRoads north east truck curfews



Sources:

- VicRoads List of Truck Curfews, 2016 (https://www.vicroads.vic.gov.au/business-and-industry/heavy-vehicle-industry/heavy-vehicle-road-safety/truck-curfews)
- VicRoads Additional Truck Curfews in the Inner West effective January 2015 (https://www.vicroads.vic.gov.au/business-and-industry/heavy-vehicle-industry/heavy-vehicle-road-safety/truck-curfews/truck-curfews-in-the-inner-west)
- VicRoads North East Truck Curfew Trial (https://www.vicroads.vic.gov.au/planning-and-projects/melbourne-road-projects/north-east-truck-curfew-trial)

Appendix C6: Public transport service plans

RAIL

Appendix Table C.20 - 2026 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-1C_2031

Appendix Table C.21 - 2036 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-2B_2031

TRAM

Appendix Table C.22 - Tram service plan 2026 and 2036

BUS

Appendix Table C.23 - Bus services - 2026 Base Case

Appendix Table C.24 - Bus services - 2036 Base Case

Please note that these service plans have been created for transport modelling and planning purposes, and do not necessarily represent future commitments regarding capital spending or infrastructure works.

Appendix Table C.20 - 2026 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-1C_2031

Group	Origin-Destination	Loop Direction	Stopping Pattern	AM PEAK				INTER PEAK		PM PEAK				WEEKDAY OFF PEAK	
				1 HOUR		2 HOUR		1 HOUR		1 HOUR		2 HOUR		1 HOUR	
				SERVICES	HEADWAY	SERVICES	HEADWAY	SERVICES	HEADWAY	SERVICES	HEADWAY	SERVICES	HEADWAY	SERVICES	HEADWAY
				(TPH)	(MINS	(TPH)	(MINS	(TPH)	(MINS	(TPH)	(MINS	(TPH)	(MINS	(TPH)	(MINS
SUNSHINE - DANDENONG	SYDENHAM - PAKENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	4.0	15	8.0	15	0.0	0	4.0	15	8.0	15	0.0	0
	PAKENHAM - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	4.0	15	8.0	15	0.0	0	4.0	15	8.0	15	0.0	0
	SUNBURY - PAKENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	6.0	10	9.0	13	3.0	20	6.0	10	9.0	13	3.0	20
	PAKENHAM - SUNBURY	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	6.0	10	9.0	13	3.0	20	6.0	10	9.0	13	3.0	20
	SYDENHAM - CRANBOURNE	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	2.0	30	4.0	30	0.0	0	3.0	20	6.0	20	0.0	0
	CRANBOURNE - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	3.0	20	6.0	20	0.0	0	2.0	30	4.0	30	0.0	0
	ALBION - CRANBOURNE	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	3.0	20
	CRANBOURNE - ALBION	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	3.0	20
	SYDENHAM - DANDENONG	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	3.0	20	3.0	40	0.0	0	5.0	12	5.0	24	0.0	0
	DANDENONG - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	5.0	12	5.0	24	0.0	0	3.0	20	3.0	40	0.0	0
	SYDENHAM - WESTALL	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	3.0	40	0.0	0
	WESTALL - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	0.0	0	3.0	40	0.0	0	0.0	0	0.0	0	0.0	0
	ALBION - WESTALL	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	WESTALL - ALBION	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
NORTHERN AS PER MM-1A (2021)	CRAIGIEBURN - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	11.0	11	6.0	10	10.0	6	19.0	6	3.0	20
	CITY LOOP - CRAIGIEBURN	ANTI-CLOCK WISE	ALL STATIONS	10.0	6	19.0	6	6.0	10	4.0	15	11.0	11	3.0	20
	CRAIGIEBURN - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS TO ESSENDON THEN EXPRESS TO NORTH MELBOURNE THEN ALL STATIONS (TRAVEL	6.0	10	8.0	15	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - CRAIGIEBURN	ANTI-CLOCK WISE	ALL STATIONS TO NORTH MELBOURNE THEN EXPRESS TO ESSENDON THEN ALL STATIONS (TRAVEL T	0.0	0	0.0	0	0.0	0	6.0	10	8.0	15	0.0	0
	BROADMEADOWS - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	2.0	30	3.0	40	0.0	0	2.0	30	3.0	40	0.0	0
	CITY LOOP - BROADMEADOWS	ANTI-CLOCK WISE	ALL STATIONS	2.0	30	3.0	40	0.0	0	2.0	30	3.0	40	0.0	0
	ESSENDON - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	5.0	24	0.0	0	4.0	15	5.0	24	0.0	0
	CITY LOOP - ESSENDON	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	5.0	24	0.0	0	4.0	15	5.0	24	0.0	0
	GOWRIE - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	0.0	0
	CITY LOOP - GOWRIE	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	0.0	0
	UPFIELD - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	3.0	20
	CITY LOOP - UPFIELD	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	3.0	20
FRANKSTON (CAULFIELD LOOP)	MORDIALLOC - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	9.0	13	0.0	0	3.0	20	9.0	13	0.0	0
	CITY LOOP - MORDIALLOC	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	9.0	13	0.0	0	3.0	20	9.0	13	0.0	0
	CARRUM - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	5.0	24	0.0	0	4.0	15	5.0	24	0.0	0
	CITY LOOP - CARRUM	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	5.0	24	0.0	0	4.0	15	5.0	24	0.0	0
	BAXTER - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	1.0	60	1.0	120	6.0	10	1.0	60	1.0	120	3.0	20
	CITY LOOP - BAXTER	ANTI-CLOCK WISE	ALL STATIONS	1.0	60	1.0	120	6.0	10	1.0	60	1.0	120	3.0	20
	BAXTER - CITY LOOP	ANTI-CLOCK WISE	All Stations to Cheltenham then Express to Caulfield then All stations	9.0	7	15.0	8	0.0	0	9.0	7	15.0	8	0.0	0
	CITY LOOP - BAXTER	ANTI-CLOCK WISE	All Stations to to Caulfield then Express to Cheltenham then All stations	9.0	7	15.0	8	0.0	0	9.0	7	15.0	8	0.0	0
CROSS CITY	WERRIBEE - SANDRINGHAM	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	10.0	6	16.0	8	3.0	20	9.0	7	15.0	8	0.0	0
	SANDRINGHAM - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	9.0	7	15.0	8	3.0	20	10.0	6	16.0	8	0.0	0
	WILLIAMSTOWN - SANDRINGHAM	DIRECT - MAIN LINE	ALL STATIONS	0.0	0	0.0	0	3.0	20	0.0	0	0.0	0	0.0	0
	SANDRINGHAM - WILLIAMSTOWN	DIRECT - MAIN LINE	ALL STATIONS	0.0	0	0.0	0	3.0	20	0.0	0	0.0	0	0.0	0
	WERRIBEE - SANDRINGHAM	DIRECT - VIA ALTONA	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	SANDRINGHAM - WERRIBEE	DIRECT - VIA ALTONA	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	LAVERTON - SOUTH YARRA	DIRECT - VIA ALTONA	ALL STATIONS	4.0	15	7.0	17	3.0	20	4.0	15	8.0	15	0.0	0
	SOUTH YARRA - LAVERTON	DIRECT - VIA ALTONA	ALL STATIONS	4.0	15	8.0	15	3.0	20	4.0	15	7.0	17	0.0	0
	WILLIAMSTOWN - SOUTH YARRA	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	SOUTH YARRA - WILLIAMSTOWN	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	WILLIAMSTOWN - FLINDERS STREET	DIRECT	ALL STATIONS	3.0	20	7.0	17	0.0	0	3.0	20	6.0	20	0.0	0
	FLINDERS STREET - WILLIAMSTOWN	DIRECT	ALL STATIONS	3.0	20	6.0	20	0.0	0	3.0	20	7.0	17	0.0	0
	WERRIBEE - SOUTH YARRA	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	SOUTH YARRA - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	WERRIBEE - FLINDERS STREET	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	FLINDERS STREET - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	BRIGHTON BEACH - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
	WERRIBEE - BRIGHTON BEACH	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
STONY POINT	STONY POINT - BAXTER2	DIRECT	ALL STATIONS	1.5	40	3.0	40	1.0	60	1.0	60	2.0	60	1.0	60
	BAXTER2 - STONY POINT	DIRECT	ALL STATIONS	1.0	60	2.0	60	1.0	60	1.5	40	3.0	40	1.0	60

Appendix Table C.22 - 2026 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-1C_2031 (Continued)

Group	Origin-Destination	Loop Direction	Stopping Pattern	AM PEAK				INTER PEAK		PM PEAK				WEEKDAY OFF PEAK	
				1 HOUR		2 HOUR		1 HOUR		1 HOUR		2 HOUR		1 HOUR	
				SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS
VLINE	BACCHUS MARSH - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS TO ARDEER THEN Sunshine (Set down only) EXPRESS TO Footscray (Set down	2.0	30	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - BACCHUS MARSH	DIRECT - VIA RRL	ALL STATIONS AFTER SUNSHINE (Footscray - Sunshine - pick up only)	0.0	0	0.0	0	0.0	0	2.0	30	6.0	20	0.0	0
	MELTON - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS TO ARDEER THEN Sunshine (Set down only) EXPRESS TO Footscray (Set down	2.0	30	2.0	60	3.0	20	1.0	60	2.0	60	3.0	20
	SOUTHERN CROSS - MELTON	DIRECT - VIA RRL	ALL STATIONS AFTER SUNSHINE (Footscray - Sunshine - pick up only)	1.0	60	2.0	60	3.0	20	2.0	30	2.0	60	3.0	20
	WENDOUREE - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS - Express Melton - Footscray (Set down only)	1.7	36	3.3	36	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - WENDOUREE	DIRECT - VIA RRL	Express Footscray (pick up only) - Melton - All Stations	1.0	60	2.0	60	1.0	60	1.7	36	3.3	36	1.0	60
	ARARAT - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations to Melton - Sunshine (Set Down Only) - Footscray (Set Down Only)	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - ARARAT	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Melton - All Stations	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	MARYBOROUGH - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Bacchus Marsh - Sunshine (Set Down Only) - Footscray (Set Down Only)	0.0	1440	0.1	1440	0.0	1440	0.0	1440	0.1	1440	0.0	1440
	SOUTHERN CROSS - MARYBOROUGH	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Bacchus Marsh - All Stations	0.0	1440	0.1	1440	0.0	1440	0.0	1440	0.1	1440	0.0	1440
	KYNETON - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Set Down Only)	0.0	0	1.0	120	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - KYNETON	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Set Down Only) - All Station	0.0	0	0.0	0	0.0	0	0.0	0	1.0	120	0.0	0
	BENDIGO - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Set Down Only)	2.0	30	2.0	60	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - BENDIGO	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Pick Up Only) - All Stations	1.0	60	2.0	60	1.0	60	2.0	30	2.0	60	1.0	60
	EPSOM - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Set Down Only)	1.0	60	1.0	120	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - EPSOM	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Pick Up Only) - All Stations	0.0	0	0.0	0	0.0	0	1.0	60	1.0	120	0.0	0
	EAGLEHAWK - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Set Down Only)	0.4	168	0.7	168	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - EAGLEHAWK	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Pick Up Only) - All Stations	0.0	0	0.0	0	0.0	0	0.4	168	0.7	168	0.0	0
	ECHUCA - SOUTHERN CROSS	DIRECT - VIA RRL	Epsom - All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Set Down (	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.0	0
	SOUTHERN CROSS - ECHUCA	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Set Down Only) - All Station	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.0	0
	SWAN HILL - SOUTHERN CROSS	DIRECT - VIA RRL	Eaglehawk - Bendigo - Castlemaine - Kyneton - Woodend - Gisborne - Sunbury (Set Down Only) - S	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.2	360
	SOUTHERN CROSS - SWAN HILL	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Set Down Only) - Gisborne	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.2	360
	SOUTH GEELONG - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations to North Geelong - Express - Lara - Express - Sunshine (pickup only) - Footscray (set do	2.0	30	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - SOUTH GEELONG	DIRECT - VIA RRL	Express Footscray (pick up only) Sunshine (pickup Only) - Express - Lara - Express North Geelong -	0.0	0	0.0	0	0.0	0	2.0	30	6.0	20	0.0	0
	SOUTH GEELONG - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS to Truginina - Express - Sunshine (set down only) - Footscray (set down only) - Soutl	0.0	0	0.0	0	1.5	40	0.0	0	0.0	0	1.5	40
	SOUTHERN CROSS - SOUTH GEELONG	DIRECT - VIA RRL	Southern Cross - Footscray (pick up only) - Sunshine (pick up only) - Express to Truginina - ALL ST	0.0	0	0.0	0	1.5	40	0.0	0	0.0	0	1.5	40
	WAURN PONDS - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations to Wyndham Vale - Tarneit - Sunshine (Set down only) - Footscray (set down only)	4.0	15	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - WAURN PONDS	DIRECT - VIA RRL	Express Footscray (pick up only) - Sunshine (pick up only) - Tarneit- Wydnham Vale - All Stations	0.0	0	0.0	0	0.0	0	4.0	15	6.0	20	0.0	0
	BLACK FOREST - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS to Truginina - Express - Sunshine - Footscray - Southern Cross	3.0	20	4.0	30	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - BLACK FOREST	DIRECT - VIA RRL	Southern Cross - Footscray - Sunshine - Truginina - All Stations	0.0	0	0.0	0	0.0	0	3.0	20	4.0	30	0.0	0
	WAURN PONDS - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS to Truginina - Express - Sunshine (set down only) - Footscray (set down only) - Soutl	0.0	0	0.0	0	1.5	40	3.0	20	6.0	20	1.5	40
	SOUTHERN CROSS - WAURN PONDS	DIRECT - VIA RRL	Southern Cross - Footscray (pick up only) - Sunshine (pick up only) - Express to Truginina - ALL ST	3.0	20	6.0	20	1.5	40	0.0	0	0.0	0	1.5	40
	WARRNAMBOOL - SOUTHERN CROSS	DIRECT - VIA RRL	EXPRESS WAURN PONDS - GEELONG - FOOTSCRAY (set down only) - SOUTHERN CROSS	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - WARRNAMBOOL	DIRECT - VIA RRL	EXPRESS SOUTHERN CROSS - FOOTSCRAY (pick up only) - GEELONG - WAURN PONDS	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SEYMOUR - SOUTHERN CROSS	DIRECT - VIA UPFIELD	All Stations to (Craigieburn Set down Only) Express - Coburg - North Melbourne - (Both Set Down O	1.7	36	3.3	36	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - SEYMOUR	DIRECT - VIA UPFIELD	All Stations (North Melbourne - Coburg - Craigieburn - Pick Up Only)	1.0	60	2.0	60	1.0	60	1.7	36	3.3	36	1.0	60
	WALLAN - SOUTHERN CROSS	DIRECT - VIA UPFIELD	All Stations to (Craigieburn Set down Only) Express - Coburg - North Melbourne - (Both Set Down O	2.0	30	4.0	30	1.0	60	1.0	60	2.0	60	0.0	0
	SOUTHERN CROSS - WALLAN	DIRECT - VIA UPFIELD	All Stations (North Melbourne - Coburg - Craigieburn - Pick Up Only)	1.0	60	2.0	60	1.0	60	2.0	30	4.0	30	0.0	0
	SHEPPARTON - SOUTHERN CROSS	DIRECT - VIA UPFIELD	All Stations - Seymour - Broadford - Kilmore East - Wadong - Wallan - Lockerbie - Craigieburn (Set I	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - SHEPPARTON	DIRECT - VIA UPFIELD	Express - Coburg (Pick Up Only) - Craigieburn (Pick Up Only) - Lockerbie - Wallan - Wandong - Kiln	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	ALBURY - SOUTHERN CROSS	DIRECT	All Stations - SEYMOUR - BROADMEADOWS (set down only) - SOUTHERN CROSS	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - ALBURY	DIRECT	EXPRESS SOUTHERN CROSS - BROADMEADOWS (pick up only) -SEYMOUR - All Stations	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	TRARALGON - SOUTHERN CROSS	DIRECT	ALL STATIONS to Nar Nar Goon - Pakenham - Dandenong (set down only) - Clayton (set down only	1.7	36	3.3	36	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - TRARALGON	DIRECT	SOUTHERN CROSS - Flinders Street (pick up only) - Richmond (pick up only) - Caulfield (pick up o	1.0	60	2.0	60	1.0	60	1.7	36	3.3	36	1.0	60
	BAIRNSDALE - SOUTHERN CROSS	DIRECT	ALL STATIONS to Moe - Warragul - Drouin - Garfield - Pakenham - Dandenong (set down only) - Cla	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - BAIRNSDALE	DIRECT	SOUTHERN CROSS - Flinders Street (pick up only) - Richmond (pick up only) - Caulfield (pick up o	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360

Appendix Table C.22 - 2026 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-1C_2031 (Continued)

Group	Origin-Destination	Loop Direction	Stopping Pattern	AM PEAK				INTER PEAK		PM PEAK				WEEKDAY OFF PEAK	
				1 HOUR		2 HOUR		1 HOUR		1 HOUR		2 HOUR		1 HOUR	
				SERVICES (TPH)	HEADWAY (MINS)	SERVICES (TPH)	HEADWAY (MINS)	SERVICES (TPH)	HEADWAY (MINS)	SERVICES (TPH)	HEADWAY (MINS)	SERVICES (TPH)	HEADWAY (MINS)	SERVICES (TPH)	HEADWAY (MINS)
CLIFTON HILL	MERNDA - CITY LOOP	CLOCK WISE	ALL STATIONS	12.0	5	24.0	5	6.0	10	12.0	5	24.0	5	6.0	10
	FLINDERS STREET - MERNDA	CLOCK WISE	ALL STATIONS	12.0	5	24.0	5	6.0	10	12.0	5	24.0	5	6.0	10
	HURSTBRIDGE - CITY LOOP	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	FLINDERS STREET - HURSTBRIDGE	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	ELTHAM - CITY LOOP	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	FLINDERS STREET - ELTHAM	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	MACLEOD - CITY LOOP	CLOCK WISE	ALL STATIONS	6.0	10	12.0	10	3.0	20	6.0	10	12.0	10	3.0	20
	FLINDERS STREET - MACLEOD	CLOCK WISE	ALL STATIONS	6.0	10	12.0	10	3.0	20	6.0	10	12.0	10	3.0	20
BURNLEY	BELGRAVE - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	0.0	0	0.0	0	3.0	20	2.0	30	5.0	24	1.5	40
	CITY LOOP - BELGRAVE	ANTI-CLOCK WISE	ALL STATIONS	2.0	30	5.0	24	3.0	20	0.0	0	0.0	0	1.5	40
	UPPER FERNTREE GULLY - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	1.0	60	2.0	60	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - UPPER FERNTREE GULLY	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	1.0	60	2.0	60	0.0	0
	BELGRAVE - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	5.0	12	10.0	12	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - BELGRAVE	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	5.0	12	10.0	12	0.0	0
	LILYDALE - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	0.0	0	0.0	0	3.0	20	4.0	15	7.0	17	1.5	40
	CITY LOOP - LILYDALE	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	7.0	17	3.0	20	0.0	0	0.0	0	1.5	40
	LILYDALE - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	4.0	15	7.0	17	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - LILYDALE	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	4.0	15	7.0	17	0.0	0
	MOOROOLBARK - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	0.0	0	0.0	0	0.0	0	2.0	30	5.0	24	0.0	0
	CITY LOOP - MOOROOLBARK	ANTI-CLOCK WISE	ALL STATIONS	2.0	30	5.0	24	0.0	0	0.0	0	0.0	0	0.0	0
	MOOROOLBARK - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	2.0	30	5.0	24	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - MOOROOLBARK	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	2.0	30	5.0	24	0.0	0
	RINGWOOD - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	6.0	10	9.0	13	0.0	0	6.0	10	6.0	20	0.0	0
	CITY LOOP - RINGWOOD	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	6.0	10	6.0	20	0.0	0	6.0	10	9.0	13	0.0	0
	BLACKBURN - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	0.0	0	3.0	40	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - BLACKBURN	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	0.0	0	0.0	0	0.0	0	0.0	0	3.0	40	0.0	0
	BOX HILL - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	0.0	0	0.0	0	0.0	0	0.0	0	6.0	20	0.0	0
	CITY LOOP - BOX HILL	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	3.0	20	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	ALAMEIN - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
	CITY LOOP - ALAMEIN	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
	ALAMEIN - CAMBERWELL2	DIRECT	ALL STATIONS	0.0	0	0.0	0	3.0	20	0.0	0	0.0	0	3.0	20
	CAMBERWELL2 - ALAMEIN	DIRECT	ALL STATIONS	0.0	0	0.0	0	3.0	20	0.0	0	0.0	0	3.0	20
	LILYDALE - RINGWOOD2	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
	RINGWOOD2 - LILYDALE	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
	BELGRAVE - RINGWOOD2	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
	RINGWOOD2 - BELGRAVE	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
BURNLEY (GLEN WAVERLEY)	GLEN WAVERLEY - FLINDERS STREET	DIRECT	ALL STATIONS	8.0	8	15.0	8	6.0	10	8.0	8	15.0	8	3.0	20
	FLINDERS STREET - GLEN WAVERLEY	DIRECT	ALL STATIONS	8.0	8	15.0	8	6.0	10	8.0	8	15.0	8	3.0	20

Appendix Table C.21 - 2036 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-2B_2031

Group	Origin-Destination	Loop Direction	Stopping Pattern	AM PEAK				INTER PEAK		PM PEAK				WEEKDAY OFF PEAK	
				1 HOUR		2 HOUR		1 HOUR		1 HOUR		2 HOUR		1 HOUR	
				SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS
SUNSHINE - DANDENONG	SYDENHAM - PAKENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	1.0	60	5.0	24	0.0	0	1.0	60	5.0	24	0.0	0
	PAKENHAM - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	1.0	60	5.0	24	0.0	0	1.0	60	5.0	24	0.0	0
	SUNBURY - PAKENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	6.0	10	9.0	13	3.0	20	6.0	10	9.0	13	3.0	20
	PAKENHAM - SUNBURY	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	6.0	10	9.0	13	3.0	20	6.0	10	9.0	13	3.0	20
	SYDENHAM - CRANBOURNE	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	CRANBOURNE - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	MELTONM - CRANBOURNE	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	6.0	10	12.0	10	3.0	20	6.0	10	12.0	10	3.0	20
	CRANBOURNE - MELTONM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	6.0	10	12.0	10	3.0	20	6.0	10	12.0	10	3.0	20
	SYDENHAM - DANDENONG	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	3.0	20	3.0	40	0.0	0	3.0	20	3.0	40	0.0	0
	DANDENONG - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	3.0	20	3.0	40	0.0	0	3.0	20	3.0	40	0.0	0
	SYDENHAM - WESTALL	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	4.0	15	6.0	20	0.0	0	0.0	0	3.0	40	0.0	0
	WESTALL - SYDENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	0.0	0	3.0	40	0.0	0	4.0	15	6.0	20	0.0	0
	MELTONM - PAKENHAM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO DOMAIN, EXPRESS TO CAULFIELD THEN ALL STATIONS	3.0	20	3.0	40	0.0	0	3.0	20	3.0	40	0.0	0
	PAKENHAM - MELTONM	DIRECT VIA MELBOURNE METRO	ALL STATIONS TO CAULFIELD, EXPRESS TO DOMAIN, THEN ALL STATIONS	3.0	20	3.0	40	0.0	0	3.0	20	3.0	40	0.0	0
NORTHERN PLUS WALLAN	WALLAN_M - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS VIA UPFIELD LINK	6.0	10	10.0	12	3.0	20	6.0	10	10.0	12	3.0	20
	CITY LOOP - WALLAN_M	ANTI-CLOCK WISE	ALL STATIONS VIA UPFIELD LINK	6.0	10	10.0	12	3.0	20	6.0	10	10.0	12	3.0	20
	CRAIGIEBURN - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS VIA UPFIELD LINK	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	0.0	0
	CITY LOOP - CRAIGIEBURN	ANTI-CLOCK WISE	ALL STATIONS VIA UPFIELD LINK	3.0	20	6.0	20	3.0	20	3.0	20	6.0	20	0.0	0
	ROXBURGH PARK - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS TO ESSENDON, THEN EXPRESS TO NORTH MELBOURNE, THEN ALL ST	3.0	20	5.0	24	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - ROXBURGH PARK	ANTI-CLOCK WISE	ALL STATIONS TO NORTH MELBOURNE, EXPRESS TO ESSENDON, THEN ALL STATION	0.0	0	0.0	0	0.0	0	3.0	20	5.0	24	0.0	0
	ROXBURGH PARK - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	9.0	7	17.0	7	6.0	10	12.0	5	22.0	5	3.0	20
	CITY LOOP - ROXBURGH PARK	ANTI-CLOCK WISE	ALL STATIONS	12.0	5	22.0	5	6.0	10	9.0	7	17.0	7	3.0	20
	ESSENDON - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	5.0	24	0.0	0	3.0	20	5.0	24	0.0	0
	CITY LOOP - ESSENDON	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	5.0	24	0.0	0	3.0	20	5.0	24	0.0	0
FRANKSTON (CAULFIELD LOOP)	MORDIALLOC - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	9.0	13	0.0	0	3.0	20	9.0	13	0.0	0
	CITY LOOP - MORDIALLOC	ANTI-CLOCK WISE	ALL STATIONS	3.0	20	9.0	13	0.0	0	3.0	20	9.0	13	0.0	0
	CARRUM - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	5.0	24	0.0	0	4.0	15	5.0	24	0.0	0
	CITY LOOP - CARRUM	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	5.0	24	0.0	0	4.0	15	5.0	24	0.0	0
	BAXTER - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	1.0	60	1.0	120	6.0	10	1.0	60	1.0	120	3.0	20
	CITY LOOP - BAXTER	ANTI-CLOCK WISE	ALL STATIONS	1.0	60	1.0	120	6.0	10	1.0	60	1.0	120	3.0	20
	BAXTER - CITY LOOP	ANTI-CLOCK WISE	All Stations to Cheltenham then Express to Caulfield then All stations	9.0	7	15.0	8	0.0	0	9.0	7	15.0	8	0.0	0
	CITY LOOP - BAXTER	ANTI-CLOCK WISE	All Stations to to Caulfield then Express to Cheltenham then All stations	9.0	7	15.0	8	0.0	0	9.0	7	15.0	8	0.0	0
CROSS CITY	WERRIBEE - SANDRINGHAM	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	10.0	6	16.0	8	3.0	20	9.0	7	15.0	8	0.0	0
	SANDRINGHAM - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	9.0	7	15.0	8	3.0	20	10.0	6	16.0	8	0.0	0
	WILLIAMSTOWN - SANDRINGHAM	DIRECT - MAIN LINE	ALL STATIONS		0		0	3.0	20		0		0		0
	SANDRINGHAM - WILLIAMSTOWN	DIRECT - MAIN LINE	ALL STATIONS		0		0	3.0	20		0		0		0
	WERRIBEE - SANDRINGHAM	DIRECT - VIA ALTONA	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	SANDRINGHAM - WERRIBEE	DIRECT - VIA ALTONA	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	LAVERTON - SOUTH YARRA	DIRECT - VIA ALTONA	ALL STATIONS	4.0	15	7.0	17	3.0	20	4.0	15	8.0	15	0.0	0
	SOUTH YARRA - LAVERTON	DIRECT - VIA ALTONA	ALL STATIONS	4.0	15	8.0	15	3.0	20	4.0	15	7.0	17	0.0	0
	WILLIAMSTOWN - SOUTH YARRA	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	SOUTH YARRA - WILLIAMSTOWN	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	3.0	20
	WILLIAMSTOWN - FLINDERS STREET	DIRECT	ALL STATIONS	3.0	20	7.0	17	0.0	0	3.0	20	6.0	20	0.0	0
	FLINDERS STREET - WILLIAMSTOWN	DIRECT	ALL STATIONS	3.0	20	6.0	20	0.0	0	3.0	20	7.0	17	0.0	0
	WERRIBEE - SOUTH YARRA	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	SOUTH YARRA - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	WERRIBEE - FLINDERS STREET	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	FLINDERS STREET - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	1.0	60	1.0	120	0.0	0	1.0	60	1.0	120	0.0	0
	BRIGHTON BEACH - WERRIBEE	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
	WERRIBEE - BRIGHTON BEACH	DIRECT - MAIN LINE	ALL STATIONS (EXCEPT NEWPORT - LAVERTON via MAINLINE)	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
STONY POINT	STONY POINT - BAXTER2	DIRECT	ALL STATIONS	1.5	40	3.0	40	1.0	60	1.0	60	2.0	60	1.0	60
	BAXTER2 - STONY POINT	DIRECT	ALL STATIONS	1.0	60	2.0	60	1.0	60	1.5	40	3.0	40	1.0	60

Appendix Table C.23 - 2036 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-2B_2031 (continued)

Group	Origin-Destination	Loop Direction	Stopping Pattern	AM PEAK				INTER PEAK		PM PEAK				WEEKDAY OFF PEAK	
				1 HOUR		2 HOUR		1 HOUR		1 HOUR		2 HOUR		1 HOUR	
				SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS
V/LINE	BACCHUS MARSH - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS TO **DEER PARK** THEN Sunshine (Set down only) EXPRESS TO	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - BACCHUS MARSH	DIRECT - VIA RRL	ALL STATIONS AFTER **DEER PARK** (Footscray - Sunshine - pick up only)	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	MELTON - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS TO **DEER PARK** THEN Sunshine (Set down only) EXPRESS TO F	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - MELTON	DIRECT - VIA RRL	ALL STATIONS AFTER **DEER PARK** (Footscray - Sunshine - pick up only)	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	WENDOUREE - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS - Express Melton - Footscray (Set down only)	2.7	22	4.3	28	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - WENDOUREE	DIRECT - VIA RRL	Express Footscray (pick up only) - Melton - All Stations	1.0	60	2.0	60	1.0	60	2.7	22	4.3	28	1.0	60
	ARARAT - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations to Melton - Sunshine (Set Down Only) - Footscray (Set Down Only)	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - ARARAT	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Melton - All Stations	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	MARYBOROUGH - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Bacchus Marsh - Sunshine (Set Down Only) - Footscray (Set Down On	0.0	1440	0.1	1440	0.0	1440	0.0	1440	0.1	1440	0.0	1440
	SOUTHERN CROSS - MARYBOROUGH	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Bacchus Marsh - All	0.0	1440	0.1	1440	0.0	1440	0.0	1440	0.1	1440	0.0	1440
	KYNETON - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Se	0.0	0	1.0	120	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - KYNETON	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Set Down O	0.0	0	0.0	0	0.0	0	0.0	0	1.0	120	0.0	0
	BENDIGO - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Se	2.0	30	2.0	60	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - BENDIGO	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Pick Up On	1.0	60	2.0	60	1.0	60	2.0	30	2.0	60	1.0	60
	EPSOM - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Se	1.0	60	1.0	120	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - EPSOM	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Pick Up On	0.0	0	0.0	0	0.0	0	1.0	60	1.0	120	0.0	0
	EAGLEHAWK - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Footscray (Se	0.0	0	0.7	168	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - EAGLEHAWK	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Pick Up On	0.0	0	0.0	0	0.0	0	0.0	0	0.7	168	0.0	0
	ECHUCA - SOUTHERN CROSS	DIRECT - VIA RRL	Epsom - All Stations - Sunbury (Set Down Only) - Sunshine (Set Down Only) - Foots	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.0	0
	SOUTHERN CROSS - ECHUCA	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Set Down O	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.0	0
	SWAN HILL - SOUTHERN CROSS	DIRECT - VIA RRL	Eaglehawk - Bendigo - Castlemaine - Kyneton - Woodend - Gisborne - Sunbury (Se	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.2	360
	SOUTHERN CROSS - SWAN HILL	DIRECT - VIA RRL	Express Footscray (Pick Up Only) - Sunshine (Pick Up Only) - Sunbury (Set Down O	0.1	420	0.3	420	0.1	420	0.1	420	0.3	420	0.2	360
	SOUTH GEELONG - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations to North Geelong - Express - Lara - Express - Sunshine (pickup only) - F	2.0	30	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - SOUTH GEELONG	DIRECT - VIA RRL	Express Footscray (pick up only) Sunshine (pickup Only) - Express - Lara - Express	0.0	0	0.0	0	0.0	0	2.0	30	6.0	20	0.0	0
	SOUTH GEELONG - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS to Truginina - Express - Sunshine (set down only) - Footscray (set d	0.0	0	0.0	0	1.5	40	0.0	0	0.0	0	1.5	40
	SOUTHERN CROSS - SOUTH GEELONG	DIRECT - VIA RRL	Southern Cross - Footscray (pick up only) - Sunshine (pick up only) - Express to Tru	0.0	0	0.0	0	1.5	40	0.0	0	0.0	0	1.5	40
	WAURN PONDS - SOUTHERN CROSS	DIRECT - VIA RRL	All Stations to Wyndham Vale - Tarneit - Sunshine (Set down only) - Footscray (set	4.0	15	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - WAURN PONDS	DIRECT - VIA RRL	Express Footscray (pick up only) - Sunshine (pick up only) - Tarneit- Wydnham Vale	0.0	0	0.0	0	0.0	0	4.0	15	6.0	20	0.0	0
	BLACK FOREST - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS to Truginina - Express - Sunshine - Footscray - Southern Cross	6.0	10	10.0	12	3.0	20	3.0	20	6.0	20	0.0	0
	SOUTHERN CROSS - BLACK FOREST	DIRECT - VIA RRL	Southern Cross - Footscray - Sunshine - Truginina - All Stations	3.0	20	6.0	20	3.0	20	6.0	10	10.0	12	0.0	0
	WAURN PONDS - SOUTHERN CROSS	DIRECT - VIA RRL	ALL STATIONS to Truginina - Express - Sunshine (set down only) - Footscray (set d	0.0	0	0.0	0	1.5	40	3.0	20	6.0	20	1.5	40
	SOUTHERN CROSS - WAURN PONDS	DIRECT - VIA RRL	Southern Cross - Footscray (pick up only) - Sunshine (pick up only) - Express to Tru	3.0	20	6.0	20	1.5	40	0.0	0	0.0	0	1.5	40
	WARRNAMBOOL - SOUTHERN CROSS	DIRECT - VIA RRL	EXPRESS WAURN PONDS - GEELONG - FOOTSCRAY (set down only) - SOUTH	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - WARRNAMBOOL	DIRECT - VIA RRL	EXPRESS SOUTHERN CROSS - FOOTSCRAY (pick up only) - GEELONG - WAU	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SEYMOUR - SOUTHERN CROSS	DIRECT - VIA UPFIELD	All Stations to Roxburgh Park (Roxburgh Park Set Down Only) - Coburg (Set Down	1.7	36	3.3	36	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - SEYMOUR	DIRECT - VIA UPFIELD	Express Coburg (Pick up only) - Roxburgh Park (pick up only) - All stations	1.0	60	2.0	60	1.0	60	1.7	36	3.3	36	1.0	60
	WALLAN - SOUTHERN CROSS	DIRECT - VIA UPFIELD	All Stations to Wallan - Roxburgh Park (Set Down Only) - Coburg (Set Down Only) -	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	SOUTHERN CROSS - WALLAN	DIRECT - VIA UPFIELD	Express Coburg (Pick up only) - Roxburgh Park (pick up only) - Wallan then All stati	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
	SHEPPARTON - SOUTHERN CROSS	DIRECT - VIA UPFIELD	All Stations - Seymour - Broadford - Kilmore East - Wadong - Wallan - Lockerbie - C	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - SHEPPARTON	DIRECT - VIA UPFIELD	Express - Coburg (Pick Up Only) - Craigieburn (Pick Up Only) - Lockerbie - Wallan	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	ALBURY - SOUTHERN CROSS	DIRECT	All Stations - SEYMOUR - BROADMEADOWS (set down only) - SOUTHERN CROS	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - ALBURY	DIRECT	EXPRESS SOUTHERN CROSS - BROADMEADOWS (pick up only) -SEYMOUR -	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	TRARALGON - SOUTHERN CROSS	DIRECT	ALL STATIONS to Nar Nar Goon - Pakenham - Dandenong (set down only) - Clayto	1.7	36	3.3	36	1.0	60	1.0	60	2.0	60	1.0	60
	SOUTHERN CROSS - TRARALGON	DIRECT	SOUTHERN CROSS - Flinders Street (pick up only) - Richmond (pick up only) - Ca	1.0	60	2.0	60	1.0	60	1.7	36	3.3	36	1.0	60
	BAIRNSDALE - SOUTHERN CROSS	DIRECT	ALL STATIONS to Moe - Warragul - Drouin - Garfield - Pakenham - Dandenong (se	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360
	SOUTHERN CROSS - BAIRNSDALE	DIRECT	SOUTHERN CROSS - Flinders Street (pick up only) - Richmond (pick up only) - Ca	0.3	180	0.7	180	0.3	180	0.3	180	0.7	180	0.2	360

Appendix Table C.23 - 2036 Train service plan - Metro Tunnel Project service plan: STAGEB_MM-2B_2031 (continued)

Group	Origin-Destination	Loop Direction	Stopping Pattern	AM PEAK				INTER PEAK		PM PEAK				WEEKDAY OFF PEAK	
				1 HOUR		2 HOUR		1 HOUR		1 HOUR		2 HOUR		1 HOUR	
				SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS	SERVICES (TPH)	HEADWAY (MINS
CLIFTON HILL	MERNDA - CITY LOOP	CLOCK WISE	ALL STATIONS	12.0	5	24.0	5	6.0	10	12.0	5	24.0	5	6.0	10
	FLINDERS STREET - MERNDA	CLOCK WISE	ALL STATIONS	12.0	5	24.0	5	6.0	10	12.0	5	24.0	5	6.0	10
	HURSTBRIDGE - CITY LOOP	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	FLINDERS STREET - HURSTBRIDGE	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	ELTHAM - CITY LOOP	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	FLINDERS STREET - ELTHAM	CLOCK WISE	ALL STATIONS	3.0	20	6.0	20	1.5	40	3.0	20	6.0	20	1.5	40
	MACLEOD - CITY LOOP	CLOCK WISE	ALL STATIONS	6.0	10	12.0	10	3.0	20	6.0	10	12.0	10	3.0	20
	FLINDERS STREET - MACLEOD	CLOCK WISE	ALL STATIONS	6.0	10	12.0	10	3.0	20	6.0	10	12.0	10	3.0	20
BURNLEY	BELGRAVE - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	0.0	0	0.0	0	3.0	20	2.0	30	5.0	24	1.5	40
	CITY LOOP - BELGRAVE	ANTI-CLOCK WISE	ALL STATIONS	2.0	30	5.0	24	3.0	20	0.0	0	0.0	0	1.5	40
	UPPER FERNTREE GULLY - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	1.0	60	2.0	60	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - UPPER FERNTREE GULLY	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	1.0	60	2.0	60	0.0	0
	BELGRAVE - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	5.0	12	10.0	12	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - BELGRAVE	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	5.0	12	10.0	12	0.0	0
	LILYDALE - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	0.0	0	0.0	0	3.0	20	4.0	15	7.0	17	1.5	40
	CITY LOOP - LILYDALE	ANTI-CLOCK WISE	ALL STATIONS	4.0	15	7.0	17	3.0	20	0.0	0	0.0	0	1.5	40
	LILYDALE - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	4.0	15	7.0	17	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - LILYDALE	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	4.0	15	7.0	17	0.0	0
	MOOROOLBARK - CITY LOOP	ANTI-CLOCK WISE	ALL STATIONS	0.0	0	0.0	0	0.0	0	2.0	30	5.0	24	0.0	0
	CITY LOOP - MOOROOLBARK	ANTI-CLOCK WISE	ALL STATIONS	2.0	30	5.0	24	0.0	0	0.0	0	0.0	0	0.0	0
	MOOROOLBARK - CITY LOOP	ANTI-CLOCK WISE	Express Box Hill-Camberwell-Glenferrie-Richmond	2.0	30	5.0	24	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - MOOROOLBARK	ANTI-CLOCK WISE	Express Richmond-Glenferrie-Camberwell-Box Hill	0.0	0	0.0	0	0.0	0	2.0	30	5.0	24	0.0	0
	RINGWOOD - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	6.0	10	9.0	13	0.0	0	6.0	10	6.0	20	0.0	0
	CITY LOOP - RINGWOOD	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	6.0	10	6.0	20	0.0	0	6.0	10	9.0	13	0.0	0
	BLACKBURN - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	0.0	0	3.0	40	0.0	0	0.0	0	0.0	0	0.0	0
	CITY LOOP - BLACKBURN	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	0.0	0	0.0	0	0.0	0	0.0	0	3.0	40	0.0	0
	BOX HILL - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	0.0	0	0.0	0	0.0	0	0.0	0	6.0	20	0.0	0
	CITY LOOP - BOX HILL	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	3.0	20	6.0	20	0.0	0	0.0	0	0.0	0	0.0	0
	ALAMEIN - CITY LOOP	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
	CITY LOOP - ALAMEIN	ANTI-CLOCK WISE	ALL EXCEPT EAST RICHMOND	3.0	20	6.0	20	0.0	0	3.0	20	6.0	20	0.0	0
	ALAMEIN - CAMBERWELL2	DIRECT	ALL STATIONS	0.0	0	0.0	0	3.0	20	0.0	0	0.0	0	3.0	20
	CAMBERWELL2 - ALAMEIN	DIRECT	ALL STATIONS	0.0	0	0.0	0	3.0	20	0.0	0	0.0	0	3.0	20
	LILYDALE - RINGWOOD2	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
	RINGWOOD2 - LILYDALE	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
	BELGRAVE - RINGWOOD2	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
	RINGWOOD2 - BELGRAVE	DIRECT	ALL STATIONS	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	1.5	40
BURNLEY (GLEN WAVERLEY)	GLEN WAVERLEY - FLINDERS STREET	DIRECT	ALL STATIONS	8.0	8	15.0	8	6.0	10	8.0	8	15.0	8	3.0	20
	FLINDERS STREET - GLEN WAVERLEY	DIRECT	ALL STATIONS	8.0	8	15.0	8	6.0	10	8.0	8	15.0	8	3.0	20

Appendix Table C.22 - Tram service plan 2026 and 2036

Parent Route	Route Id	Direction	Line From	Line To	Via	AM Peak (1 hour)					Interpeak (1 hour)					PM Peak (1 hour)					Off Peak (1 hour)				
						Frequency (tph)	Headway (mins)	SEATED (pax)	LOAD STANDARD (pax)	CRUSH LOAD (pax)	Frequency (tph)	Headway (mins)	SEATED (pax)	LOAD STANDARD (pax)	CRUSH LOAD (pax)	Frequency (tph)	Headway (mins)	SEATED (pax)	LOAD STANDARD (pax)	CRUSH LOAD (pax)	Frequency (tph)	Headway (mins)	SEATED (pax)	LOAD STANDARD (pax)	CRUSH LOAD (pax)
1	1	D	South Melbourne	East Coburg	Swanston	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
		U	East Coburg	South Melbourne	Swanston	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
2	2	D	Melbourne University	Caulfield	Swanston	8	8	64	180	290	6	10	64	180	290	8	8	64	180	290	6	10	64	180	290
		U	Caulfield	Melbourne University	Swanston	8	8	64	180	290	6	10	64	180	290	8	8	64	180	290	6	10	64	180	290
3	3	D	East Malvern Station	Melbourne University	Swanston	8	8	64	180	290	6	10	64	180	290	8	8	64	180	290	6	10	64	180	290
		U	Melbourne University	East Malvern Station	Swanston	8	8	64	180	290	6	10	64	180	290	8	8	64	180	290	6	10	64	180	290
5	5	D	Malvern	Parkville	William/La Trobe/Spencer	6	10	60	180	290	6	10	60	180	290	6	10	60	180	290	6	10	60	180	290
		U	Parkville	Malvern	William/La Trobe/Spencer	6	10	60	180	290	6	10	60	180	290	6	10	60	180	290	6	10	60	180	290
6	6	D	Glen Iris	Moreland	Swanston	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
		U	Moreland	Glen Iris	Swanston	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
11	11	D	Fishermans Bend	Reservoir	Collins	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
		U	Reservoir	Fishermans Bend	Collins	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
12	12	D	St Kilda/Fitzroy Street	Victoria Gardens	La Trobe/Spencer	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
		U	Victoria Gardens	St Kilda/Fitzroy Street	La Trobe/Spencer	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
19	19	D	Jolimont	North Coburg	Elizabeth	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
		U	North Coburg	Jolimont	Elizabeth	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
35	35	CCW	Anticlockwise	Anticlockwise	-	-	-	40	-	130	6	10	40	-	130	-	-	40	-	130	6	10	40	-	130
		CW	Clockwise	Clockwise	-	-	-	40	-	130	6	10	40	-	130	-	-	40	-	130	6	10	40	-	130
48	48	D	Victoria Harbour Docklands	Doncaster Park and Ride	Collins	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
		U	Doncaster Park and Ride	Victoria Harbour Docklands	Collins	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
55	55	D	Toorak	West Coburg	William	12	5	62	180	290	6	10	62	180	290	12	5	62	180	290	6	10	62	180	290
		U	West Coburg	Toorak	William	12	5	62	180	290	6	10	62	180	290	12	5	62	180	290	6	10	62	180	290
57	57	D	Gardiner	Highpoint	Elizabeth	12	5	60	180	290	6	10	60	180	290	12	5	60	180	290	6	10	60	180	290
		U	Highpoint	Gardiner	Elizabeth	12	5	60	180	290	6	10	60	180	290	12	5	60	180	290	6	10	60	180	290
59	59	D	City	Airport West	Elizabeth	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
		U	Airport West	City	Elizabeth	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
63	63	D	Malvern Station	Waterfront City Docklands	Spencer	12	5	62	180	290	6	10	62	180	290	12	5	62	180	290	6	10	62	180	290
		U	Waterfront City Docklands	Malvern Station	Spencer	12	5	62	180	290	6	10	62	180	290	12	5	62	180	290	6	10	62	180	290
67	67	D	Carnegie	Melbourne University	Swanston	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
		U	Melbourne University	Carnegie	Swanston	10	6	64	180	290	6	10	64	180	290	10	6	64	180	290	6	10	64	180	290
70	70	D	E-Gate	Wattle Park	Flinders	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
		U	Wattle Park	E-Gate	Flinders	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
75	75	D	Waterfront City Docklands	Vermont South	Flinders	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
		U	Vermont South	Waterfront City Docklands	Flinders	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
78	78	D	Prahran	North Richmond	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
		U	North Richmond	Prahran	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
80	80	D	Kew	East Brighton	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
		U	East Brighton	Kew	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
81	81	D	Camberwell	Gardiner	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
		U	Gardiner	Camberwell	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
82	82	D	Maribyrnong Defence Site	Footscray	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
		U	Footscray	Maribyrnong Defence Site	-	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230	6	10	60	120	230
86	86	D	Port Melbourne	Bundoora RMIT	Bourke/Spencer	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
		U	Bundoora RMIT	Port Melbourne	Bourke/Spencer	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
96	96	D	St Kilda Beach	East Brunswick	Bourke/Spencer	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
		U	East Brunswick	St Kilda Beach	Bourke/Spencer	12	5	64	180	290	6	10	64	180	290	12	5	64	180	290	6	10	64	180	290
109	109	D	Fishermans Bend	Box Hill	Collins	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230
		U	Box Hill	Fishermans Bend	Collins	10	6	60	120	230	6	10	60	120	230	10	6	60	120	230	6	10	60	120	230

With the following updates as per transport modelling reference case (see Appendix C1: TfV transport modelling reference case, v1.09):

Table 2: Summary of Tram Investment Sequence

Year	Project
2021	• Route 58 (Toorak-West Coburg introduced in 2017 to replace route 55 and Route 8). Route 6 extended to Moreland (top end of Route 8) and Route 55 extended to Toorak (bottom end of Route 8) • Glenferrie Rd Shuttle (68 Malvern to Caulfield), taken from Routes 16 & 64 • Route 12 via La Trobe St • E Class Tranche 2-3 (80-110) and Route 3 extension beyond Melbourne University to Brunswick Road • Route 2 discontinued
2026	• Route 86 runs to Port Melbourne • Route 109 runs to Victoria Harbour • Route 5 runs north to the Remand Centre on Spencer St via Park St link and south to Darling Station • Route 64 runs to Waterfront City via Park St Link to Malvern Station • Elizabeth St curves mean Route 19 runs to Jolimont, Route 57 to Melbourne Park, Route 59 to Jolimont • Route 12 via La Trobe St • Route 11 extension to Fishermans Bend • E-Gate extensions – Route 70, 75 • Route 30 discontinued • Next Generation Tram upgrades
2031	• Route 82 extension to Maribyrnong Defence Site • Route 48 extension to Doncaster • Route 3 extension to Malvern East Station • Route 5 extended to Footscray via Dynon Rd
2036+	No further changes

Appendix Table C.23 - Bus services - 2026 Base Case

Route ID	Route name	Frequency			
		AM	MD	PM	OP
c001_in	Southland to Northland	3.0	**3.0**	3.0	**3.0**
c001_out	Northland to Southland	3.0	**3.0**	3.0	**3.0**
c234_in	Garden City to City	6.0	**6.0**	6.0	**6.0**
c234_out	City to Garden City	6.0	**6.0**	6.0	**6.0**
c235_in	Fishermans Bend to City	3.0	**3.0**	3.0	**3.0**
c235_out	City to Fishermans Bend	3.0	**3.0**	3.0	**3.0**
c237_in	Fishermans Bend to City	4.0	**2.0**	4.0	**0.0**
c237_out	City to Fishermans Bend	4.0	**2.0**	4.0	**0.0**
c246_in	Elsternwick to Clifton Hill	6.0	**6.0**	6.0	**6.0**
c246_out	Clifton Hill to Elsternwick	6.0	**6.0**	6.0	**6.0**
c606_in	Elsternwick to Fishermans Bend	3.0	**3.0**	3.0	**1.5**
c606_out	Fishermans Bend to Elsternwick	3.0	**3.0**	3.0	**1.5**
c903_in	Mentone to La Trobe Uni	6.0	**6.0**	6.0	**6.0**
c903_out	La Trobe Uni to Mentone	6.0	**6.0**	6.0	**6.0**
e01_in	Cranbourne to Springvale	3.0	**3.0**	3.0	**3.0**
e01_out	Springvale to Cranbourne	3.0	**3.0**	3.0	**3.0**
e011_in	Cardinia Road to Officer Sth	1.5	**1.6**	1.5	**1.0**
e011_out	Officer Sth to Cardinia Road	1.5	**1.6**	1.5	**1.0**
e013_in	Lilydale to Mooroolbark	3.0	**1.6**	3.0	**1.5**
e013_out	Mooroolbark to Lilydale	3.0	**1.6**	3.0	**1.5**
e014_in	Cranbourne East to Narre Warren	2.0	**2.0**	2.0	**1.0**
e014_out	Narre Warren to Cranbourne East	2.0	**2.0**	2.0	**1.0**
e015_in	Cranbourne East to Merinda Park	1.5	**1.6**	1.5	**1.0**
e015_out	Merinda Park to Cranbourne East	1.5	**1.6**	1.5	**1.0**
e016_in	Clyde to Merinda Park	1.5	**1.6**	1.5	**1.0**
e016_out	Merinda Park to Clyde	1.5	**1.6**	1.5	**1.0**
e017_in	Highett to Carnegie	3.0	**3.0**	3.0	**1.5**
e017_out	Carnegie to Highett	3.0	**3.0**	3.0	**1.5**
e019_in	Berwick to Narre Warren North	1.5	**1.0**	1.5	**0.0**
e019_out	Narre Warren North to Berwick	1.5	**1.0**	1.5	**0.0**
e02_in	Carrum to Berwick	3.0	**3.0**	3.0	**3.0**
e02_out	Berwick to Carrum	3.0	**3.0**	3.0	**3.0**
e020_in	Cheltenham to Chadstone SC	3.0	**3.0**	3.0	**1.5**
e020_out	Chadstone SC to Cheltenham	3.0	**3.0**	3.0	**1.5**
e023_in	Westall to Clayton	1.5	**1.0**	1.5	**0.0**
e023_out	Clayton to Westall	1.5	**1.0**	1.5	**0.0**
e024_in	Officer to Beaconsfield	1.5	**1.0**	1.5	**0.0**
e024_out	Beaconsfield to Officer	1.5	**1.0**	1.5	**0.0**
e025_in	Ringwood to Box Hill	3.0	**3.0**	3.0	**1.5**
e025_out	Box Hill to Ringwood	3.0	**3.0**	3.0	**1.5**
e04_in	Frankston to Narre Warren	3.0	**3.0**	3.0	**1.5**
e04_out	Narre Warren to Frankston	3.0	**3.0**	3.0	**1.5**
e05_in	Pakenham to Berwick	3.0	**3.0**	3.0	**3.0**
e05_out	Berwick to Pakenham	3.0	**3.0**	3.0	**3.0**
e06_in	Westall to Southland	3.0	**3.0**	3.0	**1.5**
e06_out	Southland to Westall	3.0	**3.0**	3.0	**1.5**
e07_in	Lynbrook to Noble Park via South Dandenong industrial	3.0	**3.0**	3.0	**1.5**
e07_out	Noble Park to Lynbrook via South Dandenong industrial	3.0	**3.0**	3.0	**1.5**
e08_in	Benton Grange to Mornington Town	1.5	**1.6**	1.5	**1.0**
e08_out	Mornington Town to Benton Grange	1.5	**1.6**	1.5	**1.0**
e09_in	Beaconsfield to Narre Warren	3.0	**3.0**	3.0	**1.5**
e09_out	Narre Warren to Beaconsfield	3.0	**3.0**	3.0	**1.5**
e10_in	Mornington Town to Tanti Park	1.5	**1.6**	1.5	**1.0**
e10_out	Tanti Park to Mornington Town	1.5	**1.6**	1.5	**1.0**
e105_in	Mordialloc to Dandenong	3.0	**3.0**	3.0	**1.5**
e105_out	Dandenong to Mordialloc	3.0	**3.0**	3.0	**1.5**
e107_in	Brighton to Huntingdale	3.0	**3.0**	3.0	**3.0**
e107_out	Huntingdale to Brighton	3.0	**3.0**	3.0	**3.0**
e109_in	Glen Waverley to Oakleigh	3.0	**3.0**	3.0	**3.0**
e109_out	Oakleigh to Glen Waverley	3.0	**3.0**	3.0	**3.0**
e111_in	Heathmont to Camberwell	3.0	**3.0**	3.0	**3.0**
e111_out	Camberwell to Heathmont	3.0	**3.0**	3.0	**3.0**
e118_in	Beaconsfield to Lynbrook	3.0	**3.0**	3.0	**1.5**
e118_out	Lynbrook to Beaconsfield	3.0	**3.0**	3.0	**1.5**
e119_in	Pakenham to Officer	3.0	**3.0**	3.0	**1.5**
e119_out	Officer to Pakenham	3.0	**3.0**	3.0	**1.5**
e200_b_in	Doncaster SC to Southern Cross	6.0	**3.0**	6.0	**3.0**
e200_b_out	Southern Cross to Doncaster SC	6.0	**3.0**	6.0	**3.0**
e200_in	Auburn Station to Southern Cross	3.0	**3.0**	3.0	**3.0**
e200_out	Southern Cross to Auburn Station	3.0	**3.0**	3.0	**3.0**
e203_in	Holmesglen to Darling Road	3.0	**1.6**	3.0	**0.0**
e203_out	Darling Road to Holmesglen	3.0	**1.6**	3.0	**0.0**
e216_in	Middle Brighton to Caulfield to	1.0	**1.0**	1.0	**0.0**
e216_out	Caulfield to to Middle Brighton	1.0	**1.0**	1.0	**0.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e219_in	Elsternwick to City via Williams Road	3.0	**3.0**	3.0	**3.0**
e219_out	City to Elsternwick via Williams Road	3.0	**3.0**	3.0	**3.0**
e245_in	Sandringham to St Kilda	3.0	**1.6**	3.0	**0.0**
e245_out	St Kilda to Sandringham	3.0	**1.6**	3.0	**0.0**
e270_in	Mitcham to Box Hill	3.0	**3.0**	3.0	**1.5**
e270_out	Box Hill to Mitcham	3.0	**3.0**	3.0	**1.5**
e271_in	Park Orchards to Blackburn	1.0	**1.0**	1.0	**0.0**
e271_out	Blackburn to Park Orchards	1.0	**1.0**	1.0	**0.0**
e275_in	Blackburn to Box Hill via Blackburn North	1.5	**1.0**	1.5	**0.0**
e275_out	Box Hill to Blackburn via Blackburn North	1.5	**1.0**	1.5	**0.0**
e279_in	The Pines to Box Hill	3.0	**3.0**	3.0	**3.0**
e279_out	Box Hill to The Pines	3.0	**3.0**	3.0	**3.0**
e280_in	The Pines to Doncaster SC via Tunstall Square	1.0	**1.0**	1.0	**0.0**
e280_out	Doncaster SC to The Pines via Tunstall Square	1.0	**1.0**	1.0	**0.0**
e282_in	The Pines SC to Doncaster PR	3.0	**1.6**	3.0	**1.5**
e282_out	Doncaster PR to The Pines SC	3.0	**1.6**	3.0	**1.5**
e284_in	Box Hill to La Trobe Uni	3.0	**3.0**	3.0	**1.5**
e284_out	La Trobe Uni to Box Hill	3.0	**3.0**	3.0	**1.5**
e285_in	Doncaster Park and Ride to Camberwell	3.0	**3.0**	3.0	**1.5**
e285_out	Camberwell to Doncaster Park and Ride	3.0	**3.0**	3.0	**1.5**
e286_in	Templestowe Village to Jackson Court	1.0	**1.0**	1.0	**0.0**
e286_out	Jackson Court to Templestowe Village	1.0	**1.0**	1.0	**0.0**
e287_in	Mont Albert to Camberwell	1.0	**1.0**	1.0	**0.0**
e287_out	Camberwell to Mont Albert	1.0	**1.0**	1.0	**0.0**
e293_in	Eltham to Deakin Uni	3.0	**3.0**	3.0	**1.5**
e293_out	Deakin Uni to Eltham	3.0	**3.0**	3.0	**1.5**
e302_in	Box Hill to Southern Cross	3.0	**3.0**	3.0	**1.5**
e302_out	Southern Cross to Box Hill	3.0	**3.0**	3.0	**1.5**
e305_in	The Pines to Doncaster SC via Doncaster East SC	3.0	**3.0**	3.0	**1.5**
e305_out	Doncaster SC to The Pines via Doncaster East SC	3.0	**3.0**	3.0	**1.5**
e309_in	The Pines SC to Nunawading	3.0	**1.6**	3.0	**1.5**
e309_out	Nunawading to The Pines SC	3.0	**1.6**	3.0	**1.5**
e364_in	Warrandyte Bridge to Ringwood	3.0	**1.6**	3.0	**1.5**
e364_out	Ringwood to Warrandyte Bridge	3.0	**1.6**	3.0	**1.5**
e367_in	Ringwood East to Heathmont	3.0	**1.6**	3.0	**1.5**
e367_out	Heathmont to Ringwood East	3.0	**1.6**	3.0	**1.5**
e370_in	Ringwood to Mitcham	2.0	**2.0**	2.0	**1.0**
e370_out	Mitcham to Ringwood	2.0	**2.0**	2.0	**1.0**
e371_in	Ringwood to Park Orchards	3.0	**3.0**	3.0	**1.5**
e371_out	Park Orchards to Ringwood	3.0	**3.0**	3.0	**1.5**
e380_in	Lilydale to Ringwood	3.0	**3.0**	3.0	**3.0**
e380_out	Ringwood to Lilydale	3.0	**3.0**	3.0	**3.0**
e381_in	Croydon to Ringwood East	3.0	**1.6**	3.0	**1.5**
e381_out	Ringwood East to Croydon	3.0	**1.6**	3.0	**1.5**
e548_in	Southland to La Trobe Uni	6.0	**3.0**	6.0	**3.0**
e548_out	La Trobe Uni to Southland	6.0	**3.0**	6.0	**3.0**
e600_in	Cheltnham to Sandringham	3.0	**1.6**	3.0	**0.0**
e600_out	Sandringham to Cheltnham	3.0	**1.6**	3.0	**0.0**
e605_in	Gardenvale to City	3.0	**1.6**	3.0	**0.0**
e605_out	City to Gardenvale	3.0	**1.6**	3.0	**0.0**
e612_in	Box Hill to Chadstone SC	1.0	**1.0**	1.0	**0.0**
e612_out	Chadstone SC to Box Hill	1.0	**1.0**	1.0	**0.0**
e613_in	Burwood to Canterbury	3.0	**1.6**	3.0	**1.5**
e613_out	Canterbury to Burwood	3.0	**1.6**	3.0	**1.5**
e622_in	Holmesglen to Oakleigh	1.0	**1.0**	1.0	**0.0**
e622_out	Oakleigh to Holmesglen	1.0	**1.0**	1.0	**0.0**
e623_in	Gardenvale to Caulfield	3.0	**1.6**	3.0	**0.0**
e623_out	Caulfield to Gardenvale	3.0	**1.6**	3.0	**0.0**
e625_in	Carnegie to Burke Road/Tram 5	1.5	**1.0**	1.5	**0.0**
e625_out	Burke Road/Tram 5 to Carnegie	1.5	**1.0**	1.5	**0.0**
e640_in	Glen Waverley to Glen Iris	3.0	**3.0**	3.0	**3.0**
e640_out	Glen Iris to Glen Waverley	3.0	**3.0**	3.0	**3.0**
e664_in	Croydon to Knox SC	3.0	**3.0**	3.0	**3.0**
e664_out	Knox SC to Croydon	3.0	**3.0**	3.0	**3.0**
e670_in	Lilydale to Ringwood	3.0	**3.0**	3.0	**3.0**
e670_out	Ringwood to Lilydale	3.0	**3.0**	3.0	**3.0**
e671_in	Chirnside Park SC to Croydon	1.5	**1.6**	1.5	**1.0**
e671_out	Croydon to Chirnside Park SC	1.5	**1.6**	1.5	**1.0**
e672_in	Chirnside Park SC to Croydon	1.0	**1.0**	1.0	**0.0**
e672_out	Croydon to Chirnside Park SC	1.0	**1.0**	1.0	**0.0**
e677_in	Lilydale to Chirnside Park SC	1.5	**1.6**	1.5	**1.0**
e677_out	Chirnside Park SC to Lilydale	1.5	**1.6**	1.5	**1.0**
e679_in	Lilydale to Ringwood	3.0	**3.0**	3.0	**1.5**
e679_out	Ringwood to Lilydale	3.0	**3.0**	3.0	**1.5**
e680_in	Lilydale to Mooroolbark	1.5	**1.6**	1.5	**1.0**
e680_out	Mooroolbark to Lilydale	1.5	**1.6**	1.5	**1.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e681_in	Rowville Medical/Kellets Rd to Stud Park SC	1.0	**1.0**	1.0	**0.0**
e681_out	Stud Park SC to Rowville Medical/Kellets Rd	1.0	**1.0**	1.0	**0.0**
e682_in	Stud Park SC to Ferntree Gully Station	3.0	**1.6**	3.0	**0.0**
e682_out	Ferntree Gully Station to Stud Park SC	3.0	**1.6**	3.0	**0.0**
e683_in	Warburton to Lilydale	3.0	**1.6**	3.0	**1.5**
e683_out	Lilydale to Warburton	3.0	**1.6**	3.0	**1.5**
e683_short_in	Wandon to Lilydale	1.0	**1.0**	1.0	**0.0**
e683_short_out	Lilydale to Wandon	1.0	**1.0**	1.0	**0.0**
e684_in	Stud Park SC to Knox SC	1.0	**1.0**	1.0	**0.0**
e684_out	Knox SC to Stud Park SC	1.0	**1.0**	1.0	**0.0**
e685_in	Healesville to Lilydale	1.0	**1.0**	1.0	**0.0**
e685_out	Lilydale to Healesville	1.0	**1.0**	1.0	**0.0**
e687_in	Kilsyth to Croydon via Mooroolbark	3.0	**1.6**	3.0	**0.0**
e687_out	Croydon to Kilsyth via Mooroolbark	3.0	**1.6**	3.0	**0.0**
e688_in	Mooroolbark to Upper Ferntree Gully	1.0	**1.0**	1.0	**0.0**
e688_out	Upper Ferntree Gully to Mooroolbark	1.0	**1.0**	1.0	**0.0**
e689_in	Lilydale to Mooroolbark via Montrose	1.5	**1.6**	1.5	**1.0**
e689_out	Mooroolbark to Lilydale via Montrose	1.5	**1.6**	1.5	**1.0**
e690_in	Boronia to Croydon	3.0	**1.6**	3.0	**0.0**
e690_out	Croydon to Boronia	3.0	**1.6**	3.0	**0.0**
e691_in	Ferntree Gully to Boronia	3.0	**1.6**	3.0	**0.0**
e691_out	Boronia to Ferntree Gully	3.0	**1.6**	3.0	**0.0**
e692_in	Chirnside SC to Croydon via Mooroolbark	1.5	**1.0**	1.5	**0.0**
e692_out	Croydon to Chirnside SC via Mooroolbark	1.5	**1.0**	1.5	**0.0**
e693_in	Ferntree Gully to Caulfield	3.0	**3.0**	3.0	**3.0**
e693_out	Caulfield to Ferntree Gully	3.0	**3.0**	3.0	**3.0**
e694_in	Chirnside SC to Croydon	1.5	**1.0**	1.5	**0.0**
e694_out	Croydon to Chirnside SC	1.5	**1.0**	1.5	**0.0**
e695_in	Gembrook to Belgrave	1.0	**0.9**	1.0	**0.8**
e695_out	Belgrave to Gembrook	1.0	**0.9**	1.0	**0.8**
e697_in	Belgrave to Narre Warren Station	1.0	**1.0**	1.0	**0.0**
e697_out	Narre Warren Station to Belgrave	1.0	**1.0**	1.0	**0.0**
e698_ccw	Upwey Loop	3.0	**1.6**	3.0	**1.5**
e699_in	Belgrave to Upwey	3.0	**1.6**	3.0	**1.5**
e699_out	Upwey to Belgrave	3.0	**1.6**	3.0	**1.5**
e700_in	Monash Uni to Glen Waverley via Mt Waverley	1.0	**1.0**	1.0	**0.0**
e700_out	Glen Waverley to Monash Uni via Mt Waverley	1.0	**1.0**	1.0	**0.0**
e701_in	Middle Brighton to Oakleigh	3.0	**3.0**	3.0	**1.5**
e701_out	Oakleigh to Middle Brighton	3.0	**3.0**	3.0	**1.5**
e702_in	Hampton to Westall	3.0	**3.0**	3.0	**1.5**
e702_out	Westall to Hampton	3.0	**3.0**	3.0	**1.5**
e703_b_in	Brighton to Clayton	3.0	**3.0**	3.0	**3.0**
e703_b_out	Clayton to Brighton	3.0	**3.0**	3.0	**3.0**
e703_c_in	Doncaster E to Blackburn	3.0	**3.0**	3.0	**3.0**
e703_c_out	Blackburn to Doncaster E	3.0	**3.0**	3.0	**3.0**
e703_in	Clayton to Blackburn	12.0	**6.0**	12.0	**6.0**
e703_out	Blackburn to Clayton	12.0	**6.0**	12.0	**6.0**
e704_in	Ormond to Oakleigh	3.0	**1.6**	3.0	**0.0**
e704_out	Oakleigh to Ormond	3.0	**1.6**	3.0	**0.0**
e706_in	Aspendale to Mentone	3.0	**1.6**	3.0	**1.5**
e706_out	Mentone to Aspendale	3.0	**1.6**	3.0	**1.5**
e707_in	Mordialloc to Mentone	1.5	**1.6**	1.5	**1.0**
e707_out	Mentone to Mordialloc	1.5	**1.6**	1.5	**1.0**
e709_in	Brighton Beach to Clayton	3.0	**3.0**	3.0	**1.5**
e709_out	Clayton to Brighton Beach	3.0	**3.0**	3.0	**1.5**
e728_in	Glen Waverley to Box Hill	1.0	**1.0**	1.0	**1.0**
e728_out	Box Hill to Glen Waverley	1.0	**1.0**	1.0	**1.0**
e729_in	Huntingdale to Mt Waverley	1.5	**1.0**	1.5	**0.0**
e729_out	Mt Waverley to Huntingdale	1.5	**1.0**	1.5	**0.0**
e730_in	Nunawading to Ashburton via Deakin Uni	3.0	**1.6**	3.0	**0.0**
e730_out	Ashburton to Nunawading via Deakin Uni	3.0	**1.6**	3.0	**0.0**
e731_in	Forest Hill SC to Deakin Uni	1.5	**1.0**	1.5	**0.0**
e731_out	Deakin Uni to Forest Hill SC	1.5	**1.0**	1.5	**0.0**
e732_in	Ferntree Gully to Vermont SC	6.0	**3.0**	6.0	**3.0**
e732_out	Vermont SC to Ferntree Gully	6.0	**3.0**	6.0	**3.0**
e733_in	Mordialloc to Box Hill	3.0	**3.0**	3.0	**3.0**
e733_out	Box Hill to Mordialloc	3.0	**3.0**	3.0	**3.0**
e734_in	Boronia to Caulfield	3.0	**3.0**	3.0	**3.0**
e734_out	Caulfield to Boronia	3.0	**3.0**	3.0	**3.0**
e735_in	Vermont South SC to Blackburn	1.0	**1.0**	1.0	**0.0**
e735_out	Blackburn to Vermont South SC	1.0	**1.0**	1.0	**0.0**
e736_in	Vermont SC to Mitcham	1.5	**1.0**	1.5	**0.0**
e736_out	Mitcham to Vermont SC	1.5	**1.0**	1.5	**0.0**
e739_in	Holmesglen to Mt Waverley	3.0	**1.6**	3.0	**0.0**
e739_out	Mt Waverley to Holmesglen	3.0	**1.6**	3.0	**0.0**
e740_in	Heatherdale to Vermont SC	1.5	**1.0**	1.5	**0.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e740_out	Vermont SC to Heatherdale	1.5	**1.0**	1.5	**0.0**
e741_in	Glen Waverley to Syndal	3.0	**1.6**	3.0	**0.0**
e741_out	Syndal to Glen Waverley	3.0	**1.6**	3.0	**0.0**
e742_in	Boronia to Bayswater	3.0	**1.6**	3.0	**0.0**
e742_out	Bayswater to Boronia	3.0	**1.6**	3.0	**0.0**
e745_in	Knox SC to Bayswater	3.0	**1.6**	3.0	**0.0**
e745_out	Bayswater to Knox SC	3.0	**1.6**	3.0	**0.0**
e746_in	Boronia to Knox SC	1.0	**1.0**	1.0	**0.0**
e746_out	Knox SC to Boronia	1.0	**1.0**	1.0	**0.0**
e747_in	Ferntree Gully to Knox SC	1.5	**1.0**	1.5	**0.0**
e747_out	Knox SC to Ferntree Gully	1.5	**1.0**	1.5	**0.0**
e754_in	Monash Uni to Glen Waverley via Mt Waverley	1.0	**1.0**	1.0	**0.0**
e754_out	Glen Waverley to Monash Uni via Mt Waverley	1.0	**1.0**	1.0	**0.0**
e755_in	Boronia to Bayswater	3.0	**1.6**	3.0	**0.0**
e755_out	Bayswater to Boronia	3.0	**1.6**	3.0	**0.0**
e757_in	Stud Park SC to Knox SC	1.0	**1.0**	1.0	**0.0**
e757_out	Knox SC to Stud Park SC	1.0	**1.0**	1.0	**0.0**
e758_in	Ferntree Gully to Knox SC via Knoxfield	1.0	**1.0**	1.0	**0.0**
e758_out	Knox SC to Ferntree Gully via Knoxfield	1.0	**1.0**	1.0	**0.0**
e765_in	Nunawading to Box Hill	3.0	**1.6**	3.0	**0.0**
e765_out	Box Hill to Nunawading	3.0	**1.6**	3.0	**0.0**
e767_in	Southland to Box Hill	6.0	**3.0**	6.0	**3.0**
e767_out	Box Hill to Southland	6.0	**3.0**	6.0	**3.0**
e769_in	Clyde North to Cranbourne via Linsell Boulevarde	3.0	**3.0**	3.0	**1.5**
e769_out	Cranbourne to Clyde North via Linsell Boulevarde	3.0	**3.0**	3.0	**1.5**
e770_in	Karingal SC to Frankston	3.0	**3.0**	3.0	**3.0**
e770_out	Frankston to Karingal SC	3.0	**3.0**	3.0	**3.0**
e772_in	Frankston South to Frankston via Rosedale Grove	1.5	**1.6**	1.5	**1.0**
e772_out	Frankston to Frankston South via Rosedale Grove	1.5	**1.6**	1.5	**1.0**
e773_in	Frankston South to Frankston via Humphries Road	1.5	**1.6**	1.5	**1.0**
e773_out	Frankston to Frankston South via Humphries Road	1.5	**1.6**	1.5	**1.0**
e774_in	Mt Eliza to Frankston	1.5	**1.6**	1.5	**1.0**
e774_out	Frankston to Mt Eliza	1.5	**1.6**	1.5	**1.0**
e775_in	Frankston South to Frankston	3.0	**3.0**	3.0	**1.5**
e775_out	Frankston to Frankston South	3.0	**3.0**	3.0	**1.5**
e776_in	Pearcedale to Frankston	1.5	**1.6**	1.5	**1.0**
e776_out	Frankston to Pearcedale	1.5	**1.6**	1.5	**1.0**
e778_in	Seaford to Carrum Downs via Hall Rd	3.0	**3.0**	3.0	**1.5**
e778_out	Carrum Downs to Seaford via Hall Rd	3.0	**3.0**	3.0	**1.5**
e779_in	Carrum to Mordialloc	3.0	**1.6**	3.0	**1.5**
e779_out	Mordialloc to Carrum	3.0	**1.6**	3.0	**1.5**
e780_in	Frankston to Carrum via Seaford	3.0	**3.0**	3.0	**3.0**
e780_out	Carrum to Frankston via Seaford	3.0	**3.0**	3.0	**3.0**
e781_in	Mt Martha to Frankston	3.0	**1.6**	3.0	**1.5**
e781_out	Frankston to Mt Martha	3.0	**1.6**	3.0	**1.5**
e782_in	Flinders to Frankston via Balnarring	1.0	**0.9**	1.0	**0.8**
e782_out	Frankston to Flinders via Balnarring	1.0	**0.9**	1.0	**0.8**
e783_in	Balnarring to Frankston	1.5	**1.6**	1.5	**1.0**
e783_out	Frankston to Balnarring	1.5	**1.6**	1.5	**1.0**
e784_in	Osbourne to Mornington Town via Dunns Road	1.5	**1.6**	1.5	**1.0**
e784_out	Mornington Town to Osbourne via Dunns Road	1.5	**1.6**	1.5	**1.0**
e785_in	Osbourne to Mornington Town via Racecourse Road	1.5	**1.6**	1.5	**1.0**
e785_out	Mornington Town to Osbourne via Racecourse Road	1.5	**1.6**	1.5	**1.0**
e786_in	St Andrews to Rye	1.5	**1.6**	1.5	**1.0**
e786_out	Rye to St Andrews	1.5	**1.6**	1.5	**1.0**
e788_in	Portsea to Frankston via Nepean Highway	1.5	**1.6**	1.5	**1.0**
e788_out	Frankston to Portsea via Nepean Highway	1.5	**1.6**	1.5	**1.0**
e788a_in	Portsea to Frankstont via Melbourne Rd	1.5	**1.6**	1.5	**1.0**
e788a_out	Frankstont to Portsea via Melbourne Rd	1.5	**1.6**	1.5	**1.0**
e789_in	Langwarrin North to Franskton	1.5	**1.6**	1.5	**1.0**
e789_out	Franskton to Langwarrin North	1.5	**1.6**	1.5	**1.0**
e790_in	Langwarrin South to Frankston	1.5	**1.6**	1.5	**1.0**
e790_out	Frankston to Langwarrin South	1.5	**1.6**	1.5	**1.0**
e791_in	Frankston to Cranbourne	3.0	**3.0**	3.0	**3.0**
e791_out	Cranbourne to Frankston	3.0	**3.0**	3.0	**3.0**
e792_in	Botanic Ridge to Cranbourne	1.5	**1.6**	1.5	**1.0**
e792_out	Cranbourne to Botanic Ridge	1.5	**1.6**	1.5	**1.0**
e793_in	Tooradin to Cranbourne	1.0	**0.9**	1.0	**0.8**
e793_out	Cranbourne to Tooradin	1.0	**0.9**	1.0	**0.8**
e794_in	Warneet to Cranbourne	1.0	**0.9**	1.0	**0.8**
e794_out	Cranbourne to Warneet	1.0	**0.9**	1.0	**0.8**
e795_in	Cannons Creek to Cranbourne	1.0	**0.9**	1.0	**0.8**
e795_out	Cranbourne to Cannons Creek	1.0	**0.9**	1.0	**0.8**
e796_in	Cranbourne West to Cranbourne	1.5	**1.6**	1.5	**1.0**
e796_out	Cranbourne to Cranbourne West	1.5	**1.6**	1.5	**1.0**
e797_in	Cranbourne West Loop	2.0	**2.0**	2.0	**1.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e797_out	Cranbourne West Loop	2.0	**2.0**	2.0	**1.0**
e798_in	Selandra Rise to Cranbourne via Linsell Boulevarde	3.0	**3.0**	3.0	**1.5**
e798_out	Cranbourne to Selandra Rise via Linsell Boulevarde	3.0	**3.0**	3.0	**1.5**
e799_in	Merinda Park to Casey Central SC	1.5	**1.6**	1.5	**1.0**
e799_out	Casey Central SC to Merinda Park	1.5	**1.6**	1.5	**1.0**
e800_in	Dandenong to Chadstone SC	3.0	**3.0**	3.0	**3.0**
e800_out	Chadstone SC to Dandenong	3.0	**3.0**	3.0	**3.0**
e801_in	Cranbourne East to Lynbrook	1.5	**1.6**	1.5	**1.0**
e801_out	Lynbrook to Cranbourne East	1.5	**1.6**	1.5	**1.0**
e803_in	Cranbourne East to Merinda Park	1.5	**1.6**	1.5	**1.0**
e803_out	Merinda Park to Cranbourne East	1.5	**1.6**	1.5	**1.0**
e813_in	Sandown to Waverley Gardens	1.5	**1.0**	1.5	**0.0**
e813_out	Waverley Gardens to Sandown	1.5	**1.0**	1.5	**0.0**
e814_in	Waverley Gardens SC to Westall	1.5	**1.0**	1.5	**0.0**
e814_out	Westall to Waverley Gardens SC	1.5	**1.0**	1.5	**0.0**
e815_in	Parkmore SC to Yarraman	1.5	**1.0**	1.5	**0.0**
e815_out	Yarraman to Parkmore SC	1.5	**1.0**	1.5	**0.0**
e816_in	Parkmore SC to Noble Park	1.5	**1.6**	1.5	**1.0**
e816_out	Noble Park to Parkmore SC	1.5	**1.6**	1.5	**1.0**
e817_in	Parkmore SC to Sandown	1.5	**1.0**	1.5	**0.0**
e817_out	Sandown to Parkmore SC	1.5	**1.0**	1.5	**0.0**
e825_in	Mentone to Sandringham	3.0	**3.0**	3.0	**1.5**
e825_out	Sandringham to Mentone	3.0	**3.0**	3.0	**1.5**
e826_in	Sandringham to Caulfield	1.5	**1.6**	1.5	**1.0**
e826_out	Caulfield to Sandringham	1.5	**1.6**	1.5	**1.0**
e827_in	Hallam to Dandenong	3.0	**1.6**	3.0	**1.5**
e827_out	Dandenong to Hallam	3.0	**1.6**	3.0	**1.5**
e828_in	Dandenong to Sandringham	3.0	**3.0**	3.0	**3.0**
e828_out	Sandringham to Dandenong	3.0	**3.0**	3.0	**3.0**
e829_in	Berwick to Dandenong	3.0	**3.0**	3.0	**1.5**
e829_out	Dandenong to Berwick	3.0	**3.0**	3.0	**1.5**
e832_in	Frankston to Carrum via Carrum Downs	3.0	**3.0**	3.0	**3.0**
e832_out	Carrum to Frankston via Carrum Downs	3.0	**3.0**	3.0	**3.0**
e833_in	Seaford to Carrum Downs	3.0	**3.0**	3.0	**1.5**
e833_out	Carrum Downs to Seaford	3.0	**3.0**	3.0	**1.5**
e834_in	Berwick RS to Jackson Reserve	3.0	**1.6**	3.0	**1.5**
e834_out	Jackson Reserve to Berwick RS	3.0	**1.6**	3.0	**1.5**
e835_in	Berwick North to Narren Warren	1.5	**1.0**	1.5	**0.0**
e835_out	Narren Warren to Berwick North	1.5	**1.0**	1.5	**0.0**
e836_in	Officer to Beaconsfield via Clyde North	1.5	**1.6**	1.5	**1.0**
e836_out	Beaconsfield to Officer via Clyde North	1.5	**1.6**	1.5	**1.0**
e837_in	Princes Hwy Activity Centre (Officer) to Berwick via Beaconsfield	1.5	**1.0**	1.5	**0.0**
e837_out	Berwick to Princes Hwy Activity Centre (Officer) via Beaconsfield	1.5	**1.0**	1.5	**0.0**
e839_in	Berwick East to Parkhill Plaza	1.5	**1.0**	1.5	**0.0**
e839_out	Parkhill Plaza to Berwick East	1.5	**1.0**	1.5	**0.0**
e841_in	Narre Warren to Endeavour Hills	1.0	**1.0**	1.0	**0.0**
e841_out	Endeavour Hills to Narre Warren	1.0	**1.0**	1.0	**0.0**
e844_in	Endeavour Hills SC to Dandenong	3.0	**1.6**	3.0	**0.0**
e844_out	Dandenong to Endeavour Hills SC	3.0	**1.6**	3.0	**0.0**
e845_ccw	Endeavour Hills SC Loop	1.5	**1.0**	1.5	**0.0**
e845_cw	Endeavour Hills SC Loop	1.5	**1.0**	1.5	**0.0**
e846_cw	Berwick town Loop	1.0	**1.0**	1.0	**0.0**
e848_in	Wheelers Hill SC to Brandon Park SC	1.0	**1.0**	1.0	**0.0**
e848_out	Brandon Park SC to Wheelers Hill SC	1.0	**1.0**	1.0	**0.0**
e850_in	Brandon Park SC to Glen Waverley	1.5	**1.0**	1.5	**0.0**
e850_out	Glen Waverley to Brandon Park SC	1.5	**1.0**	1.5	**0.0**
e851_in	Noble Park to Mitcham	3.0	**3.0**	3.0	**3.0**
e851_out	Mitcham to Noble Park	3.0	**3.0**	3.0	**3.0**
e852_in	Dandenong to Clayton	3.0	**3.0**	3.0	**1.5**
e852_out	Clayton to Dandenong	3.0	**3.0**	3.0	**1.5**
e857_in	Bonbeach to Chelsea	3.0	**1.6**	3.0	**1.5**
e857_out	Chelsea to Bonbeach	3.0	**1.6**	3.0	**1.5**
e858_in	Parkmore SC to Dandenong	1.5	**1.6**	1.5	**1.0**
e858_out	Dandenong to Parkmore SC	1.5	**1.6**	1.5	**1.0**
e866_in	Chisholm TAFE to Rosebud	1.0	**1.0**	1.0	**0.0**
e866_out	Rosebud to Chisholm TAFE	1.0	**1.0**	1.0	**0.0**
e891_in	Lynbrook to Narre Warren	1.5	**1.6**	1.5	**1.0**
e891_out	Narre Warren to Lynbrook	1.5	**1.6**	1.5	**1.0**
e892_in	Casey Central to Dandenong	3.0	**3.0**	3.0	**1.5**
e892_out	Dandenong to Casey Central	3.0	**3.0**	3.0	**1.5**
e893_in	Cranbourne to Dandenong	1.5	**1.6**	1.5	**1.0**
e893_out	Dandenong to Cranbourne	1.5	**1.6**	1.5	**1.0**
e895_in	Fountain Gate SC to Casey Central SC	1.5	**1.6**	1.5	**1.0**
e895_out	Casey Central SC to Fountain Gate SC	1.5	**1.6**	1.5	**1.0**
e900_in	Croydon to Elsternwick	12.0	**6.0**	12.0	**6.0**
e900_out	Elsternwick to Croydon	12.0	**6.0**	12.0	**6.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e901_in	Frankston to Ringwood	6.0	**6.0**	6.0	**6.0**
e901_out	Ringwood to Frankston	6.0	**6.0**	6.0	**6.0**
e902_in	Chelsea to Greensborough	6.0	**6.0**	6.0	**6.0**
e902_out	Greensborough to Chelsea	6.0	**6.0**	6.0	**6.0**
e905_in	The Pines SC to City via Templestowe	6.0	**3.0**	6.0	**3.0**
e905_out	City to The Pines SC via Templestowe	6.0	**3.0**	6.0	**3.0**
e906_in	The Pines SC to Docklands via Doncaster	12.0	**6.0**	12.0	**6.0**
e906_out	City to Warrandyte	12.0	**6.0**	12.0	**6.0**
e907_in	The Pines SC to Docklands via Doncaster	12.0	**6.0**	12.0	**6.0**
e907_out	Docklands to Mitcham	12.0	**6.0**	12.0	**6.0**
e908_in	The Pines SC to Docklands via Doncaster	6.0	**3.0**	6.0	**3.0**
e908_out	Docklands to The Pines SC via Doncaster	6.0	**3.0**	6.0	**3.0**
e920_in	Officer to Lynbrook	3.0	**3.0**	3.0	**3.0**
e920_out	Lynbrook to Officer	3.0	**3.0**	3.0	**3.0**
e921_in	Cardinia Road to Officer	1.5	**1.6**	1.5	**1.0**
e921_out	Officer to Cardinia Road	1.5	**1.6**	1.5	**1.0**
e922_in	Princess Hwy Activity Centre (Officer) to Officer Town Centre	1.5	**1.0**	1.5	**0.0**
e922_out	Officer Town Centre to Princess Hwy Activity Centre (Officer)	1.5	**1.0**	1.5	**0.0**
e923_in	Casey Central to Beaconsfield via Clyde North	1.5	**1.6**	1.5	**1.0**
e923_out	Beaconsfield to Casey Central via Clyde North	1.5	**1.6**	1.5	**1.0**
e924_cw	Pakenham Business Park Loop	1.5	**1.6**	1.5	**1.0**
e925_	Cardinia Road to Officer Nth	1.5	**1.6**	1.5	**1.0**
e925_in	Officer Nth to Cardinia Road	1.5	**1.6**	1.5	**1.0**
e926_in	Pakenham to Cardinia Road via Pakenham North West	1.5	**1.6**	1.5	**1.0**
e926_out	Cardinia Road to Pakenham via Pakenham North West	1.5	**1.6**	1.5	**1.0**
e927_ccw	Pakenham Station/Pakenham North Loop	1.5	**1.6**	1.5	**1.0**
e928_in	Pakenham to Cardinia Road via Pakenham Sth	3.0	**1.6**	3.0	**1.5**
e928_out	Cardinia Road to Pakenham via Pakenham Sth	3.0	**1.6**	3.0	**1.5**
e929_cw	Pakenham Station/Pakenham North East Loop	1.5	**1.6**	1.5	**1.0**
e931_in	Officer to Beaconsfield	1.5	**1.6**	1.5	**1.0**
e931_out	Beaconsfield to Officer	1.5	**1.6**	1.5	**1.0**
n001_tb_in	Merrifield Express Beveridge - Upfield	3.0	**3.0**	3.0	**1.5**
n001_tb_out	Merrifield Express Upfield - Beveridge	3.0	**3.0**	3.0	**1.5**
n002_tb_in	Beveridge - Epping	3.0	**1.6**	3.0	**1.5**
n002_tb_out	Epping - Beveridge	3.0	**1.6**	3.0	**1.5**
n003_tb_in	Donnybrook - Upfield	3.0	**1.6**	3.0	**1.5**
n003_tb_out	Upfield - Donnybrook	3.0	**1.6**	3.0	**1.5**
n004_tb_in	Beveridge - Epping	3.0	**1.6**	3.0	**1.5**
n004_tb_out	Epping - Beveridge	3.0	**1.6**	3.0	**1.5**
n250_in	La Trobe University to City	12.0	**6.0**	12.0	**6.0**
n250_out	City to La Trobe University	12.0	**6.0**	12.0	**6.0**
n251_in	La Trobe Uni to Moonee Ponds via Clifton Hill & Northland	3.0	**1.6**	3.0	**1.5**
n251_out	Moonee Ponds to La Trobe Uni via Clifton Hill & Northland	3.0	**1.6**	3.0	**1.5**
n301_in	La Trobe University to Reservoir	6.0	**6.0**	6.0	**0.0**
n301_out	Reservoir to La Trobe University	6.0	**6.0**	6.0	**0.0**
n303_in	Greensborough to Pascoe Vale	6.0	**3.0**	6.0	**3.0**
n303_out	Pascoe Vale to Greensborough	6.0	**3.0**	6.0	**3.0**
n311_in	Doreen West to South Morang	3.0	**1.6**	3.0	**1.5**
n311_out	South Morang to Doreen West	3.0	**1.6**	3.0	**1.5**
n312_in	Doreen East to South Morang	3.0	**1.6**	3.0	**1.5**
n312_out	South Morang to Doreen East	3.0	**1.6**	3.0	**1.5**
n313_in	Doreen South to South Morang	3.0	**1.6**	3.0	**1.5**
n313_out	South Morang to Doreen South	3.0	**1.6**	3.0	**1.5**
n315_in	South Morang to Greensborough	1.0	**1.0**	1.0	**1.0**
n315_out	Greensborough to South Morang	1.0	**1.0**	1.0	**1.0**
n317_in	Whittlesea to Mernda	1.0	**1.0**	1.0	**1.0**
n317_out	Mernda to Whittlesea	1.0	**1.0**	1.0	**1.0**
n322_in	Mernda to South Morang via Lakes Bvd	3.0	**3.0**	3.0	**1.5**
n322_out	South Morang to Mernda via Lakes Bvd	3.0	**3.0**	3.0	**1.5**
n323_in	Mernda to South Morang via Everywhere	2.0	**2.0**	2.0	**1.0**
n323_out	South Morang to Mernda via Everywhere	2.0	**2.0**	2.0	**1.0**
n331_in	South Morang to Bundoora RMIT	3.0	**1.6**	3.0	**1.5**
n331_out	Bundoora RMIT to South Morang	3.0	**1.6**	3.0	**1.5**
n332_in	South Morang to Thomastown	3.0	**1.6**	3.0	**1.5**
n332_out	Thomastown to South Morang	3.0	**1.6**	3.0	**1.5**
n333_in	South Morang to Greensborough	3.0	**1.6**	3.0	**1.5**
n333_out	Greensborough to South Morang	3.0	**1.6**	3.0	**1.5**
n334_in	East South Morang to Bundoora RMIT	3.0	**3.0**	3.0	**1.5**
n334_out	Bundoora RMIT to East South Morang	3.0	**3.0**	3.0	**1.5**
n341_in	Eltham North to Greensborough	3.0	**3.0**	3.0	**1.5**
n341_out	Greensborough to Eltham North	3.0	**3.0**	3.0	**1.5**
n342_in	Eltham North to Greensborough	3.0	**1.6**	3.0	**1.5**
n342_out	Greensborough to Eltham North	3.0	**1.6**	3.0	**1.5**
n343_in	Diamond Creek to Greensborough	3.0	**1.6**	3.0	**1.5**
n343_out	Greensborough to Diamond Creek	3.0	**1.6**	3.0	**1.5**
n344_in	Campbellfield to West Preston	3.0	**3.0**	3.0	**1.5**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
n344_out	West Preston to Campbellfield	3.0	**3.0**	3.0	**1.5**
n345_in	South Morang to Northland	3.0	**1.6**	3.0	**1.5**
n345_out	Northland to South Morang	3.0	**1.6**	3.0	**1.5**
n346_in	South Morang to Thomastown	1.0	**1.0**	1.0	**1.0**
n346_out	Thomastown to South Morang	1.0	**1.0**	1.0	**1.0**
n347_in	Greensborough to Rosanna	3.0	**1.6**	3.0	**1.5**
n347_out	Rosanna to Greensborough	3.0	**1.6**	3.0	**1.5**
n351_in	Beveridge - Epping	3.0	**3.0**	3.0	**1.5**
n351_out	Epping - Beveridge	3.0	**3.0**	3.0	**1.5**
n352_in	Northland to Keon Park	2.0	**2.0**	2.0	**1.0**
n352_out	Keon Park to Northland	2.0	**2.0**	2.0	**1.0**
n353_in	Eltham to Rosanna	1.5	**1.6**	1.5	**1.0**
n353_out	Rosanna to Eltham	1.5	**1.6**	1.5	**1.0**
n354_in	Thomastown West Loop SB	3.0	**1.6**	3.0	**1.5**
n354_out	Thomastown West Loop NB	3.0	**1.6**	3.0	**1.5**
n355_in	Epping Plaza to Northland Shopping Centre	3.0	**1.6**	3.0	**1.5**
n355_out	Northland Shopping Centre to Epping Plaza	3.0	**1.6**	3.0	**1.5**
n356_in	Aurora to Epping	3.0	**1.6**	3.0	**1.5**
n356_out	Epping to Aurora	3.0	**1.6**	3.0	**1.5**
n357_in	Wollert to Bundoora	2.0	**2.0**	2.0	**1.0**
n357_out	Bundoora to Wollert	2.0	**2.0**	2.0	**1.0**
n358_in	Epping North to Epping	3.0	**1.6**	3.0	**1.5**
n358_out	Epping to Epping North	3.0	**1.6**	3.0	**1.5**
n361_in	Wollert to Thomastown via Harvest Home Rd	3.0	**3.0**	3.0	**1.5**
n361_out	Thomastown to Wollert via Harvest Home Rd	3.0	**3.0**	3.0	**1.5**
n365_in	Kinglake to Whittlesea	0.0	**0.3**	0.0	**0.0**
n365_out	Whittlesea to Kinglake	0.0	**0.3**	0.0	**0.0**
n368_in	Greensborough to Macleod	2.0	**2.0**	2.0	**1.0**
n368_out	Macleod to Greensborough	2.0	**2.0**	2.0	**1.0**
n378x_in	Warrandyte to Eltham	1.0	**1.0**	1.0	**0.0**
n378x_out	Eltham to Warrandyte	1.0	**1.0**	1.0	**0.0**
n379_in	Warrandyte to Eltham	1.5	**1.6**	1.5	**1.0**
n379_out	Eltham to Warrandyte	1.5	**1.6**	1.5	**1.0**
n382_ccw	Eltham Town Service Loop	2.0	**2.0**	2.0	**1.0**
n398_in	Wattle Glen to Diamond Creek	1.0	**1.0**	1.0	**0.0**
n398_out	Diamond Creek to Wattle Glen	1.0	**1.0**	1.0	**0.0**
n401_in	North Melbourne to Parkville	30.0	**15.0**	30.0	**6.0**
n401_out	Parkville to North Melbourne	30.0	**15.0**	30.0	**6.0**
n407_ccw	Moonee Valley Mover Loop	1.0	**1.0**	1.0	**0.0**
n407_cw	Moonee Valley Mover Loop	1.0	**1.0**	1.0	**0.0**
n464_in	Airport West to Essendon	3.0	**1.6**	3.0	**1.5**
n464_out	Essendon to Airport West	3.0	**1.6**	3.0	**1.5**
n465_in	Keilor Park to Essendon	3.0	**3.0**	3.0	**1.5**
n465_out	Essendon to Keilor Park	3.0	**3.0**	3.0	**1.5**
n466_in	Niddrie to Essendon	3.0	**1.6**	3.0	**1.5**
n466_out	Essendon to Niddrie	3.0	**1.6**	3.0	**1.5**
n467_in	Aberfeldie to Moonee Ponds	3.0	**1.6**	3.0	**1.5**
n467_out	Moonee Ponds to Aberfeldie	3.0	**1.6**	3.0	**1.5**
n480_in	Roxburgh Park to Essendon	3.0	**1.6**	3.0	**1.5**
n480_out	Essendon to Roxburgh Park	3.0	**1.6**	3.0	**1.5**
n482_in	Melbourne Airport to Airport West via Industrial Route	1.0	**1.0**	1.0	**0.0**
n482_out	Airport West to Melbourne Airport via Industrial Route	1.0	**1.0**	1.0	**0.0**
n484_in	Roxburgh Park to Broadmeadows	1.5	**1.6**	1.5	**1.0**
n484_out	Broadmeadows to Roxburgh Park	1.5	**1.6**	1.5	**1.0**
n490x_in	Airport West to Gowanbrea	1.0	**1.0**	1.0	**0.0**
n490x_out	Gowanbrea to Airport West	1.0	**1.0**	1.0	**0.0**
n500_in	Melbourne Airport to Airport West	6.0	**6.0**	6.0	**6.0**
n500_out	Airport West to Melbourne Airport	6.0	**6.0**	6.0	**6.0**
n503_in	Essendon to East Brunswick	3.0	**1.6**	3.0	**0.0**
n503_out	East Brunswick to Essendon	3.0	**1.6**	3.0	**0.0**
n505x_in	Moonee Ponds to Melbourne University	2.0	**2.0**	2.0	**1.0**
n505x_out	Melbourne University to Moonee Ponds	2.0	**2.0**	2.0	**1.0**
n506_in	Moonee Ponds to Clifton Hil	6.0	**3.0**	6.0	**3.0**
n506_out	Clifton Hil to Moonee Ponds	6.0	**3.0**	6.0	**3.0**
n507_in	Airport West to Moonee Ponds	1.5	**1.6**	1.5	**1.0**
n507_out	Moonee Ponds to Airport West	1.5	**1.6**	1.5	**1.0**
n508_in	Heidelberg to Moonee Ponds	3.0	**3.0**	3.0	**3.0**
n508_out	Moonee Ponds to Heidelberg	3.0	**3.0**	3.0	**3.0**
n509_in	La Trobe Uni to Airport West	6.0	**3.0**	6.0	**3.0**
n509_out	Airport West to La Trobe Uni	6.0	**3.0**	6.0	**3.0**
n510_in	Ivanhoe to Essendon	3.0	**1.6**	3.0	**1.5**
n510_out	Essendon to Ivanhoe	3.0	**1.6**	3.0	**1.5**
n511_in	North Lockerbie to Craigieburn	1.5	**1.6**	1.5	**1.0**
n511_out	Craigieburn to North Lockerbie	1.5	**1.6**	1.5	**1.0**
n512_in	East Coburg to Essendon DFO	3.0	**1.6**	3.0	**0.0**
n512_out	Essendon DFO to East Coburg	3.0	**1.6**	3.0	**0.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
n513_in	Eltham to Glenroy	6.0	**3.0**	6.0	**3.0**
n513_out	Glenroy to Eltham	6.0	**3.0**	6.0	**3.0**
n525_in	Mt Ridley to Craigieburn Central	1.5	**1.6**	1.5	**1.0**
n525_out	Craigieburn Central to Mt Ridley	1.5	**1.6**	1.5	**1.0**
n526_in	West Craigieburn to Craigieburn	6.0	**3.0**	6.0	**1.5**
n526_out	Craigieburn to West Craigieburn	6.0	**3.0**	6.0	**1.5**
n527_in	Glenroy to Northland	3.0	**1.6**	3.0	**1.5**
n527_out	Northland to Glenroy	3.0	**1.6**	3.0	**1.5**
n528_in	Craigieburn South to Craigieburn Station	3.0	**1.6**	3.0	**1.5**
n528_out	Craigieburn Station to Craigieburn South	3.0	**1.6**	3.0	**1.5**
n529_in	Epping - Lockerbie	3.0	**1.6**	3.0	**1.5**
n529_out	Lockerbie - Epping	3.0	**1.6**	3.0	**1.5**
n530_in	Cambellfield to Coburg	1.5	**1.6**	1.5	**1.0**
n530_out	Coburg to Cambellfield	1.5	**1.6**	1.5	**1.0**
n531_in	Upfield to North Coburg	1.5	**1.0**	1.5	**1.0**
n531_out	North Coburg to Upfield	1.5	**1.0**	1.5	**1.0**
n532_in	Broadmeadows to Coburg	1.5	**1.0**	1.5	**1.0**
n532_out	Coburg to Broadmeadows	1.5	**1.0**	1.5	**1.0**
n533_in	Donnybrook to Craigieburn North	6.0	**3.0**	6.0	**1.5**
n533_out	Craigieburn North to Donnybrook	6.0	**3.0**	6.0	**1.5**
n536_in	Gowrie to Pascoe Vale	3.0	**1.6**	3.0	**1.5**
n536_out	Pascoe Vale to Gowrie	3.0	**1.6**	3.0	**1.5**
n537_in	Craigieburn to Roxburgh Park	3.0	**1.6**	3.0	**1.5**
n537_out	Roxburgh Park to Craigieburn	3.0	**1.6**	3.0	**1.5**
n538_in	Greenvale North to Roxburgh Park	3.0	**1.6**	3.0	**1.5**
n538_out	Roxburgh Park to Greenvale North	3.0	**1.6**	3.0	**1.5**
n540_in	Upfield to Broadmeadows	1.5	**1.6**	1.5	**1.0**
n540_out	Broadmeadows to Upfield	1.5	**1.6**	1.5	**1.0**
n541_in	Roxburgh Park to Broadmeadows	3.0	**1.6**	3.0	**1.5**
n541_out	Broadmeadows to Roxburgh Park	3.0	**1.6**	3.0	**1.5**
n542_in	Broadmeadows to Coburg	3.0	**1.6**	3.0	**1.5**
n542_out	Coburg to Broadmeadows	3.0	**1.6**	3.0	**1.5**
n544_in	Craigieburn to Roxburgh Park	3.0	**3.0**	3.0	**1.5**
n544_out	Roxburgh Park to Craigieburn	3.0	**3.0**	3.0	**1.5**
n583_in	Lockerbie to Epping	6.0	**3.0**	6.0	**1.5**
n583_out	Epping to Lockerbie	6.0	**3.0**	6.0	**1.5**
n584_in	Mernda to Craigieburn	3.0	**3.0**	3.0	**3.0**
n584_out	Craigieburn to Mernda	3.0	**3.0**	3.0	**3.0**
n585_in	Donnybrook to Craigieburn South	1.5	**0.0**	1.5	**0.0**
n585_out	Craigieburn South to Donnybrook	1.5	**0.0**	1.5	**0.0**
n589_ccw	Lockerbie Eastern Loop	3.0	**3.0**	3.0	**1.5**
n589_cw	Lockerbie Eastern Loop	3.0	**3.0**	3.0	**1.5**
n590_in	Beveridge to Mandalay	3.0	**1.5**	3.0	**1.0**
n590_out	Mandalay to Beveridge	3.0	**1.5**	3.0	**1.0**
n902_in	Melbourne Airport to Greensborough	6.0	**6.0**	6.0	**6.0**
n902_out	Greensborough to Melbourne Airport	6.0	**6.0**	6.0	**6.0**
n911_in	Craigieburn Town Centre to Roxburgh Park	3.0	**3.0**	3.0	**3.0**
n911_out	Roxburgh Park to Craigieburn Town Centre	3.0	**3.0**	3.0	**3.0**
n913_in	Heidelberg to Essendon	6.0	**3.0**	6.0	**3.0**
n913_out	Essendon to Heidelberg	6.0	**3.0**	6.0	**3.0**
skybus_in	Bus Melbourne Airport to City	12.0	**12.0**	12.0	**12.0**
skybus_out	Bus City to Melbourne Airport	12.0	**12.0**	12.0	**12.0**
w101_in	Caroline Springs to Watergardens	3.0	**1.6**	3.0	**1.5**
w101_out	Watergardens to Caroline Springs	3.0	**1.6**	3.0	**1.5**
w102_in	Laverton to Deer Park	1.5	**1.0**	1.5	**0.0**
w102_out	Deer Park to Laverton	1.5	**1.0**	1.5	**0.0**
w105_in	Tarneit to Williams Landing	3.0	**1.6**	3.0	**0.0**
w105_out	Williams Landing to Tarneit	3.0	**1.6**	3.0	**0.0**
w106_in	Werribee to Tarneit	6.0	**3.0**	6.0	**3.0**
w106_out	Tarneit to Werribee	6.0	**3.0**	6.0	**3.0**
w107_in	Hoppers Crossing to Tarneit	12.0	**3.0**	12.0	**3.0**
w107_out	Tarneit to Hoppers Crossing	12.0	**3.0**	12.0	**3.0**
w108_in	Manor Lakes to Werribee	6.0	**3.0**	6.0	**3.0**
w108_out	Werribee to Manor Lakes	6.0	**3.0**	6.0	**3.0**
w110_in	Werribee to Tarneit	3.0	**3.0**	3.0	**3.0**
w110_out	Tarneit to Werribee	3.0	**3.0**	3.0	**3.0**
w113_in	Exford Rd to Melton	6.0	**3.0**	6.0	**1.5**
w113_out	Melton to Exford Rd	6.0	**3.0**	6.0	**1.5**
w115_ccw	Rockbank/Rockbank north Loop	1.5	**1.6**	1.5	**1.0**
w115_cw	Rockbank/Rockbank north Loop	1.5	**1.6**	1.5	**1.0**
w116_in	Melton to Rockbank	1.5	**1.6**	1.5	**1.0**
w116_out	Rockbank to Melton	1.5	**1.6**	1.5	**1.0**
w117_in	Melton to Toolern	6.0	**3.0**	6.0	**3.0**
w117_out	Toolern to Melton	6.0	**3.0**	6.0	**3.0**
w119_in	Woodgrove SC to Melton	1.5	**1.6**	1.5	**1.0**
w119_out	Melton to Woodgrove SC	1.5	**1.6**	1.5	**1.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
w121_in	Caroline Springs to Ravenhall	1.5	**1.0**	1.5	**1.0**
w121_out	Ravenhall to Caroline Springs	1.5	**1.0**	1.5	**1.0**
w131_in	Laverton to Sunshine	1.5	**1.0**	1.5	**0.0**
w131_out	Sunshine to Laverton	1.5	**1.0**	1.5	**0.0**
w135_in	Tarneit to Laverton	1.5	**0.0**	1.5	**0.0**
w135_out	Laverton to Tarneit	1.5	**0.0**	1.5	**0.0**
w144_in	Hoppers Crossing to Williams Landing	3.0	**3.0**	3.0	**1.5**
w144_out	Williams Landing to Hoppers Crossing	3.0	**3.0**	3.0	**1.5**
w179_in	Tarneit to Hoppers Crossing	3.0	**3.0**	3.0	**3.0**
w179_out	Hoppers Crossing to Tarneit	3.0	**3.0**	3.0	**3.0**
w183_in	Wyndham Vale to Werribee	6.0	**3.0**	6.0	**1.5**
w183_out	Werribee to Wyndham Vale	6.0	**3.0**	6.0	**1.5**
w185_in	Wyndham Vale to Tarneit	1.5	**1.6**	1.5	**1.0**
w185_out	Tarneit to Wyndham Vale	1.5	**1.6**	1.5	**1.0**
w216_in	Caroline Springs to Sunshine	3.0	**3.0**	3.0	**3.0**
w216_out	Sunshine to Caroline Springs	3.0	**3.0**	3.0	**3.0**
w219_in	Sunshine to Footscray	6.0	**6.0**	6.0	**6.0**
w219_out	Footscray to Sunshine	6.0	**6.0**	6.0	**6.0**
w220_in	Sunshine to City	12.0	**6.0**	12.0	**6.0**
w220_out	City to Sunshine	12.0	**6.0**	12.0	**6.0**
w232_in	Altona Gate to City	3.0	**3.0**	3.0	**3.0**
w232_out	City to Altona Gate	3.0	**3.0**	3.0	**3.0**
w236_in	Garden City to City via Pickles	3.0	**1.6**	3.0	**1.5**
w236_out	City to Garden City via Pickles	3.0	**1.6**	3.0	**1.5**
w400_in	Williams Landing to Deer Park	1.5	**1.0**	1.5	**0.0**
w400_out	Deer Park to Williams Landing	1.5	**1.0**	1.5	**0.0**
w400a_in	Derrimut West to Deer Park	1.5	**1.0**	1.5	**1.0**
w400a_out	Deer Park to Derrimut West	1.5	**1.0**	1.5	**1.0**
w402_in	Footscray to East Melbourne	6.0	**6.0**	6.0	**6.0**
w402_out	East Melbourne to Footscray	6.0	**6.0**	6.0	**6.0**
w404n_in	Footscray to Moonee Ponds	6.0	**6.0**	6.0	**6.0**
w404n_out	Moonee Ponds to Footscray	6.0	**6.0**	6.0	**6.0**
w404s_in	Williamstown to Footscray	6.0	**6.0**	6.0	**6.0**
w404s_out	Footscray to Williamstown	6.0	**6.0**	6.0	**6.0**
w406_in	St Albans to Footscray via Highpoint SC	3.0	**3.0**	3.0	**3.0**
w406_out	Footscray to St Albans via Highpoint SC	3.0	**3.0**	3.0	**3.0**
w406a_in	Highpoint SC to Footscray	6.0	**3.0**	6.0	**3.0**
w406a_out	Footscray to Highpoint SC	6.0	**3.0**	6.0	**3.0**
w408_in	St Albans to Sunshine	3.0	**3.0**	3.0	**3.0**
w408_out	Sunshine to St Albans	3.0	**3.0**	3.0	**3.0**
w409_in	Highpoint SC to Footscray	3.0	**1.6**	3.0	**0.0**
w409_out	Footscray to Highpoint SC	3.0	**1.6**	3.0	**0.0**
w410_in	Sunshine to City via Footscray	6.0	**3.0**	6.0	**3.0**
w410_out	City to Sunshine via Footscray	6.0	**3.0**	6.0	**3.0**
w411_in	Laverton to Footscray	6.0	**3.0**	6.0	**3.0**
w411_out	Footscray to Laverton	6.0	**3.0**	6.0	**3.0**
w414_in	Laverton to Footscray	3.0	**3.0**	3.0	**1.5**
w414_out	Footscray to Laverton	3.0	**3.0**	3.0	**1.5**
w415_in	Laverton to Williamstown	1.5	**1.0**	1.5	**1.0**
w415_out	Williamstown to Laverton	1.5	**1.0**	1.5	**1.0**
w418_in	Caroline Springs to St Albans	3.0	**3.0**	3.0	**1.5**
w418_out	St Albans to Caroline Springs	3.0	**3.0**	3.0	**1.5**
w419_in	Watergardens to Sunshine	3.0	**3.0**	3.0	**1.5**
w419_out	Sunshine to Watergardens	3.0	**3.0**	3.0	**1.5**
w420_in	Watergardens to Sunshine	6.0	**3.0**	6.0	**3.0**
w420_out	Sunshine to Watergardens	6.0	**3.0**	6.0	**3.0**
w421_in	Watergardens to St Albans	3.0	**1.6**	3.0	**1.5**
w421_out	St Albans to Watergardens	3.0	**1.6**	3.0	**1.5**
w423_in	Brimbank Plaza to St Albans	3.0	**1.6**	3.0	**1.5**
w423_out	St Albans to Brimbank Plaza	3.0	**1.6**	3.0	**1.5**
w424_in	Brimbank Plaza to St Albans	3.0	**1.6**	3.0	**1.5**
w424_out	St Albans to Brimbank Plaza	3.0	**1.6**	3.0	**1.5**
w425_in	Watergardens to St Albans	3.0	**3.0**	3.0	**1.5**
w425_out	St Albans to Watergardens	3.0	**3.0**	3.0	**1.5**
w427_in	Sunshine West to Sunshine	3.0	**3.0**	3.0	**3.0**
w427_out	Sunshine to Sunshine West	3.0	**3.0**	3.0	**3.0**
w428_in	Sunshine West to Sunshine	3.0	**3.0**	3.0	**3.0**
w428_out	Sunshine to Sunshine West	3.0	**3.0**	3.0	**3.0**
w431_in	Highpoint SC to Yarraville	3.0	**3.0**	3.0	**3.0**
w431_out	Yarraville to Highpoint SC	3.0	**3.0**	3.0	**3.0**
w432_in	Altona Gate to Yarraville	1.5	**1.0**	1.5	**0.0**
w432_out	Yarraville to Altona Gate	1.5	**1.0**	1.5	**0.0**
w437_in	Werribee to Hoppers Crossing	3.0	**1.6**	3.0	**0.0**
w437_out	Hoppers Crossing to Werribee	3.0	**1.6**	3.0	**0.0**
w439_in	Werribee South to Werribee	1.0	**1.0**	1.0	**0.0**
w439_out	Werribee to Werribee South	1.0	**1.0**	1.0	**0.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
w440_in	Wyndham Vale to Hoppers Crossing	3.0	**3.0**	3.0	**1.5**
w440_out	Hoppers Crossing to Wyndham Vale	3.0	**3.0**	3.0	**1.5**
w441_cw	West Werribee One Way Loop	1.0	**1.0**	1.0	**0.0**
w442_in	Werribee to Hoppers Crossing	3.0	**1.6**	3.0	**0.0**
w442_out	Hoppers Crossing to Werribee	3.0	**1.6**	3.0	**0.0**
w443_ccw	Werribee/Werribee Sth Loop	1.5	**1.6**	1.5	**1.0**
w443_cw	Werribee/Werribee Sth Loop	1.5	**1.6**	1.5	**1.0**
w444_in	Wyndham Vale to Tarneit via Werribee	12.0	**3.0**	12.0	**3.0**
w444_out	Tarneit to Wyndham Vale via Werribee	12.0	**3.0**	12.0	**3.0**
w445_in	Wyndham Vale to Williams Landing	6.0	**3.0**	6.0	**3.0**
w445_out	Williams Landing to Wyndham Vale	6.0	**3.0**	6.0	**3.0**
w446_in	Wyndham Vale to Williams Landing	3.0	**3.0**	3.0	**1.5**
w446_out	Williams Landing to Wyndham Vale	3.0	**3.0**	3.0	**1.5**
w447_in	Wyndham Vale to Werribee	1.5	**1.6**	1.5	**1.0**
w447_out	Werribee to Wyndham Vale	1.5	**1.6**	1.5	**1.0**
w448_in	Wyndam Vale to Werribee	12.0	**3.0**	12.0	**3.0**
w448_out	Werribee to Wyndam Vale	12.0	**3.0**	12.0	**3.0**
w449_in	Manor Lakes to Werribee	3.0	**3.0**	3.0	**1.5**
w449_out	Werribee to Manor Lakes	3.0	**3.0**	3.0	**1.5**
w453_in	West Melton to Melton	1.5	**1.6**	1.5	**1.0**
w453_out	Melton to West Melton	1.5	**1.6**	1.5	**1.0**
w455_in	Melton North to Melton	3.0	**3.0**	3.0	**1.5**
w455_out	Melton to Melton North	3.0	**3.0**	3.0	**1.5**
w456_in	Melton to Caroline Springs	6.0	**3.0**	6.0	**3.0**
w456_out	Caroline Springs to Melton	6.0	**3.0**	6.0	**3.0**
w457_in	Westlakes Dr to Melton	1.5	**1.0**	1.5	**0.0**
w457_out	Melton to Westlakes Dr	1.5	**1.0**	1.5	**0.0**
w458_in	Centenery Dr to Melton	1.5	**1.6**	1.5	**1.0**
w458_out	Melton to Centenery Dr	1.5	**1.6**	1.5	**1.0**
w459_in	Kurunjang to Melton	3.0	**3.0**	3.0	**1.5**
w459_out	Melton to Kurunjang	3.0	**3.0**	3.0	**1.5**
w460_in	Ravenhall to Watergardens	6.0	**3.0**	6.0	**3.0**
w460_out	Watergardens to Ravenhall	6.0	**3.0**	6.0	**3.0**
w461_in	Caroline Springs to Watergardens	3.0	**3.0**	3.0	**1.5**
w461_out	Watergardens to Caroline Springs	3.0	**3.0**	3.0	**1.5**
w462_in	Watergardens to Deer Park via Caroline Springs	3.0	**3.0**	3.0	**3.0**
w462_out	Deer Park to Watergardens via Caroline Springs	3.0	**3.0**	3.0	**3.0**
w466_in	Rockbank to Watergardens	3.0	**1.5**	3.0	**0.0**
w466_out	Watergardens to Rockbank	3.0	**1.5**	3.0	**0.0**
w471_in	Williamstown to Sunshine	6.0	**3.0**	6.0	**3.0**
w471_out	Sunshine to Williamstown	6.0	**3.0**	6.0	**3.0**
w472_in	Moonee Ponds to Footscray	3.0	**3.0**	3.0	**1.5**
w472_out	Footscray to Moonee Ponds	3.0	**3.0**	3.0	**1.5**
w476_in	Watergardens to Moonee Pds	3.0	**3.0**	3.0	**1.5**
w476_out	Moonee Pds to Watergardens	3.0	**3.0**	3.0	**1.5**
w479_in	Sunbury to Melbourne Airport	3.0	**3.0**	3.0	**1.5**
w479_out	Melbourne Airport to Sunbury	3.0	**3.0**	3.0	**1.5**
w479a_in	Sunbury west to Sunbury	3.0	**3.0**	3.0	**1.5**
w479a_out	Sunbury to Sunbury west	3.0	**3.0**	3.0	**1.5**
w481_in	Mt Lion to Sunbury	3.0	**1.6**	3.0	**1.5**
w481_out	Sunbury to Mt Lion	3.0	**1.6**	3.0	**1.5**
w483_in	Diggers Rest to Sunbury	1.5	**1.0**	1.5	**1.0**
w483_out	Sunbury to Diggers Rest	1.5	**1.0**	1.5	**1.0**
w485_in	Sunbury west to Sunbury	1.5	**1.0**	1.5	**1.0**
w485_out	Sunbury to Sunbury west	1.5	**1.0**	1.5	**1.0**
w486_in	Rolling Meadows to Sunbury	1.5	**1.0**	1.5	**1.0**
w486_out	Sunbury to Rolling Meadows	1.5	**1.0**	1.5	**1.0**
w487_in	Cantebury Hills to Sunbury	3.0	**3.0**	3.0	**1.5**
w487_out	Sunbury to Cantebury Hills	3.0	**3.0**	3.0	**1.5**
w488_in	Jackons Hill to Sunbury	1.5	**1.0**	1.5	**1.0**
w488_out	Sunbury to Jackons Hill	1.5	**1.0**	1.5	**1.0**
w489_in	Elizabeth Dr to Sunbury	1.5	**1.0**	1.5	**1.0**
w489_out	Sunbury to Elizabeth Dr	1.5	**1.0**	1.5	**1.0**
w493_in	Werribee to Williams Landing	3.0	**1.6**	3.0	**1.5**
w493_out	Williams Landing to Werribee	3.0	**1.6**	3.0	**1.5**
w494_in	Point Cook South to Willilams Landing	3.0	**3.0**	3.0	**1.5**
w494_out	Willilams Landing to Point Cook South	3.0	**3.0**	3.0	**1.5**
w495_in	Point Cook South to Williams Landing	3.0	**3.0**	3.0	**1.5**
w495_out	Williams Landing to Point Cook South	3.0	**3.0**	3.0	**1.5**
w496_in	Sanctruary Lakes to Laverton	1.5	**1.6**	1.5	**1.0**
w496_out	Laverton to Sanctruary Lakes	1.5	**1.6**	1.5	**1.0**
w497_in	Saltwater Coast to Williams Landing	3.0	**3.0**	3.0	**1.5**
w497_out	Williams Landing to Saltwater Coast	3.0	**3.0**	3.0	**1.5**
w498_in	Hoppers Crossing to Laverton	3.0	**1.6**	3.0	**1.5**
w498_out	Laverton to Hoppers Crossing	3.0	**1.6**	3.0	**1.5**
w903_in	Sunshine to Essendon via Highpoint	6.0	**6.0**	6.0	**6.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
w903_out	Essendon to Sunshine via Highpoint	6.0	**6.0**	6.0	**6.0**
wairport_in	Melb Airport to Keilor Plains	3.0	**3.0**	3.0	**1.5**
wairport_out	Keilor Plains to Melb Airport	3.0	**3.0**	3.0	**1.5**
waltonaind_in	Altona to Sunshine	1.5	**1.0**	1.5	**0.0**
waltonaind_out	Sunshine to Altona	1.5	**1.0**	1.5	**0.0**
wdohertys_in	Tarneit to Sunshine	1.5	**0.0**	1.5	**0.0**
wdohertys_out	Sunshine to Tarneit	1.5	**0.0**	1.5	**0.0**
wforsythrd_in	Tarneit to Williams Landing	3.0	**1.6**	3.0	**1.5**
wforsythrd_out	Williams Landing to Tarneit	3.0	**1.6**	3.0	**1.5**
whighst_in	Woodgrove SC to Toolern	3.0	**1.6**	3.0	**1.5**
whighst_out	Toolern to Woodgrove SC	3.0	**1.6**	3.0	**1.5**
wmelttax1_in	Melton South West to Melton	1.0	**1.0**	1.0	**0.0**
wmelttax1_out	Melton to Melton South West	1.0	**1.0**	1.0	**0.0**
wmelttax2_in	Brookfield to Melton	1.0	**1.0**	1.0	**0.0**
wmelttax2_out	Melton to Brookfield	1.0	**1.0**	1.0	**0.0**

Appendix Table C.24 - Bus services - 2036 Base Case

Route ID	Route name	Frequency			
		AM	MD	PM	OP
c001_in	Southland to Northland	3.0	**3.0**	3.0	**3.0**
c001_out	Northland to Southland	3.0	**3.0**	3.0	**3.0**
c246_in	Elsternwick to Clifton Hill	12.0	**6.0**	12.0	**6.0**
c246_out	Clifton Hill to Elsternwick	12.0	**6.0**	12.0	**6.0**
c606_in	Elsternwick to Fishermans Bend	3.0	**3.0**	3.0	**1.5**
c606_out	Fishermans Bend to Elsternwick	3.0	**3.0**	3.0	**1.5**
e000_in	Waverley Gardens to Dandenong	1.5	**1.6**	1.5	**1.0**
e000_out	Dandenong to Waverley Gardens	1.5	**1.6**	1.5	**1.0**
e01_in	Cranbourne to Springvale	3.0	**3.0**	3.0	**3.0**
e01_out	Springvale to Cranbourne	3.0	**3.0**	3.0	**3.0**
e011_in	Cardinia Road to Officer Sth	1.5	**1.6**	1.5	**1.0**
e011_out	Officer Sth to Cardinia Road	1.5	**1.6**	1.5	**1.0**
e012_in	Clyde to Beaconsfield Station	3.0	**3.0**	3.0	**1.5**
e012_out	Beaconsfield Station to Clyde	3.0	**3.0**	3.0	**1.5**
e013_in	Lilydale to Mooroolbark	3.0	**1.6**	3.0	**1.5**
e013_out	Mooroolbark to Lilydale	3.0	**1.6**	3.0	**1.5**
e015_in	Cranbourne East to Merinda Park	3.0	**3.0**	3.0	**3.0**
e015_out	Merinda Park to Cranbourne East	3.0	**3.0**	3.0	**3.0**
e016_in	Clyde to Cranbourne	1.5	**1.6**	1.5	**1.0**
e016_out	Cranbourne to Clyde	1.5	**1.6**	1.5	**1.0**
e017_in	Highett to Carnegie	3.0	**3.0**	3.0	**1.5**
e017_out	Carnegie to Highett	3.0	**3.0**	3.0	**1.5**
e018_in	Clyde to Officer	3.0	**1.6**	3.0	**1.5**
e018_out	Officer to Clyde	3.0	**1.6**	3.0	**1.5**
e019_in	Berwick to Narre Warren North	1.5	**1.0**	1.5	**0.0**
e019_out	Narre Warren North to Berwick	1.5	**1.0**	1.5	**0.0**
e02_in	Beaconsfield to Carrum	6.0	**3.0**	6.0	**3.0**
e02_out	Carrum to Beaconsfield	6.0	**3.0**	6.0	**3.0**
e020_in	Cheltenham to Chadstone SC	3.0	**3.0**	3.0	**1.5**
e020_out	Chadstone SC to Cheltenham	3.0	**3.0**	3.0	**1.5**
e022_in	Clyde to Berwick	3.0	**3.0**	3.0	**3.0**
e022_out	Berwick to Clyde	3.0	**3.0**	3.0	**3.0**
e023_in	Westall to Clayton	1.5	**1.0**	1.5	**0.0**
e023_out	Clayton to Westall	1.5	**1.0**	1.5	**0.0**
e024_in	Officer to Beaconsfield	1.5	**1.6**	1.5	**1.0**
e024_out	Beaconsfield to Officer	1.5	**1.6**	1.5	**1.0**
e025_in	Ringwood to Box Hill	3.0	**3.0**	3.0	**1.5**
e025_out	Box Hill to Ringwood	3.0	**3.0**	3.0	**1.5**
e026_in	Clyde to Berwick	1.5	**1.6**	1.5	**1.0**
e026_out	Berwick to Clyde	1.5	**1.6**	1.5	**1.0**
e03_in	Officer to Cranbourne	3.0	**3.0**	3.0	**3.0**
e03_out	Cranbourne to Officer	3.0	**3.0**	3.0	**3.0**
e04_b_in	Frankston to Cranbourne via Botanic Ridge	3.0	**3.0**	3.0	**3.0**
e04_b_out	Cranbourne to Frankston via Botanic Ridge	3.0	**3.0**	3.0	**3.0**
e04_in	Cranbourne to Narre Warren	3.0	**3.0**	3.0	**3.0**
e04_out	Narre Warren to Cranbourne	3.0	**3.0**	3.0	**3.0**
e05_in	Pakenham to Berwick	3.0	**3.0**	3.0	**3.0**
e05_out	Berwick to Pakenham	3.0	**3.0**	3.0	**3.0**
e06_in	Westall to Southland	3.0	**3.0**	3.0	**1.5**
e06_out	Southland to Westall	3.0	**3.0**	3.0	**1.5**
e07_in	Lynbrook to Noble Park via South Dandenong industrial	3.0	**3.0**	3.0	**1.5**
e07_out	Noble Park to Lynbrook via South Dandenong industrial	3.0	**3.0**	3.0	**1.5**
e08_in	Benton Grange to Mornington Town	1.5	**1.6**	1.5	**1.0**
e08_out	Mornington Town to Benton Grange	1.5	**1.6**	1.5	**1.0**
e09_in	Beaconsfield to Narre Warren	1.5	**1.6**	1.5	**1.0**
e09_out	Narre Warren to Beaconsfield	1.5	**1.6**	1.5	**1.0**
e10_in	Mornington Town to Tanti Park	1.5	**1.6**	1.5	**1.0**
e10_out	Tanti Park to Mornington Town	1.5	**1.6**	1.5	**1.0**
e105_in	Mordialloc to Dandenong	3.0	**3.0**	3.0	**1.5**
e105_out	Dandenong to Mordialloc	3.0	**3.0**	3.0	**1.5**
e107_in	Brighton to Huntingdale	12.0	**3.0**	12.0	**3.0**
e107_out	Huntingdale to Brighton	12.0	**3.0**	12.0	**3.0**
e109_in	Glen Waverley to Oakleigh	3.0	**3.0**	3.0	**3.0**
e109_out	Oakleigh to Glen Waverley	3.0	**3.0**	3.0	**3.0**
e111_in	Heathmont to Camberwell	3.0	**3.0**	3.0	**3.0**
e111_in	Heathmont to Camberwell	3.0	**3.0**	3.0	**3.0**
e111_out	Camberwell to Heathmont	3.0	**3.0**	3.0	**3.0**
e111_out	Camberwell to Heathmont	3.0	**3.0**	3.0	**3.0**
e118_in	Beaconsfield to Lynbrook	3.0	**3.0**	3.0	**3.0**
e118_out	Lynbrook to Beaconsfield	3.0	**3.0**	3.0	**3.0**
e119_in	Pakenham to Officer	3.0	**3.0**	3.0	**1.5**
e119_out	Officer to Pakenham	3.0	**3.0**	3.0	**1.5**
e121_in	Officer to Cranbourne	6.0	**3.0**	6.0	**3.0**
e121_out	Cranbourne to Officer	6.0	**3.0**	6.0	**3.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e200_b_in	Doncaster SC to Southern Cross	6.0	**3.0**	6.0	**3.0**
e200_b_out	Southern Cross to Doncaster SC	6.0	**3.0**	6.0	**3.0**
e200_in	Auburn Station to Southern Cross	12.0	**3.0**	12.0	**3.0**
e200_out	Southern Cross to Auburn Station	12.0	**3.0**	12.0	**3.0**
e203_in	Holmesglen to Darling Road	3.0	**1.6**	3.0	**0.0**
e203_out	Darling Road to Holmesglen	3.0	**1.6**	3.0	**0.0**
e216_in	Middle Brighton to Caulfield to	1.0	**1.0**	1.0	**0.0**
e216_out	Caulfield to Middle Brighton	1.0	**1.0**	1.0	**0.0**
e219_in	Elsternwick to City via Williams Road	3.0	**3.0**	3.0	**3.0**
e219_out	City to Elsternwick via Williams Road	3.0	**3.0**	3.0	**3.0**
e270_in	Mitcham to Box Hill	3.0	**3.0**	3.0	**1.5**
e270_out	Box Hill to Mitcham	3.0	**3.0**	3.0	**1.5**
e271_in	Park Orchards to Blackburn	1.0	**1.0**	1.0	**0.0**
e271_out	Blackburn to Park Orchards	1.0	**1.0**	1.0	**0.0**
e275_in	Blackburn to Box Hill via Blackburn North	1.5	**1.0**	1.5	**0.0**
e275_out	Box Hill to Blackburn via Blackburn North	1.5	**1.0**	1.5	**0.0**
e279_in	The Pines to Box Hill	3.0	**3.0**	3.0	**3.0**
e279_out	Box Hill to The Pines	3.0	**3.0**	3.0	**3.0**
e280_in	The Pines to Doncaster SC via Tunstall Square	1.0	**1.0**	1.0	**0.0**
e280_out	Doncaster SC to The Pines via Tunstall Square	1.0	**1.0**	1.0	**0.0**
e282_in	The Pines SC to Doncaster PR	3.0	**1.6**	3.0	**1.5**
e282_out	Doncaster PR to The Pines SC	3.0	**1.6**	3.0	**1.5**
e284_in	Box Hill to La Trobe Uni	3.0	**3.0**	3.0	**1.5**
e284_out	La Trobe Uni to Box Hill	3.0	**3.0**	3.0	**1.5**
e285_in	Doncaster Park and Ride to Camberwell	3.0	**3.0**	3.0	**1.5**
e285_out	Camberwell to Doncaster Park and Ride	3.0	**3.0**	3.0	**1.5**
e286_in	Templestowe Village to Jackson Court	1.0	**1.0**	1.0	**0.0**
e286_out	Jackson Court to Templestowe Village	1.0	**1.0**	1.0	**0.0**
e287_in	Mont Albert to Camberwell	1.0	**1.0**	1.0	**0.0**
e287_out	Camberwell to Mont Albert	1.0	**1.0**	1.0	**0.0**
e293_in	Eltham to Deakin Uni	3.0	**3.0**	3.0	**1.5**
e293_out	Deakin Uni to Eltham	3.0	**3.0**	3.0	**1.5**
e302_in	Box Hill to Southern Cross	3.0	**3.0**	3.0	**1.5**
e302_out	Southern Cross to Box Hill	3.0	**3.0**	3.0	**1.5**
e304_in	Doncaster SC to City via Kew	3.0	**3.0**	3.0	**1.5**
e304_out	City to Doncaster SC via Kew	3.0	**3.0**	3.0	**1.5**
e305_in	The Pines to Doncaster SC via Doncaster East SC	3.0	**3.0**	3.0	**1.5**
e305_out	Doncaster SC to The Pines via Doncaster East SC	3.0	**3.0**	3.0	**1.5**
e309_in	The Pines SC to Nunawading	3.0	**1.6**	3.0	**1.5**
e309_out	Nunawading to The Pines SC	3.0	**1.6**	3.0	**1.5**
e364_in	Warrandyte Bridge to Ringwood	3.0	**1.6**	3.0	**1.5**
e364_out	Ringwood to Warrandyte Bridge	3.0	**1.6**	3.0	**1.5**
e367_in	Ringwood East to Heathmont	3.0	**1.6**	3.0	**1.5**
e367_out	Heathmont to Ringwood East	3.0	**1.6**	3.0	**1.5**
e370_in	Ringwood to Mitcham	2.0	**2.0**	2.0	**1.0**
e370_out	Mitcham to Ringwood	2.0	**2.0**	2.0	**1.0**
e371_in	Ringwood to Park Orchards	3.0	**3.0**	3.0	**1.5**
e371_out	Park Orchards to Ringwood	3.0	**3.0**	3.0	**1.5**
e380_in	Lilydale to Ringwood	3.0	**3.0**	3.0	**3.0**
e380_out	Ringwood to Lilydale	3.0	**3.0**	3.0	**3.0**
e381_in	Croydon to Ringwood East	3.0	**1.6**	3.0	**1.5**
e381_out	Ringwood East to Croydon	3.0	**1.6**	3.0	**1.5**
e548_in	Southland to La Trobe Uni	6.0	**3.0**	6.0	**3.0**
e548_out	La Trobe Uni to Southland	6.0	**3.0**	6.0	**3.0**
e600_in	Cheltnham to Sandringham	3.0	**1.6**	3.0	**0.0**
e600_out	Sandringham to Cheltnham	3.0	**1.6**	3.0	**0.0**
e605_in	Gardenvale to City	3.0	**1.6**	3.0	**1.5**
e605_out	City to Gardenvale	3.0	**1.6**	3.0	**1.5**
e612_in	Box Hill to Chadstone SC	1.5	**1.6**	1.5	**1.0**
e612_out	Chadstone SC to Box Hill	1.5	**1.6**	1.5	**1.0**
e613_in	Burwood to Canterbury	3.0	**1.6**	3.0	**1.5**
e613_out	Canterbury to Burwood	3.0	**1.6**	3.0	**1.5**
e622_in	Holmesglen to Oakleigh	1.0	**1.0**	1.0	**0.0**
e622_out	Oakleigh to Holmesglen	1.0	**1.0**	1.0	**0.0**
e623_in	Gardenvale to Caulfield	3.0	**1.6**	3.0	**0.0**
e623_out	Caulfield to Gardenvale	3.0	**1.6**	3.0	**0.0**
e625_in	Carnegie to Burke Road/Tram 5	1.5	**1.0**	1.5	**0.0**
e625_out	Burke Road/Tram 5 to Carnegie	1.5	**1.0**	1.5	**0.0**
e640_in	Glen Waverley to Glen Iris	3.0	**3.0**	3.0	**3.0**
e640_out	Glen Iris to Glen Waverley	3.0	**3.0**	3.0	**3.0**
e664_in	Croydon to Knox SC	3.0	**3.0**	3.0	**3.0**
e664_out	Knox SC to Croydon	3.0	**3.0**	3.0	**3.0**
e670_in	Lilydale to Ringwood	3.0	**3.0**	3.0	**3.0**
e670_out	Ringwood to Lilydale	3.0	**3.0**	3.0	**3.0**
e671_in	Chirnside Park SC to Croydon	1.5	**1.6**	1.5	**1.0**
e671_out	Croydon to Chirnside Park SC	1.5	**1.6**	1.5	**1.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e672_in	Chirnside Park SC to Croydon	1.0	**1.0**	1.0	**0.0**
e672_out	Croydon to Chirnside Park SC	1.0	**1.0**	1.0	**0.0**
e677_in	Lilydale to Chirnside Park SC	1.5	**1.6**	1.5	**1.0**
e677_out	Chirnside Park SC to Lilydale	1.5	**1.6**	1.5	**1.0**
e679_in	Lilydale to Ringwood	3.0	**3.0**	3.0	**1.5**
e679_out	Ringwood to Lilydale	3.0	**3.0**	3.0	**1.5**
e680_in	Lilydale to Mooroolbark	1.5	**1.6**	1.5	**1.0**
e680_out	Mooroolbark to Lilydale	1.5	**1.6**	1.5	**1.0**
e681_in	Rowville Medical/Kellets Rd to Stud Park SC	1.5	**1.6**	1.5	**1.0**
e681_out	Stud Park SC to Rowville Medical/Kellets Rd	1.5	**1.6**	1.5	**1.0**
e682_in	Stud Park SC to Ferntree Gully Station	3.0	**1.6**	3.0	**1.5**
e682_out	Ferntree Gully Station to Stud Park SC	3.0	**1.6**	3.0	**1.5**
e683_in	Warburton to Lilydale	3.0	**1.6**	3.0	**1.5**
e683_out	Lilydale to Warburton	3.0	**1.6**	3.0	**1.5**
e683_short_in	Wandon to Lilydale	1.0	**1.0**	1.0	**0.0**
e683_short_out	Lilydale to Wandon	1.0	**1.0**	1.0	**0.0**
e684_in	Stud Park SC to Knox SC	1.5	**1.6**	1.5	**1.0**
e684_out	Knox SC to Stud Park SC	1.5	**1.6**	1.5	**1.0**
e685_in	Healesville to Lilydale	1.0	**1.0**	1.0	**0.0**
e685_out	Lilydale to Healesville	1.0	**1.0**	1.0	**0.0**
e687_in	Kilsyth to Croydon via Mooroolbark	3.0	**1.6**	3.0	**0.0**
e687_out	Croydon to Kilsyth via Mooroolbark	3.0	**1.6**	3.0	**0.0**
e688_in	Mooroolbark to Upper Ferntree Gully	1.0	**1.0**	1.0	**0.0**
e688_out	Upper Ferntree Gully to Mooroolbark	1.0	**1.0**	1.0	**0.0**
e689_in	Lilydale to Mooroolbark via Montrose	1.5	**1.6**	1.5	**1.0**
e689_out	Mooroolbark to Lilydale via Montrose	1.5	**1.6**	1.5	**1.0**
e690_in	Boronia to Croydon	3.0	**1.6**	3.0	**1.5**
e690_out	Croydon to Boronia	3.0	**1.6**	3.0	**1.5**
e691_in	Ferntree Gully to Boronia	3.0	**1.6**	3.0	**1.5**
e691_out	Boronia to Ferntree Gully	3.0	**1.6**	3.0	**1.5**
e692_in	Chirnside SC to Croydon via Mooroolbark	1.5	**1.6**	1.5	**1.0**
e692_out	Croydon to Chirnside SC via Mooroolbark	1.5	**1.6**	1.5	**1.0**
e693_in	Ferntree Gully to Caulfield	3.0	**3.0**	3.0	**3.0**
e693_out	Caulfield to Ferntree Gully	3.0	**3.0**	3.0	**3.0**
e694_in	Chirnside SC to Croydon	1.5	**1.0**	1.5	**0.0**
e694_out	Croydon to Chirnside SC	1.5	**1.0**	1.5	**0.0**
e695_in	Gembrook to Belgrave	1.0	**0.9**	1.0	**0.8**
e695_out	Belgrave to Gembrook	1.0	**0.9**	1.0	**0.8**
e697_in	Belgrave to Narre Warren Station	1.0	**1.0**	1.0	**0.0**
e697_out	Narre Warren Station to Belgrave	1.0	**1.0**	1.0	**0.0**
e698_ccw	Upwey Loop	3.0	**1.6**	3.0	**1.5**
e699_in	Belgrave to Upwey	3.0	**1.6**	3.0	**1.5**
e699_out	Upwey to Belgrave	3.0	**1.6**	3.0	**1.5**
e700_in	Monash Uni to Glen Waverley via Mt Waverley	1.5	**1.6**	1.5	**1.0**
e700_out	Glen Waverley to Monash Uni via Mt Waverley	1.5	**1.6**	1.5	**1.0**
e701_in	Middle Brighton to Oakleigh	3.0	**3.0**	3.0	**1.5**
e701_out	Oakleigh to Middle Brighton	3.0	**3.0**	3.0	**1.5**
e702_in	Hampton to Westall	3.0	**3.0**	3.0	**1.5**
e702_out	Westall to Hampton	3.0	**3.0**	3.0	**1.5**
e703_b_in	Brighton to Clayton	3.0	**3.0**	3.0	**3.0**
e703_b_out	Clayton to Brighton	3.0	**3.0**	3.0	**3.0**
e703_c_in	Doncaster E to Blackburn	3.0	**1.6**	3.0	**1.5**
e703_c_out	Blackburn to Doncaster E	3.0	**1.6**	3.0	**1.5**
e703_in	Clayton to Blackburn	12.0	**6.0**	12.0	**6.0**
e703_out	Blackburn to Clayton	12.0	**6.0**	12.0	**6.0**
e704_in	Ormond to Oakleigh	3.0	**1.6**	3.0	**0.0**
e704_out	Oakleigh to Ormond	3.0	**1.6**	3.0	**0.0**
e706_in	Aspendale to Mentone	3.0	**1.6**	3.0	**1.5**
e706_out	Mentone to Aspendale	3.0	**1.6**	3.0	**1.5**
e707_in	Mordialloc to Mentone	1.5	**1.6**	1.5	**1.0**
e707_out	Mentone to Mordialloc	1.5	**1.6**	1.5	**1.0**
e709_in	Brighton Beach to Clayton	3.0	**1.6**	3.0	**1.5**
e709_out	Clayton to Brighton Beach	3.0	**1.6**	3.0	**1.5**
e728_in	Glen Waverley to Box Hill	1.0	**1.0**	1.0	**1.0**
e728_out	Box Hill to Glen Waverley	1.0	**1.0**	1.0	**1.0**
e729_in	Huntingdale to Mt Waverley	1.5	**1.0**	1.5	**0.0**
e729_out	Mt Waverley to Huntingdale	1.5	**1.0**	1.5	**0.0**
e730_in	Nunawading to Ashburton via Deakin Uni	3.0	**1.6**	3.0	**1.5**
e730_out	Ashburton to Nunawading via Deakin Uni	3.0	**1.6**	3.0	**1.5**
e731_in	Forest Hill SC to Deakin Uni	1.5	**1.0**	1.5	**0.0**
e731_out	Deakin Uni to Forest Hill SC	1.5	**1.0**	1.5	**0.0**
e732_in	Ferntree Gully to Vermont SC	6.0	**3.0**	6.0	**3.0**
e732_out	Vermont SC to Ferntree Gully	6.0	**3.0**	6.0	**3.0**
e733_in	Mordialloc to Box Hill	6.0	**3.0**	6.0	**3.0**
e733_out	Box Hill to Mordialloc	6.0	**3.0**	6.0	**3.0**
e734_in	Boronia to Caulfield	3.0	**3.0**	3.0	**3.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e734_out	Caulfield to Boronia	3.0	**3.0**	3.0	**3.0**
e735_in	Vermont South SC to Blackburn	1.0	**1.0**	1.0	**0.0**
e735_out	Blackburn to Vermont South SC	1.0	**1.0**	1.0	**0.0**
e736_in	Vermont SC to Mitcham	1.5	**1.0**	1.5	**0.0**
e736_out	Mitcham to Vermont SC	1.5	**1.0**	1.5	**0.0**
e739_in	Holmesglen to Mt Waverley	3.0	**1.6**	3.0	**1.5**
e739_out	Mt Waverley to Holmesglen	3.0	**1.6**	3.0	**1.5**
e740_in	Heatherdale to Vermont SC	1.5	**1.0**	1.5	**0.0**
e740_out	Vermont SC to Heatherdale	1.5	**1.0**	1.5	**0.0**
e741_in	Glen Waverley to Syndal	3.0	**1.6**	3.0	**0.0**
e741_out	Syndal to Glen Waverley	3.0	**1.6**	3.0	**0.0**
e742_in	Boronia to Bayswater	3.0	**1.6**	3.0	**0.0**
e742_out	Bayswater to Boronia	3.0	**1.6**	3.0	**0.0**
e745_in	Knox SC to Bayswater	3.0	**1.6**	3.0	**1.5**
e745_out	Bayswater to Knox SC	3.0	**1.6**	3.0	**1.5**
e746_in	Boronia to Knox SC	1.5	**1.6**	1.5	**1.0**
e746_out	Knox SC to Boronia	1.5	**1.6**	1.5	**1.0**
e747_in	Ferntree Gully to Knox SC	1.5	**1.0**	1.5	**0.0**
e747_out	Knox SC to Ferntree Gully	1.5	**1.0**	1.5	**0.0**
e754_in	Monash Uni to Glen Waverley via Mt Waverley	3.0	**1.6**	3.0	**1.5**
e754_out	Glen Waverley to Monash Uni via Mt Waverley	3.0	**1.6**	3.0	**1.5**
e755_in	Boronia to Bayswater	3.0	**1.6**	3.0	**1.5**
e755_out	Bayswater to Boronia	3.0	**1.6**	3.0	**1.5**
e757_in	Stud Park SC to Knox SC	1.0	**1.0**	1.0	**0.0**
e757_out	Knox SC to Stud Park SC	1.0	**1.0**	1.0	**0.0**
e758_in	Ferntree Gully to Knox SC via Knoxfield	1.0	**1.0**	1.0	**0.0**
e758_out	Knox SC to Ferntree Gully via Knoxfield	1.0	**1.0**	1.0	**0.0**
e765_in	Nunawading to Box Hill	3.0	**1.6**	3.0	**0.0**
e765_out	Box Hill to Nunawading	3.0	**1.6**	3.0	**0.0**
e767_in	Southland to Box Hill	6.0	**3.0**	6.0	**3.0**
e767_out	Box Hill to Southland	6.0	**3.0**	6.0	**3.0**
e770_in	Karingal SC to Frankston	3.0	**3.0**	3.0	**3.0**
e770_out	Frankston to Karingal SC	3.0	**3.0**	3.0	**3.0**
e772_in	Frankston South to Frankston via Rosedale Grove	1.5	**1.6**	1.5	**1.0**
e772_out	Frankston to Frankston South via Rosedale Grove	1.5	**1.6**	1.5	**1.0**
e773_in	Frankston South to Frankston via Humphries Road	1.5	**1.6**	1.5	**1.0**
e773_out	Frankston to Frankston South via Humphries Road	1.5	**1.6**	1.5	**1.0**
e774_in	Mt Eliza to Frankston	1.5	**1.6**	1.5	**1.0**
e774_out	Frankston to Mt Eliza	1.5	**1.6**	1.5	**1.0**
e775_in	Frankston South to Frankston	3.0	**3.0**	3.0	**1.5**
e775_out	Frankston to Frankston South	3.0	**3.0**	3.0	**1.5**
e776_in	Pearcedale to Frankston	1.5	**1.6**	1.5	**1.0**
e776_out	Frankston to Pearcedale	1.5	**1.6**	1.5	**1.0**
e778_in	Seaford to Carrum Downs via Hall Rd	3.0	**3.0**	3.0	**1.5**
e778_out	Carrum Downs to Seaford via Hall Rd	3.0	**3.0**	3.0	**1.5**
e779_in	Carrum to Mordialloc	3.0	**1.6**	3.0	**1.5**
e779_out	Mordialloc to Carrum	3.0	**1.6**	3.0	**1.5**
e780_in	Frankston to Carrum via Seaford	3.0	**3.0**	3.0	**3.0**
e780_out	Carrum to Frankston via Seaford	3.0	**3.0**	3.0	**3.0**
e781_in	Rye to Frankston via Mt Martha	3.0	**1.6**	3.0	**1.5**
e781_out	Frankston to Rye via Mt Martha	3.0	**1.6**	3.0	**1.5**
e782_in	Flinders to Frankston via Balnarring	1.0	**0.9**	1.0	**0.8**
e782_out	Frankston to Flinders via Balnarring	1.0	**0.9**	1.0	**0.8**
e783_in	Balnarring to Frankston	1.5	**1.6**	1.5	**1.0**
e783_out	Frankston to Balnarring	1.5	**1.6**	1.5	**1.0**
e784_in	Osbourne to Mornington Town via Dunns Road	1.5	**1.6**	1.5	**1.0**
e784_out	Mornington Town to Osbourne via Dunns Road	1.5	**1.6**	1.5	**1.0**
e785_in	Osbourne to Mornington Town via Racecourse Road	1.5	**1.6**	1.5	**1.0**
e785_out	Mornington Town to Osbourne via Racecourse Road	1.5	**1.6**	1.5	**1.0**
e786_in	St Andrews to Rye	1.5	**1.6**	1.5	**1.0**
e786_out	Rye to St Andrews	1.5	**1.6**	1.5	**1.0**
e788_in	Portsea to Frankston via Nepean Highway	3.0	**3.0**	3.0	**3.0**
e788_out	Frankston to Portsea via Nepean Highway	3.0	**3.0**	3.0	**3.0**
e788a_in	Portsea to Frankstont via Melbourne Rd	3.0	**3.0**	3.0	**3.0**
e788a_out	Frankstont to Portsea via Melbourne Rd	3.0	**3.0**	3.0	**3.0**
e789_in	Langwarrin North to Franskton	1.5	**1.6**	1.5	**1.0**
e789_out	Franskton to Langwarrin North	1.5	**1.6**	1.5	**1.0**
e790_in	Langwarrin South to Frankston	1.5	**1.6**	1.5	**1.0**
e790_out	Frankston to Langwarrin South	1.5	**1.6**	1.5	**1.0**
e791_in	Frankston to Cranbourne	3.0	**3.0**	3.0	**3.0**
e791_out	Cranbourne to Frankston	3.0	**3.0**	3.0	**3.0**
e792_in	Clyde to Cranbourne via Botanic Ridge	3.0	**1.6**	3.0	**1.5**
e792_out	Cranbourne to Clyde via Botanic Ridge	3.0	**1.6**	3.0	**1.5**
e793_in	Tooradin to Cranbourne	1.0	**0.9**	1.0	**0.8**
e793_out	Cranbourne to Tooradin	1.0	**0.9**	1.0	**0.8**
e794_in	Warneet to Cranbourne	1.0	**0.9**	1.0	**0.8**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e794_out	Cranbourne to Warneet	1.0	**0.9**	1.0	**0.8**
e795_in	Cannons Creek to Cranbourne	1.0	**0.9**	1.0	**0.8**
e795_out	Cranbourne to Cannons Creek	1.0	**0.9**	1.0	**0.8**
e797_in	Cranbourne West to Cranbourne	3.0	**1.6**	3.0	**1.5**
e797_out	Cranbourne to Cranbourne West	3.0	**1.6**	3.0	**1.5**
e798_in	Clyde North to Cranbourne via Heather Ave	3.0	**3.0**	3.0	**3.0**
e798_out	Cranbourne to Clyde North via Heather Ave	3.0	**3.0**	3.0	**3.0**
e799_in	Merinda Park to Casey Central SC	1.5	**1.6**	1.5	**1.0**
e799_out	Casey Central SC to Merinda Park	1.5	**1.6**	1.5	**1.0**
e800_in	Dandenong to Chadstone SC	3.0	**3.0**	3.0	**3.0**
e800_out	Chadstone SC to Dandenong	3.0	**3.0**	3.0	**3.0**
e801_in	Cranbourne East to Lynbrook	6.0	**3.0**	6.0	**3.0**
e801_out	Lynbrook to Cranbourne East	6.0	**3.0**	6.0	**3.0**
e813_in	Sandown to Waverley Gardens	1.5	**1.0**	1.5	**0.0**
e813_out	Waverley Gardens to Sandown	1.5	**1.0**	1.5	**0.0**
e814_in	Waverley Gardens SC to Westall	1.5	**1.0**	1.5	**0.0**
e814_out	Westall to Waverley Gardens SC	1.5	**1.0**	1.5	**0.0**
e815_in	Parkmore SC to Yarraman	1.5	**1.0**	1.5	**0.0**
e815_out	Yarraman to Parkmore SC	1.5	**1.0**	1.5	**0.0**
e816_in	Parkmore SC to Noble Park	1.5	**1.6**	1.5	**1.0**
e816_out	Noble Park to Parkmore SC	1.5	**1.6**	1.5	**1.0**
e817_in	Parkmore SC to Sandown	1.5	**1.6**	1.5	**1.0**
e817_out	Sandown to Parkmore SC	1.5	**1.6**	1.5	**1.0**
e825_in	Mentone to Sandringham	3.0	**3.0**	3.0	**1.5**
e825_out	Sandringham to Mentone	3.0	**3.0**	3.0	**1.5**
e826_in	Sandringham to Caulfield	1.5	**1.6**	1.5	**1.0**
e826_out	Caulfield to Sandringham	1.5	**1.6**	1.5	**1.0**
e827_in	Hallam to Dandenong	6.0	**3.0**	6.0	**3.0**
e827_out	Dandenong to Hallam	6.0	**3.0**	6.0	**3.0**
e828_in	Dandenong to Sandringham	3.0	**3.0**	3.0	**3.0**
e828_out	Sandringham to Dandenong	3.0	**3.0**	3.0	**3.0**
e829_in	Berwick to Dandenong	3.0	**3.0**	3.0	**1.5**
e829_out	Dandenong to Berwick	3.0	**3.0**	3.0	**1.5**
e83_in	Noble Park to Glen Waverley	3.0	**3.0**	3.0	**3.0**
e83_out	Glen Waverley to Noble Park	3.0	**3.0**	3.0	**3.0**
e832_in	Frankston to Carrum via Carrum Downs	3.0	**3.0**	3.0	**3.0**
e832_out	Carrum to Frankston via Carrum Downs	3.0	**3.0**	3.0	**3.0**
e833_in	Seaford to Carrum Downs	3.0	**3.0**	3.0	**1.5**
e833_out	Carrum Downs to Seaford	3.0	**3.0**	3.0	**1.5**
e834_in	Berwick RS to Jackson Reserve	3.0	**1.6**	3.0	**1.5**
e834_out	Jackson Reserve to Berwick RS	3.0	**1.6**	3.0	**1.5**
e835_in	Cranbourne East to Narre Warren	3.0	**3.0**	3.0	**1.5**
e835_out	Narre Warren to Cranbourne East	3.0	**3.0**	3.0	**1.5**
e837_in	Princes Hwy Activity Centre (Officer) to Berwick via Beaconsfield	1.5	**1.0**	1.5	**0.0**
e837_out	Berwick to Princes Hwy Activity Centre (Officer) via Beaconsfield	1.5	**1.0**	1.5	**0.0**
e839_in	Berwick East to Parkhill Plaza	3.0	**1.6**	3.0	**1.5**
e839_out	Parkhill Plaza to Berwick East	3.0	**1.6**	3.0	**1.5**
e841_in	Narre Warren to Endeavour Hills	1.5	**1.6**	1.5	**1.0**
e841_out	Endeavour Hills to Narre Warren	1.5	**1.6**	1.5	**1.0**
e844_in	Endeavour Hills SC to Dandenong	6.0	**3.0**	6.0	**3.0**
e844_out	Dandenong to Endeavour Hills SC	6.0	**3.0**	6.0	**3.0**
e845_ccw	Endeavour Hills SC Loop	1.5	**1.6**	1.5	**1.0**
e845_cw	Endeavour Hills SC Loop	1.5	**1.6**	1.5	**1.0**
e846_cw	Berwick town Loop	1.0	**1.0**	1.0	**0.0**
e848_in	Wheelers Hill SC to Brandon Park SC	1.0	**1.0**	1.0	**0.0**
e848_out	Brandon Park SC to Wheelers Hill SC	1.0	**1.0**	1.0	**0.0**
e850_in	Brandon Park SC to Glen Waverley	1.5	**1.0**	1.5	**0.0**
e850_out	Glen Waverley to Brandon Park SC	1.5	**1.0**	1.5	**0.0**
e851_in	Glen Waverley to Mitcham	3.0	**3.0**	3.0	**3.0**
e851_out	Mitcham to Glen Waverley	3.0	**3.0**	3.0	**3.0**
e852_in	Dandenong to Clayton	12.0	**3.0**	12.0	**3.0**
e852_out	Clayton to Dandenong	12.0	**3.0**	12.0	**3.0**
e857_in	Bonbeach to Chelsea	3.0	**1.6**	3.0	**1.5**
e857_out	Chelsea to Bonbeach	3.0	**1.6**	3.0	**1.5**
e858_in	Parkmore SC to Dandenong	1.5	**1.6**	1.5	**1.0**
e858_out	Dandenong to Parkmore SC	1.5	**1.6**	1.5	**1.0**
e866_in	Chisholm TAFE to Rosebud	1.0	**1.0**	1.0	**0.0**
e866_out	Rosebud to Chisholm TAFE	1.0	**1.0**	1.0	**0.0**
e891_in	Lynbrook to Narre Warren	1.5	**1.6**	1.5	**1.0**
e891_out	Narre Warren to Lynbrook	1.5	**1.6**	1.5	**1.0**
e892_in	Narre Warren South to Dandenong	1.5	**1.6**	1.5	**1.0**
e892_out	Dandenong to Narre Warren South	1.5	**1.6**	1.5	**1.0**
e893_in	Cranbourne to Dandenong	1.5	**1.6**	1.5	**1.0**
e893_out	Dandenong to Cranbourne	1.5	**1.6**	1.5	**1.0**
e895_in	Narre Warren to Jackson Reserve via Lynbrook	1.5	**1.6**	1.5	**1.0**
e895_out	Jackson Reserve to Narre Warren via Lynbrook	1.5	**1.6**	1.5	**1.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
e900_in	Croydon to Elsternwick	12.0	**6.0**	12.0	**6.0**
e900_out	Elsternwick to Croydon	12.0	**6.0**	12.0	**6.0**
e901_in	Frankston to Ringwood	6.0	**6.0**	6.0	**6.0**
e901_out	Ringwood to Frankston	6.0	**6.0**	6.0	**6.0**
e902_in	Chelsea to Greensborough	6.0	**6.0**	6.0	**6.0**
e902_out	Greensborough to Chelsea	6.0	**6.0**	6.0	**6.0**
e903_in	Mentone to La Trobe Uni	12.0	**12.0**	12.0	**12.0**
e903_out	La Trobe Uni to Mentone	12.0	**12.0**	12.0	**12.0**
e905_in	The Pines SC to City via Templestowe	6.0	**3.0**	6.0	**3.0**
e905_out	City to The Pines SC via Templestowe	6.0	**3.0**	6.0	**3.0**
e906_in	Warrandyte to City	12.0	**6.0**	12.0	**6.0**
e906_out	City to Warrandyte	12.0	**6.0**	12.0	**6.0**
e907_in	Mitcham to Docklands	12.0	**6.0**	12.0	**6.0**
e907_out	Docklands to Mitcham	12.0	**6.0**	12.0	**6.0**
e908_in	The Pines SC to Docklands via Doncaster	6.0	**3.0**	6.0	**3.0**
e908_out	Docklands to The Pines SC via Doncaster	6.0	**3.0**	6.0	**3.0**
e920_in	Officer to Lynbrook	3.0	**3.0**	3.0	**3.0**
e920_out	Lynbrook to Officer	3.0	**3.0**	3.0	**3.0**
e921_in	Cardinia Road to Officer	3.0	**1.6**	3.0	**1.5**
e921_out	Officer to Cardinia Road	3.0	**1.6**	3.0	**1.5**
e922_in	Princess Hwy Activity Centre (Officer) to Officer Town Centre	1.5	**1.0**	1.5	**0.0**
e922_out	Officer Town Centre to Princess Hwy Activity Centre (Officer)	1.5	**1.0**	1.5	**0.0**
e923_in	Officer to Casey Central	3.0	**3.0**	3.0	**1.5**
e923_out	Casey Central to Officer	3.0	**3.0**	3.0	**1.5**
e924_cw	Pakenham Business Park Loop	1.5	**1.6**	1.5	**1.0**
e925_	Cardinia Road to Officer Nth	1.5	**1.6**	1.5	**1.0**
e925_in	Officer Nth to Cardinia Road	1.5	**1.6**	1.5	**1.0**
e926_in	Pakenham to Cardinia Road via Pakenham North West	3.0	**1.6**	3.0	**1.5**
e926_out	Cardinia Road to Pakenham via Pakenham North West	3.0	**1.6**	3.0	**1.5**
e927_ccw	Pakenham Station via Pakenham North	1.5	**1.6**	1.5	**1.0**
e928_in	Pakenham to Cardinia Road via Pakenham Sth	3.0	**1.6**	3.0	**1.5**
e928_out	Cardinia Road to Pakenham via Pakenham Sth	3.0	**1.6**	3.0	**1.5**
e929_cw	Pakenham Station via Pakenham North East	3.0	**1.6**	3.0	**1.5**
e930_in	Pakenham Station to Pakenham East	1.5	**1.6**	1.5	**1.0**
e930_out	Pakenham East to Pakenham Station	1.5	**1.6**	1.5	**1.0**
e931_in	Officer to Beaconsfield	1.5	**1.6**	1.5	**1.0**
e931_out	Beaconsfield to Officer	1.5	**1.6**	1.5	**1.0**
e941_in	Clyde South to Clyde	1.5	**1.6**	1.5	**1.0**
e941_out	Clyde to Clyde South	1.5	**1.6**	1.5	**1.0**
e942_in	Pearcedale to Cranbourne	1.0	**0.9**	1.0	**0.8**
e942_out	Cranbourne to Pearcedale	1.0	**0.9**	1.0	**0.8**
n001_tb_in	Merrifield Express (Beveridge-Upfield)	6.0	**3.0**	6.0	**3.0**
n001_tb_out	Merrifield Express (Upfield-Beveridge)	6.0	**3.0**	6.0	**3.0**
n002_tb_in	Craigieburn - Merrifield	3.0	**1.6**	3.0	**1.5**
n002_tb_out	Merrifield - Craigieburn	3.0	**1.6**	3.0	**1.5**
n003_tb_in	Donnybrook - Upfield	3.0	**3.0**	3.0	**1.5**
n003_tb_out	Upfield - Donnybrook	3.0	**3.0**	3.0	**1.5**
n004_tb_in	Epping - Beveridge	6.0	**3.0**	6.0	**1.5**
n004_tb_out	Beveridge - Epping	6.0	**3.0**	6.0	**1.5**
n011_in	Donnybrook to Craigieburn	1.5	**1.0**	1.5	**1.0**
n011_out	Craigieburn to Donnybrook	1.5	**1.0**	1.5	**1.0**
n250_in	La Trobe University to City	12.0	**6.0**	12.0	**6.0**
n250_out	City to La Trobe University	12.0	**6.0**	12.0	**6.0**
n251_in	La Trobe Uni to Moonee Ponds via Clifton Hill & Northland	3.0	**1.6**	3.0	**1.5**
n251_out	Moonee Ponds to La Trobe Uni via Clifton Hill & Northland	3.0	**1.6**	3.0	**1.5**
n303_in	Greensborough to Coburg	6.0	**3.0**	6.0	**3.0**
n303_out	Coburg to Greensborough	6.0	**3.0**	6.0	**3.0**
n311_in	Doreen West to South Morang	3.0	**1.6**	3.0	**1.5**
n311_out	South Morang to Doreen West	3.0	**1.6**	3.0	**1.5**
n312_in	Doreen East to South Morang	3.0	**1.6**	3.0	**1.5**
n312_out	South Morang to Doreen East	3.0	**1.6**	3.0	**1.5**
n313_in	Doreen South to South Morang	3.0	**1.6**	3.0	**1.5**
n313_out	South Morang to Doreen South	3.0	**1.6**	3.0	**1.5**
n315_in	South Morang to Greensborough	1.0	**1.0**	1.0	**1.0**
n315_out	Greensborough to South Morang	1.0	**1.0**	1.0	**1.0**
n317_in	Whittlesea to Mernda	1.0	**1.0**	1.0	**1.0**
n317_out	Mernda to Whittlesea	1.0	**1.0**	1.0	**1.0**
n322_in	Mernda to South Morang via Lakes Bvd	3.0	**3.0**	3.0	**1.5**
n322_out	South Morang to Mernda via Lakes Bvd	3.0	**3.0**	3.0	**1.5**
n323_in	Doreen to Bundoora	2.0	**2.0**	2.0	**1.0**
n323_out	Bundoora to Doreen	2.0	**2.0**	2.0	**1.0**
n326_in	South Morang to La Trobe University	3.0	**3.0**	3.0	**3.0**
n326_out	La Trobe University to South Morang	3.0	**3.0**	3.0	**3.0**
n342_in	St Helena to Eltham	3.0	**1.6**	3.0	**1.5**
n342_out	Eltham to St Helena	3.0	**1.6**	3.0	**1.5**
n343_in	Diamond Creek to Greensborough	3.0	**1.6**	3.0	**1.5**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
n343_in	Diamond Creek to Greensborough	3.0	**1.6**	3.0	**1.5**
n343_out	Greensborough to Diamond Creek	3.0	**1.6**	3.0	**1.5**
n343_out	Greensborough to Diamond Creek	3.0	**1.6**	3.0	**1.5**
n344_in	Campbellfield to West Preston	3.0	**1.6**	3.0	**1.5**
n344_out	West Preston to Campbellfield	3.0	**1.6**	3.0	**1.5**
n345_in	South Morang to Northland	3.0	**1.6**	3.0	**1.5**
n345_out	Northland to South Morang	3.0	**1.6**	3.0	**1.5**
n346_in	North South Morang to Thomastown	1.0	**1.0**	1.0	**1.0**
n346_out	Thomastown to North South Morang	1.0	**1.0**	1.0	**1.0**
n347_in	St Helena to Heidelberg	3.0	**1.6**	3.0	**1.5**
n347_out	Heidelberg to St Helena	3.0	**1.6**	3.0	**1.5**
n351_in	Beveridge - Epping	12.0	**3.0**	12.0	**3.0**
n351_out	Epping - Beveridge	12.0	**3.0**	12.0	**3.0**
n352_in	Northland to Keon Park	2.0	**2.0**	2.0	**1.0**
n352_out	Keon Park to Northland	2.0	**2.0**	2.0	**1.0**
n353_in	Eltham to Heidelberg via Rosanna	1.5	**1.6**	1.5	**1.0**
n353_out	Heidelberg to Eltham via Rosanna	1.5	**1.6**	1.5	**1.0**
n354_in	Lalor to Thomastown	3.0	**1.6**	3.0	**1.5**
n354_out	Thomastown to Lalor	3.0	**1.6**	3.0	**1.5**
n355_in	Epping Plaza to Thornbury	1.0	**1.0**	1.0	**1.0**
n355_out	Thornbury to Epping Plaza	1.0	**1.0**	1.0	**1.0**
n356_in	Wollert to Epping	3.0	**1.6**	3.0	**1.5**
n356_out	Epping to Wollert	3.0	**1.6**	3.0	**1.5**
n357_in	Wollert to Bundoora	2.0	**2.0**	2.0	**1.0**
n357_out	Bundoora to Wollert	2.0	**2.0**	2.0	**1.0**
n358_in	Wollert to Epping	3.0	**1.6**	3.0	**1.5**
n358_out	Epping to Wollert	3.0	**1.6**	3.0	**1.5**
n361_in	Wollert to Thomastown via Harvest Home Rd	3.0	**3.0**	3.0	**1.5**
n361_out	Thomastown to Wollert via Harvest Home Rd	3.0	**3.0**	3.0	**1.5**
n368_in	Greensborough to Macleod	2.0	**2.0**	2.0	**1.0**
n368_out	Macleod to Greensborough	2.0	**2.0**	2.0	**1.0**
n378x_in	Research East to Research via Warrandyte	1.0	**1.0**	1.0	**0.0**
n378x_out	Research to Research East via Warrandyte	1.0	**1.0**	1.0	**0.0**
n379_in	Research to Eltham	1.5	**1.6**	1.5	**1.0**
n379_out	Eltham to Research	1.5	**1.6**	1.5	**1.0**
n382_ccw	Eltham Town Service Loop	2.0	**2.0**	2.0	**1.0**
n401_in	North Melbourne to Parkville	6.0	**6.0**	6.0	**6.0**
n401_out	Parkville to North Melbourne	6.0	**6.0**	6.0	**6.0**
n464_in	Airport West to Essendon	3.0	**1.6**	3.0	**1.5**
n464_out	Essendon to Airport West	3.0	**1.6**	3.0	**1.5**
n465_in	Keilor Park to Essendon	6.0	**3.0**	6.0	**3.0**
n465_out	Essendon to Keilor Park	6.0	**3.0**	6.0	**3.0**
n467_in	Aberfeldie to Moonee Ponds	3.0	**1.6**	3.0	**1.5**
n467_out	Moonee Ponds to Aberfeldie	3.0	**1.6**	3.0	**1.5**
n479_in	Sunbury to Melbourne Airport	1.0	**1.0**	1.0	**1.0**
n479_out	Melbourne Airport to Sunbury	1.0	**1.0**	1.0	**1.0**
n480_in	Roxburgh Park to Essendon	3.0	**1.6**	3.0	**1.5**
n480_out	Essendon to Roxburgh Park	3.0	**1.6**	3.0	**1.5**
n482_in	Melbourne Airport to Airport West via Industrial Route	1.5	**1.0**	1.5	**0.0**
n482_out	Airport West to Melbourne Airport via Industrial Route	1.5	**1.0**	1.5	**0.0**
n484_in	Roxburgh Park to Broadmeadows	1.5	**1.6**	1.5	**1.0**
n484_out	Broadmeadows to Roxburgh Park	1.5	**1.6**	1.5	**1.0**
n490x_in	Gowanbrae to Airport West	1.0	**1.0**	1.0	**0.0**
n490x_out	Airport West to Gowanbrae	1.0	**1.0**	1.0	**0.0**
n500_in	Melbourne Airport to Airport West	3.0	**1.6**	3.0	**1.5**
n500_out	Airport West to Melbourne Airport	3.0	**1.6**	3.0	**1.5**
n503_in	Essendon to East Brunswick	2.0	**2.0**	2.0	**1.0**
n503_out	East Brunswick to Essendon	2.0	**2.0**	2.0	**1.0**
n505_in	Moonee Ponds to Melbourne University	3.0	**1.6**	3.0	**1.5**
n505_out	Melbourne University to Moonee Ponds	3.0	**1.6**	3.0	**1.5**
n506_in	Moonee Ponds to Clifton Hil	6.0	**3.0**	6.0	**3.0**
n506_out	Clifton Hil to Moonee Ponds	6.0	**3.0**	6.0	**3.0**
n507_in	Airport West to Moonee Ponds	1.5	**1.6**	1.5	**1.0**
n507_out	Moonee Ponds to Airport West	1.5	**1.6**	1.5	**1.0**
n508_in	Heidelberg to Moonee Ponds	6.0	**3.0**	6.0	**3.0**
n508_out	Moonee Ponds to Heidelberg	6.0	**3.0**	6.0	**3.0**
n509_in	La Trobe Uni to Airport West	6.0	**3.0**	6.0	**3.0**
n509_out	Airport West to La Trobe Uni	6.0	**3.0**	6.0	**3.0**
n510_in	Ivanhoe to Essendon	3.0	**1.6**	3.0	**1.5**
n510_out	Essendon to Ivanhoe	3.0	**1.6**	3.0	**1.5**
n512_in	East Coburg to Essendon DFO	3.0	**1.6**	3.0	**1.5**
n512_out	Essendon DFO to East Coburg	3.0	**1.6**	3.0	**1.5**
n513_in	Eltham to Glenroy	12.0	**6.0**	12.0	**6.0**
n513_out	Glenroy to Eltham	12.0	**6.0**	12.0	**6.0**
n525_in	West Craigieburn to North Craigieburn	1.0	**1.0**	1.0	**1.0**
n525_out	North Craigieburn to West Craigieburn	1.0	**1.0**	1.0	**1.0**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
n526_in	West Craigieburn to Craigieburn	6.0	**3.0**	6.0	**1.5**
n526_out	Craigieburn to West Craigieburn	6.0	**3.0**	6.0	**1.5**
n527_in	Glenroy to Heidelberg	3.0	**1.6**	3.0	**1.5**
n527_out	Heidelberg to Glenroy	3.0	**1.6**	3.0	**1.5**
n529_in	Lockerbie - Epping	3.0	**3.0**	3.0	**1.5**
n529_out	Epping - Lockerbie	3.0	**3.0**	3.0	**1.5**
n530_in	Cambellfield to Coburg	1.5	**1.6**	1.5	**1.0**
n530_out	Coburg to Cambellfield	1.5	**1.6**	1.5	**1.0**
n531_in	Upfield to North Coburg	1.0	**1.0**	1.0	**0.0**
n531_out	North Coburg to Upfield	1.0	**1.0**	1.0	**0.0**
n532_in	Craigieburn to Broadmeadows	1.5	**1.0**	1.5	**1.0**
n532_out	Broadmeadows to Craigieburn	1.5	**1.0**	1.5	**1.0**
n533_in	Donnybrook to Craigieburn North	6.0	**3.0**	6.0	**1.5**
n533_out	Craigieburn North to Donnybrook	6.0	**3.0**	6.0	**1.5**
n536_in	Gowrie to Pascoe Vale	3.0	**3.0**	3.0	**1.5**
n536_out	Pascoe Vale to Gowrie	3.0	**3.0**	3.0	**1.5**
n537_in	Roxburgh Park to Craigieburn	6.0	**3.0**	6.0	**1.5**
n537_out	Craigieburn to Roxburgh Park	6.0	**3.0**	6.0	**1.5**
n538_in	Craigieburn Station to Roxburgh Park	3.0	**3.0**	3.0	**1.5**
n538_out	Roxburgh Park to Craigieburn Station	3.0	**3.0**	3.0	**1.5**
n540_in	Campbellfield to Glenroy via Upfield	3.0	**1.6**	3.0	**1.5**
n540_out	Glenroy to Campbellfield via Upfield	3.0	**1.6**	3.0	**1.5**
n541_in	Roxburgh Park to Broadmeadows	3.0	**1.6**	3.0	**1.5**
n541_out	Broadmeadows to Roxburgh Park	3.0	**1.6**	3.0	**1.5**
n542_in	Broadmeadows to Coburg	3.0	**1.6**	3.0	**1.5**
n542_out	Coburg to Broadmeadows	3.0	**1.6**	3.0	**1.5**
n544_in	Roxburgh Park to Craigieburn	3.0	**3.0**	3.0	**1.5**
n544_out	Craigieburn to Roxburgh Park	3.0	**3.0**	3.0	**1.5**
n565x_in	Humevale to Whittlesea	0.0	**0.3**	0.0	**0.0**
n565x_out	Whittlesea to Humevale	0.0	**0.3**	0.0	**0.0**
n566_in	La Trobe Uni to Airport West	3.0	**1.6**	3.0	**1.5**
n566_out	Airport West to La Trobe Uni	3.0	**1.6**	3.0	**1.5**
n583_in	Lockerbie to Epping	6.0	**3.0**	6.0	**1.5**
n583_out	Epping to Lockerbie	6.0	**3.0**	6.0	**1.5**
n584_in	Mernda to Craigieburn	3.0	**3.0**	3.0	**3.0**
n584_out	Craigieburn to Mernda	3.0	**3.0**	3.0	**3.0**
n585_in	Donnybrook to Craigieburn South	1.5	**0.0**	1.5	**0.0**
n585_out	Craigieburn South to Donnybrook	1.5	**0.0**	1.5	**0.0**
n586_cw	Beveridge/Mandalay Loop	6.0	**3.0**	6.0	**1.5**
n589_ccw	Lockerbie Eastern Loop	3.0	**3.0**	3.0	**1.5**
n589_cw	Lockerbie Eastern Loop	3.0	**3.0**	3.0	**1.5**
n590_in	Beveridge to Mandalay	3.0	**1.5**	3.0	**1.0**
n590_out	Mandalay to Beveridge	3.0	**1.5**	3.0	**1.0**
n591_in	Merrifields to Craigieburn Central	1.0	**1.0**	1.0	**1.0**
n591_out	Craigieburn Central to Merrifields	1.0	**1.0**	1.0	**1.0**
n902_in	Melbourne Airport to Greensborough	12.0	**6.0**	12.0	**6.0**
n902_out	Greensborough to Melbourne Airport	12.0	**6.0**	12.0	**6.0**
n911_in	Craigieburn to Broadmeadows	3.0	**1.6**	3.0	**1.5**
n911_out	Broadmeadows to Craigieburn	3.0	**1.6**	3.0	**1.5**
n913_in	Heidelberg to Essendon	6.0	**3.0**	6.0	**3.0**
n913_out	Essendon to Heidelberg	6.0	**3.0**	6.0	**3.0**
skybus_in	Bus Melbourne Airport to City	20.0	**20.0**	20.0	**20.0**
skybus_out	Bus City to Melbourne Airport	20.0	**20.0**	20.0	**20.0**
w101_in	Caroline Springs to Watergardens	3.0	**1.6**	3.0	**1.5**
w101_out	Watergardens to Caroline Springs	3.0	**1.6**	3.0	**1.5**
w102_in	Laverton to Deer Park	1.5	**1.0**	1.5	**0.0**
w102_out	Deer Park to Laverton	1.5	**1.0**	1.5	**0.0**
w105_in	Tarneit to Williams Landing	3.0	**1.6**	3.0	**0.0**
w105_out	Williams Landing to Tarneit	3.0	**1.6**	3.0	**0.0**
w106_in	Werribee to Tarneit	12.0	**3.0**	12.0	**3.0**
w106_out	Tarneit to Werribee	12.0	**3.0**	12.0	**3.0**
w107_in	Sayers Rd to Hoppers Crossing	12.0	**3.0**	12.0	**3.0**
w107_out	Hoppers Crossing to Sayers Rd	12.0	**3.0**	12.0	**3.0**
w110_in	Werribee to Tarneit	12.0	**3.0**	12.0	**3.0**
w110_out	Tarneit to Werribee	12.0	**3.0**	12.0	**3.0**
w113_in	Exford Rd to Melton	6.0	**3.0**	6.0	**1.5**
w113_out	Melton to Exford Rd	6.0	**3.0**	6.0	**1.5**
w114_in	Rockbank to Caroline Springs	1.5	**1.6**	1.5	**1.0**
w114_out	Caroline Springs to Rockbank	1.5	**1.6**	1.5	**1.0**
w115_in	Watergardens to Ravenhall	1.5	**1.6**	1.5	**1.0**
w115_out	Ravenhall to Watergardens	1.5	**1.6**	1.5	**1.0**
w116_in	Melton to Rockbank	1.5	**1.6**	1.5	**1.0**
w116_out	Rockbank to Melton	1.5	**1.6**	1.5	**1.0**
w117_in	Melton to Toolern	6.0	**3.0**	6.0	**3.0**
w117_out	Toolern to Melton	6.0	**3.0**	6.0	**3.0**
w118_in	Melton to Toolern	3.0	**1.6**	3.0	**1.5**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
w118_out	Toolern to Melton	3.0	**1.6**	3.0	**1.5**
w119_in	Rockbank to Caroline Springs	1.5	**1.0**	1.5	**0.0**
w119_out	Caroline Springs to Rockbank	1.5	**1.0**	1.5	**0.0**
w120_in	Woodgrove SC to Melton Station	3.0	**1.6**	3.0	**1.5**
w120_out	Melton Station to Woodgrove SC	3.0	**1.6**	3.0	**1.5**
w121_in	Watergardens to Ravenhall	3.0	**1.5**	3.0	**0.0**
w121_out	Ravenhall to Watergardens	3.0	**1.5**	3.0	**0.0**
w122_in	Melton to Rockbank	12.0	**3.0**	12.0	**3.0**
w122_out	Rockbank to Melton	12.0	**3.0**	12.0	**3.0**
w123_in	Toolern North to Rockbank	1.5	**1.6**	1.5	**1.0**
w123_out	Rockbank to Toolern North	1.5	**1.6**	1.5	**1.0**
w124_in	Toolern to Tarneit	6.0	**3.0**	6.0	**3.0**
w124_out	Tarneit to Toolern	6.0	**3.0**	6.0	**3.0**
w125_in	Toolern to Tarneit	3.0	**1.6**	3.0	**1.5**
w125_out	Tarneit to Toolern	3.0	**1.6**	3.0	**1.5**
w125a_in	Tarneit to Taneit East	3.0	**1.6**	3.0	**1.5**
w125a_out	Taneit East to Tarneit	3.0	**1.6**	3.0	**1.5**
w128_in	Toolern to Rockbank	3.0	**1.6**	3.0	**1.5**
w128_out	Rockbank to Toolern	3.0	**1.6**	3.0	**1.5**
w135_in	Tarneit to Laverton	1.5	**0.0**	1.5	**0.0**
w135_out	Laverton to Tarneit	1.5	**0.0**	1.5	**0.0**
w144_in	Hoppers Crossing to Williams Landing	3.0	**3.0**	3.0	**1.5**
w144_out	Williams Landing to Hoppers Crossing	3.0	**3.0**	3.0	**1.5**
w179_in	Tarneit to Hoppers Crossing	3.0	**3.0**	3.0	**3.0**
w179_out	Hoppers Crossing to Tarneit	3.0	**3.0**	3.0	**3.0**
w183_in	Wyndham Vale to Werribee	6.0	**3.0**	6.0	**1.5**
w183_out	Werribee to Wyndham Vale	6.0	**3.0**	6.0	**1.5**
w184_ccw	Manor Lakes/Sayers Rd Loop	1.5	**1.6**	1.5	**1.0**
w184_cw	Manor Lakes/Sayers Rd Loop	1.5	**1.6**	1.5	**1.0**
w185_in	Sayers Rd to Truganina	1.5	**1.6**	1.5	**1.0**
w185_out	Truganina to Sayers Rd	1.5	**1.6**	1.5	**1.0**
w186_in	Wyndham Vale to Truganina	3.0	**3.0**	3.0	**1.5**
w186_out	Truganina to Wyndham Vale	3.0	**3.0**	3.0	**1.5**
w187_in	Davis Rd to Truganina	3.0	**1.6**	3.0	**1.5**
w187_out	Truganina to Davis Rd	3.0	**1.6**	3.0	**1.5**
w216_in	Caroline Springs to Sunshine	3.0	**3.0**	3.0	**3.0**
w216_out	Sunshine to Caroline Springs	3.0	**3.0**	3.0	**3.0**
w219_in	Sunshine to Footscray	6.0	**6.0**	6.0	**6.0**
w219_out	Footscray to Sunshine	6.0	**6.0**	6.0	**6.0**
w220_in	Sunshine to City	12.0	**12.0**	12.0	**12.0**
w220_out	City to Sunshine	12.0	**12.0**	12.0	**12.0**
w232_in	Altona Gate to City	6.0	**3.0**	6.0	**3.0**
w232_out	City to Altona Gate	6.0	**3.0**	6.0	**3.0**
w234_in	Garden City to City	12.0	**6.0**	12.0	**6.0**
w234_out	City to Garden City	12.0	**6.0**	12.0	**6.0**
w235_in	Fishermans Bend to City	3.0	**3.0**	3.0	**3.0**
w235_out	City to Fishermans Bend	3.0	**3.0**	3.0	**3.0**
w236_in	Garden City to City via Pickles	3.0	**1.6**	3.0	**1.5**
w236_out	City to Garden City via Pickles	3.0	**1.6**	3.0	**1.5**
w237_in	Fishermans Bend to City	15.0	**6.0**	15.0	**3.0**
w237_out	City to Fishermans Bend	15.0	**6.0**	15.0	**3.0**
w400_in	Williams Landing to Deer Park	1.5	**1.0**	1.5	**0.0**
w400_out	Deer Park to Williams Landing	1.5	**1.0**	1.5	**0.0**
w400a_in	Derrimut West to Deer Park	1.5	**1.0**	1.5	**1.0**
w400a_out	Deer Park to Derrimut West	1.5	**1.0**	1.5	**1.0**
w402_in	Footscray to East Melbourne	6.0	**6.0**	6.0	**6.0**
w402_out	East Melbourne to Footscray	6.0	**6.0**	6.0	**6.0**
w404_in	Williamstown to Moonee Ponds	12.0	**6.0**	12.0	**6.0**
w404_out	Moonee Ponds to Williamstown	12.0	**6.0**	12.0	**6.0**
w406_in	St Albans to Footscray via Highpoint SC	6.0	**3.0**	6.0	**3.0**
w406_out	Footscray to St Albans via Highpoint SC	6.0	**3.0**	6.0	**3.0**
w406a_in	Highpoint SC to Footscray	3.0	**3.0**	3.0	**3.0**
w406a_out	Footscray to Highpoint SC	3.0	**3.0**	3.0	**3.0**
w408_in	St Albans to Sunshine	3.0	**3.0**	3.0	**3.0**
w408_out	Sunshine to St Albans	3.0	**3.0**	3.0	**3.0**
w409_in	Highpoint SC to Footscray	3.0	**1.6**	3.0	**0.0**
w409_out	Footscray to Highpoint SC	3.0	**1.6**	3.0	**0.0**
w410_in	Sunshine to City	6.0	**3.0**	6.0	**3.0**
w410_out	City to Sunshine	6.0	**3.0**	6.0	**3.0**
w411_in	Laverton to Footscray	12.0	**6.0**	12.0	**6.0**
w411_out	Footscray to Laverton	12.0	**6.0**	12.0	**6.0**
w414_in	Williams Landing to Footscray	3.0	**3.0**	3.0	**3.0**
w414_out	Footscray to Williams Landing	3.0	**3.0**	3.0	**3.0**
w415_in	Laverton to Williamstown	1.5	**1.0**	1.5	**1.0**
w415_out	Williamstown to Laverton	1.5	**1.0**	1.5	**1.0**
w418_in	Woodgrove SC to St Albans	12.0	**3.0**	12.0	**3.0**

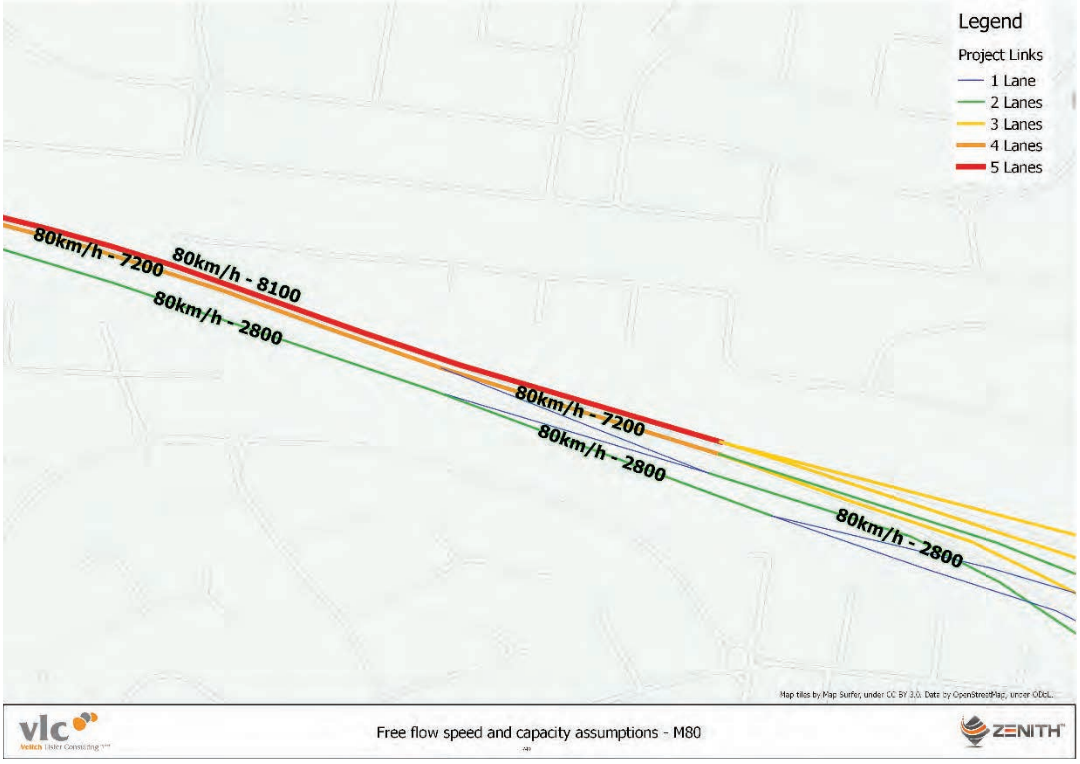
Route ID	Route name	Frequency			
		AM	MD	PM	OP
w418_out	St Albans to Woodgrove SC	12.0	**3.0**	12.0	**3.0**
w419_in	Watergardens to Sunshine	3.0	**3.0**	3.0	**3.0**
w419_out	Sunshine to Watergardens	3.0	**3.0**	3.0	**3.0**
w420_in	Watergardens to Sunshine	6.0	**3.0**	6.0	**3.0**
w420_out	Sunshine to Watergardens	6.0	**3.0**	6.0	**3.0**
w421_in	Watergardens to St Albans	3.0	**1.6**	3.0	**1.5**
w421_out	St Albans to Watergardens	3.0	**1.6**	3.0	**1.5**
w422_in	St Albans to Deer Park	3.0	**1.6**	3.0	**1.5**
w422_out	Deer Park to St Albans	3.0	**1.6**	3.0	**1.5**
w423_in	Brimbank Plaza to St Albans	3.0	**1.6**	3.0	**1.5**
w423_out	St Albans to Brimbank Plaza	3.0	**1.6**	3.0	**1.5**
w424_in	Brimbank Plaza to St Albans	3.0	**1.6**	3.0	**1.5**
w424_out	St Albans to Brimbank Plaza	3.0	**1.6**	3.0	**1.5**
w425_in	Watergardens to St Albans	3.0	**3.0**	3.0	**3.0**
w425_out	St Albans to Watergardens	3.0	**3.0**	3.0	**3.0**
w427_in	Sunshine West to Sunshine	2.0	**2.0**	2.0	**1.0**
w427_out	Sunshine to Sunshine West	2.0	**2.0**	2.0	**1.0**
w428_in	Sunshine West to Sunshine	2.0	**2.0**	2.0	**1.0**
w428_out	Sunshine to Sunshine West	2.0	**2.0**	2.0	**1.0**
w431_in	Highpoint SC to Yarraville	3.0	**3.0**	3.0	**3.0**
w431_out	Yarraville to Highpoint SC	3.0	**3.0**	3.0	**3.0**
w432_in	Altona Gate SC to Yarraville	1.0	**1.0**	1.0	**0.0**
w432_out	Yarraville to Altona Gate SC	1.0	**1.0**	1.0	**0.0**
w437_in	Werribee to Hoppers Crossing	3.0	**1.5**	3.0	**1.0**
w437_out	Hoppers Crossing to Werribee	3.0	**1.5**	3.0	**1.0**
w439_in	Werribee South to Werribee	1.0	**1.0**	1.0	**0.0**
w439_out	Werribee to Werribee South	1.0	**1.0**	1.0	**0.0**
w440_in	Wyndham Vale to Hoppers Crossing	12.0	**3.0**	12.0	**3.0**
w440_out	Hoppers Crossing to Wyndham Vale	12.0	**3.0**	12.0	**3.0**
w441_cw	Werribee/Riverwalk Loop	3.0	**1.6**	3.0	**0.0**
w442_in	Sayers Rd to Hoppers Crossing	1.5	**1.6**	1.5	**1.0**
w442_out	Hoppers Crossing to Sayers Rd	1.5	**1.6**	1.5	**1.0**
w443_ccw	Werribee/South Ring Rd Loop	3.0	**1.6**	3.0	**0.0**
w443_cw	Werribee/South Ring Rd Loop	3.0	**1.6**	3.0	**0.0**
w444_in	Wyndham Vale to Tarneit via Werribee	12.0	**3.0**	12.0	**3.0**
w444_out	Tarneit to Wyndham Vale via Werribee	12.0	**3.0**	12.0	**3.0**
w445_in	Wyndham Vale to Williams Landing	6.0	**3.0**	6.0	**3.0**
w445_out	Williams Landing to Wyndham Vale	6.0	**3.0**	6.0	**3.0**
w446_in	Sayers Rd to Williams Landing	12.0	**3.0**	12.0	**3.0**
w446_out	Williams Landing to Sayers Rd	12.0	**3.0**	12.0	**3.0**
w447_in	Wyndham Vale to Werribee	6.0	**3.0**	6.0	**3.0**
w447_out	Werribee to Wyndham Vale	6.0	**3.0**	6.0	**3.0**
w448_in	Wyndam Vale to Werribee	12.0	**3.0**	12.0	**3.0**
w448_out	Werribee to Wyndam Vale	12.0	**3.0**	12.0	**3.0**
w449_in	Wyndham Vale to Werribee	12.0	**3.0**	12.0	**3.0**
w449_out	Werribee to Wyndham Vale	12.0	**3.0**	12.0	**3.0**
w453_ccw	Melton/West Melton Loop	1.5	**1.6**	1.5	**1.0**
w453_cw	Melton/West Melton Loop	1.5	**1.6**	1.5	**1.0**
w455_in	Melton North to Melton	6.0	**3.0**	6.0	**1.5**
w455_out	Melton to Melton North	6.0	**3.0**	6.0	**1.5**
w456_in	Rockbank to Tarneit	6.0	**3.0**	6.0	**3.0**
w456_out	Tarneit to Rockbank	6.0	**3.0**	6.0	**3.0**
w457_in	Westlakes Dr to Melton	3.0	**1.6**	3.0	**1.5**
w457_out	Melton to Westlakes Dr	3.0	**1.6**	3.0	**1.5**
w458_in	Centenery Dr to Melton	3.0	**1.6**	3.0	**1.5**
w458_out	Melton to Centenery Dr	3.0	**1.6**	3.0	**1.5**
w459_in	Kurunjang to Melton	6.0	**3.0**	6.0	**1.5**
w459_out	Melton to Kurunjang	6.0	**3.0**	6.0	**1.5**
w460_in	Watergardens to Ravenhall	12.0	**3.0**	12.0	**3.0**
w460_out	Ravenhall to Watergardens	12.0	**3.0**	12.0	**3.0**
w461_in	Rockbank to Watergardens	3.0	**3.0**	3.0	**1.5**
w461_out	Watergardens to Rockbank	3.0	**3.0**	3.0	**1.5**
w462_in	Ravenhall to Watergardens	3.0	**3.0**	3.0	**3.0**
w462_out	Watergardens to Ravenhall	3.0	**3.0**	3.0	**3.0**
w466_in	Watergardens to Ravenhall	6.0	**3.0**	6.0	**3.0**
w466_out	Ravenhall to Watergardens	6.0	**3.0**	6.0	**3.0**
w471_in	Sunshine to Williamstown	6.0	**3.0**	6.0	**3.0**
w471_out	Williamstown to Sunshine	6.0	**3.0**	6.0	**3.0**
w472_in	Moonee Ponds to Footscray	6.0	**3.0**	6.0	**3.0**
w472_out	Footscray to Moonee Ponds	6.0	**3.0**	6.0	**3.0**
w476_in	Watergardens to Moonee Pds	3.0	**1.6**	3.0	**1.5**
w476_out	Moonee Pds to Watergardens	3.0	**1.6**	3.0	**1.5**
w479_in	Sunbury to Melbourne Airport	3.0	**1.6**	3.0	**1.5**
w479_out	Melbourne Airport to Sunbury	3.0	**1.6**	3.0	**1.5**
w479a_in	Sunbury west to Sunbury	3.0	**3.0**	3.0	**1.5**
w479a_out	Sunbury to Sunbury west	3.0	**3.0**	3.0	**1.5**

Route ID	Route name	Frequency			
		AM	MD	PM	OP
w480_in	Sunbury to Diggers Rest	1.5	**1.6**	1.5	**1.0**
w480_out	Diggers Rest to Sunbury	1.5	**1.6**	1.5	**1.0**
w481_in	Mt Lion to Sunbury	3.0	**1.6**	3.0	**1.5**
w481_out	Sunbury to Mt Lion	3.0	**1.6**	3.0	**1.5**
w482_in	Sunbury to Sunbury East	3.0	**1.5**	3.0	**1.0**
w482_out	Sunbury East to Sunbury	3.0	**1.5**	3.0	**1.0**
w483_in	Diggers Rest to Sunbury	1.5	**1.6**	1.5	**1.0**
w483_out	Sunbury to Diggers Rest	1.5	**1.6**	1.5	**1.0**
w485_in	Wilsons Rd to Sunbury	1.5	**1.0**	1.5	**1.0**
w485_out	Sunbury to Wilsons Rd	1.5	**1.0**	1.5	**1.0**
w486_in	Rolling Meadows to Sunbury	1.5	**1.0**	1.5	**1.0**
w486_out	Sunbury to Rolling Meadows	1.5	**1.0**	1.5	**1.0**
w487_in	Canterbury Hills to Sunbury	3.0	**3.0**	3.0	**1.5**
w487_out	Sunbury to Canterbury Hills	3.0	**3.0**	3.0	**1.5**
w488_in	Jacksons Hill to Sunbury	1.5	**1.0**	1.5	**1.0**
w488_out	Sunbury to Jacksons Hill	1.5	**1.0**	1.5	**1.0**
w489_in	Elizabeth Dr to Sunbury	1.5	**1.0**	1.5	**1.0**
w489_out	Sunbury to Elizabeth Dr	1.5	**1.0**	1.5	**1.0**
w492_in	Derrimut Rd to Williams Landing	3.0	**3.0**	3.0	**1.5**
w492_out	Williams Landing to Derrimut Rd	3.0	**3.0**	3.0	**1.5**
w494_in	Point Cook South to Willilams Landing	6.0	**3.0**	6.0	**1.5**
w494_out	Willilams Landing to Point Cook South	6.0	**3.0**	6.0	**1.5**
w495_in	Point Cook Sth to Williams Landing	3.0	**3.0**	3.0	**1.5**
w495_out	Williams Landing to Point Cook Sth	3.0	**3.0**	3.0	**1.5**
w496_in	Hoppers Crossing to Laverton	1.5	**1.6**	1.5	**1.0**
w496_out	Laverton to Hoppers Crossing	1.5	**1.6**	1.5	**1.0**
w497_in	Saltwater Coast to Williams Landing	6.0	**3.0**	6.0	**1.5**
w497_out	Williams Landing to Saltwater Coast	6.0	**3.0**	6.0	**1.5**
w498_in	Werribee to Laverton	6.0	**3.0**	6.0	**3.0**
w498_out	Laverton to Werribee	6.0	**3.0**	6.0	**3.0**
w499_in	Hoppers Crossing to Williams Landing	3.0	**1.6**	3.0	**1.5**
w499_out	Williams Landing to Hoppers Crossing	3.0	**1.6**	3.0	**1.5**
w903_in	Sunshine to Essendon via Highpoint	6.0	**6.0**	6.0	**6.0**
w903_out	Essendon to Sunshine via Highpoint	6.0	**6.0**	6.0	**6.0**
wairport_in	Melb Airport to Keilor Plains	3.0	**3.0**	3.0	**1.5**
wairport_out	Keilor Plains to Melb Airport	3.0	**3.0**	3.0	**1.5**
waltonaind_in	Altona to Sunshine	1.5	**1.0**	1.5	**0.0**
waltonaind_out	Sunshine to Altona	1.5	**1.0**	1.5	**0.0**
wdohertys_in	Davis Rd to Altona Gate	3.0	**1.6**	3.0	**1.5**
wdohertys_out	Altona Gate to Davis Rd	3.0	**1.6**	3.0	**1.5**
wforsythrd_in	Tarneit to Williams Landing	12.0	**3.0**	12.0	**3.0**
wforsythrd_out	Williams Landing to Tarneit	12.0	**3.0**	12.0	**3.0**
whighst_in	Woodgrove SC to Toolern	3.0	**1.6**	3.0	**1.5**
whighst_out	Toolern to Woodgrove SC	3.0	**1.6**	3.0	**1.5**
wmelttax1_in	Melton South West to Melton	1.0	**1.0**	1.0	**0.0**
wmelttax1_out	Melton to Melton South West	1.0	**1.0**	1.0	**0.0**
wmelttax2_in	Brookfield to Melton	1.0	**1.0**	1.0	**0.0**
wmelttax2_out	Melton to Brookfield	1.0	**1.0**	1.0	**0.0**
wrockbankn_in	Rockbank North to Rockbank	3.0	**1.6**	3.0	**1.5**
wrockbankn_out	Rockbank to Rockbank North	3.0	**1.6**	3.0	**1.5**
wrockbanks_ccw	Rockbank south loop	1.5	**1.6**	1.5	**1.0**
wrockbanks_cw	Rockbank south loop	1.5	**1.6**	1.5	**1.0**

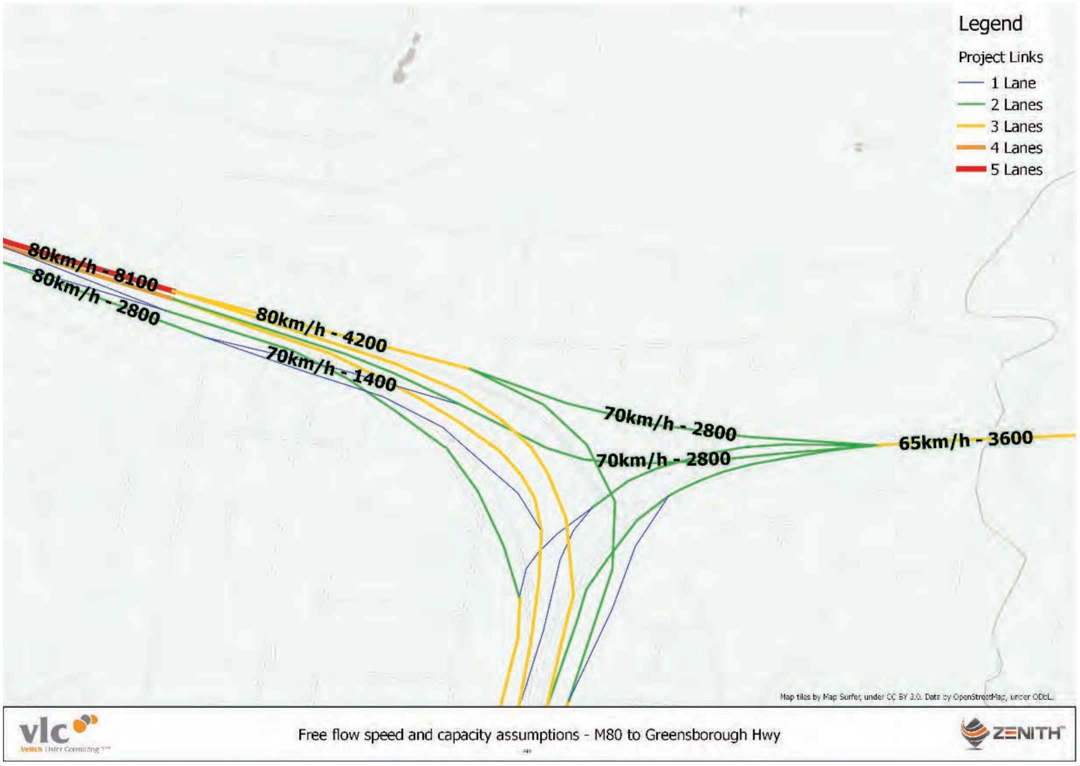
Appendix C7: Project network assumptions

Project Network coding – free flow speeds (km/h) and passenger car unit (PCU) capacity

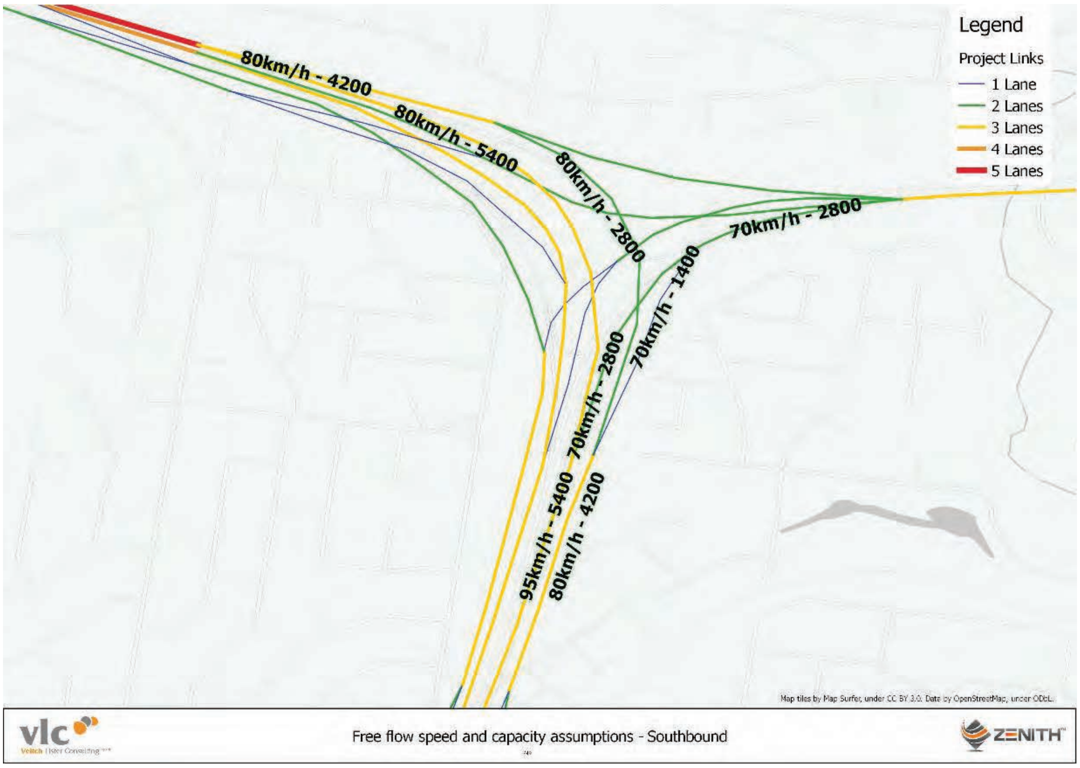
Appendix Figure C.17 - NEL network coding assumptions – M80



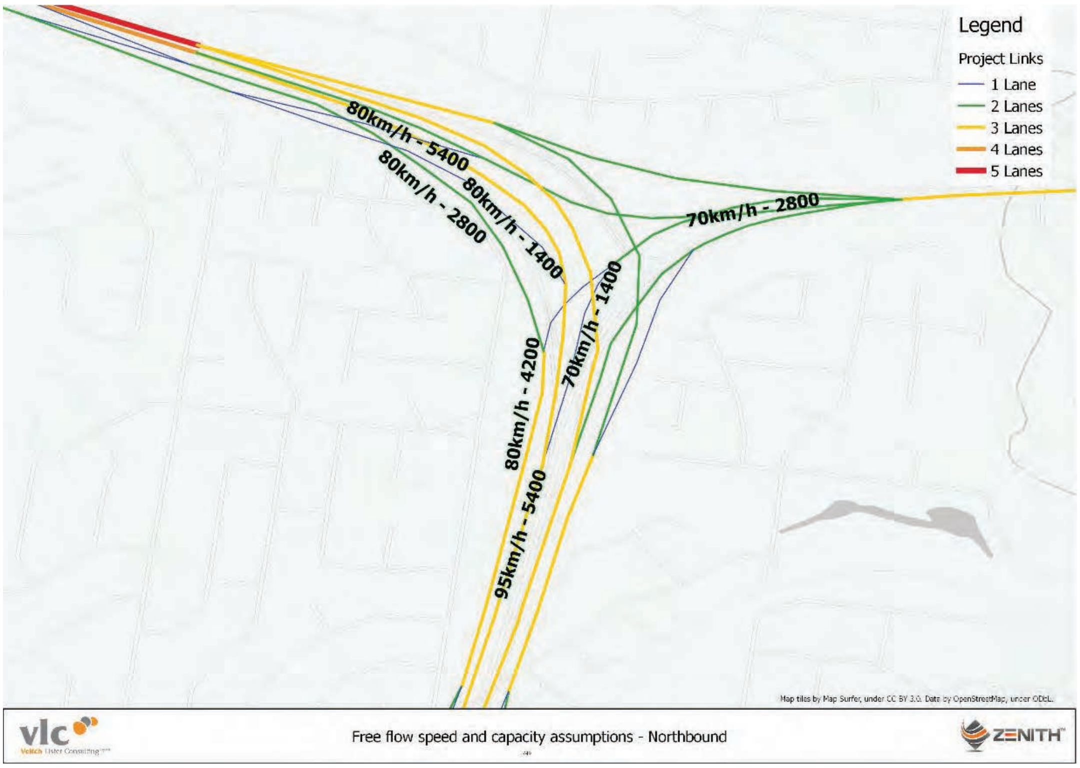
Appendix Figure C.18 - NEL network coding assumptions – M80 & Greensborough Bypass



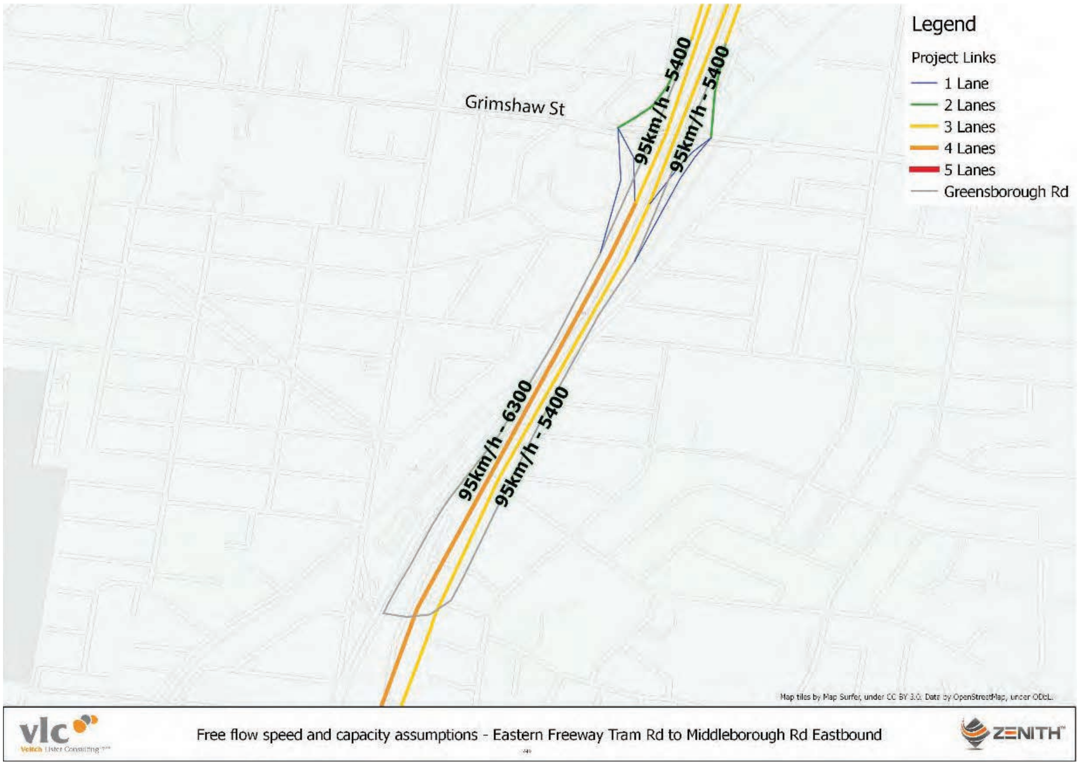
Appendix Figure C.19 - NEL network coding assumptions – NEL, M80 & Greensborough Bypass southbound



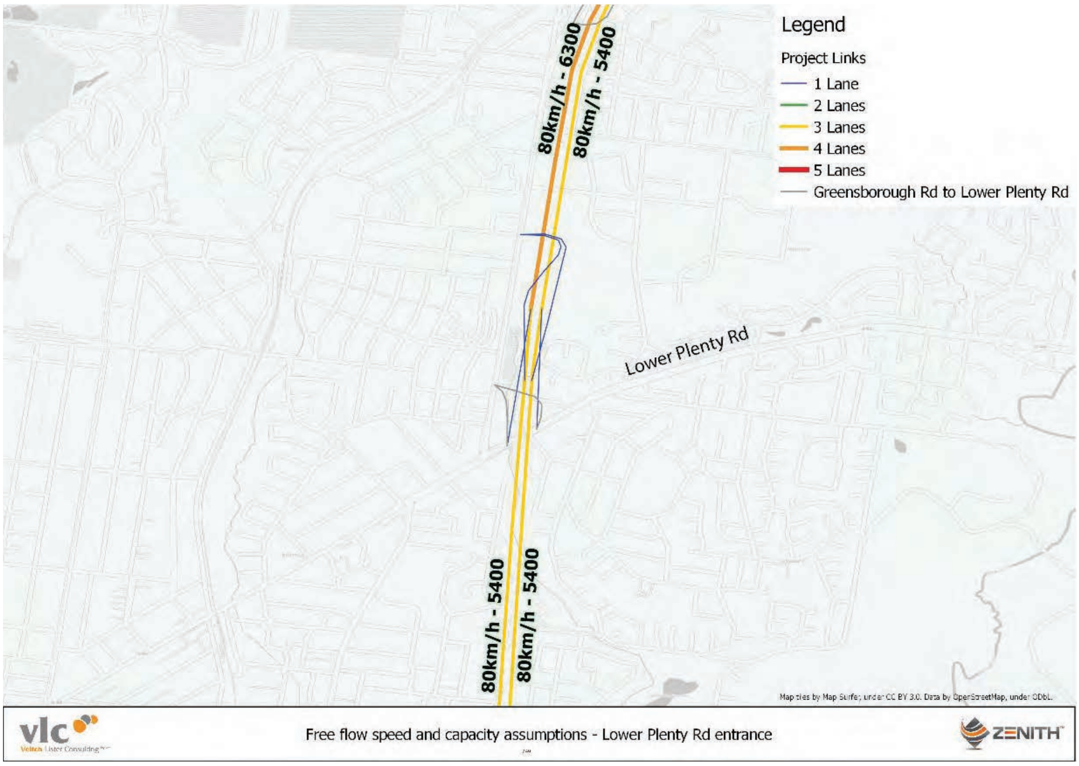
Appendix Figure C.20 - NEL network coding assumptions – NEL, M80 & Greensborough Bypass northbound



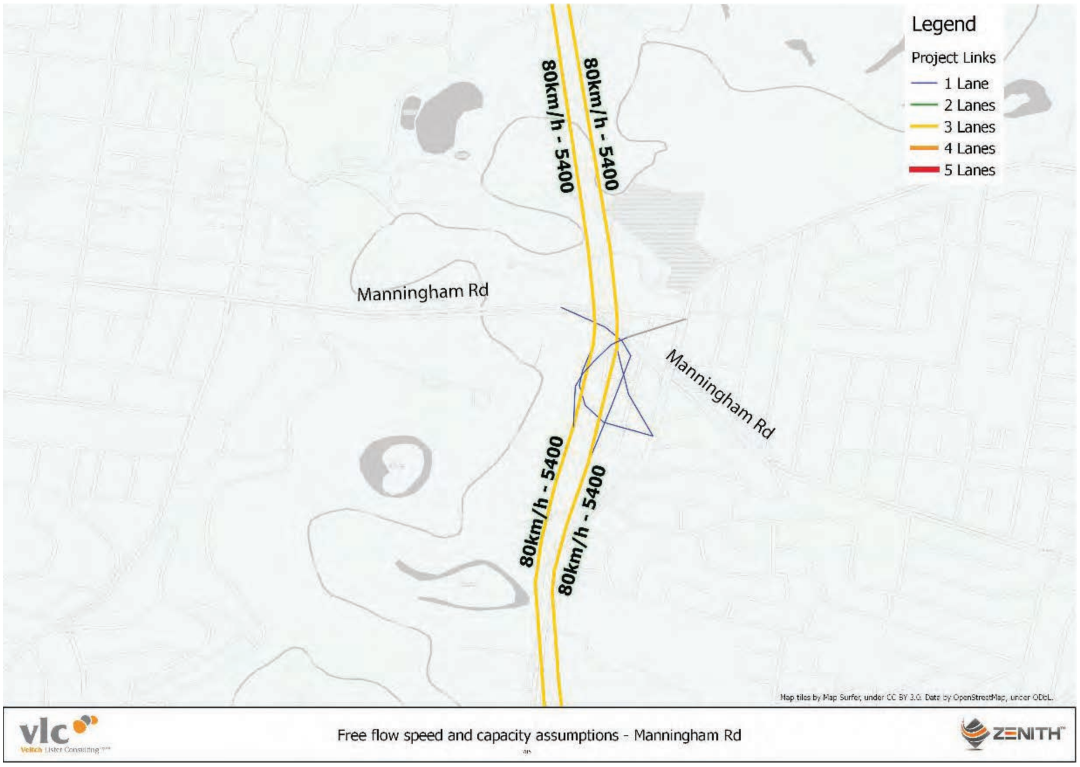
Appendix Figure C.21 - NEL network coding assumptions – South of Grimshaw St



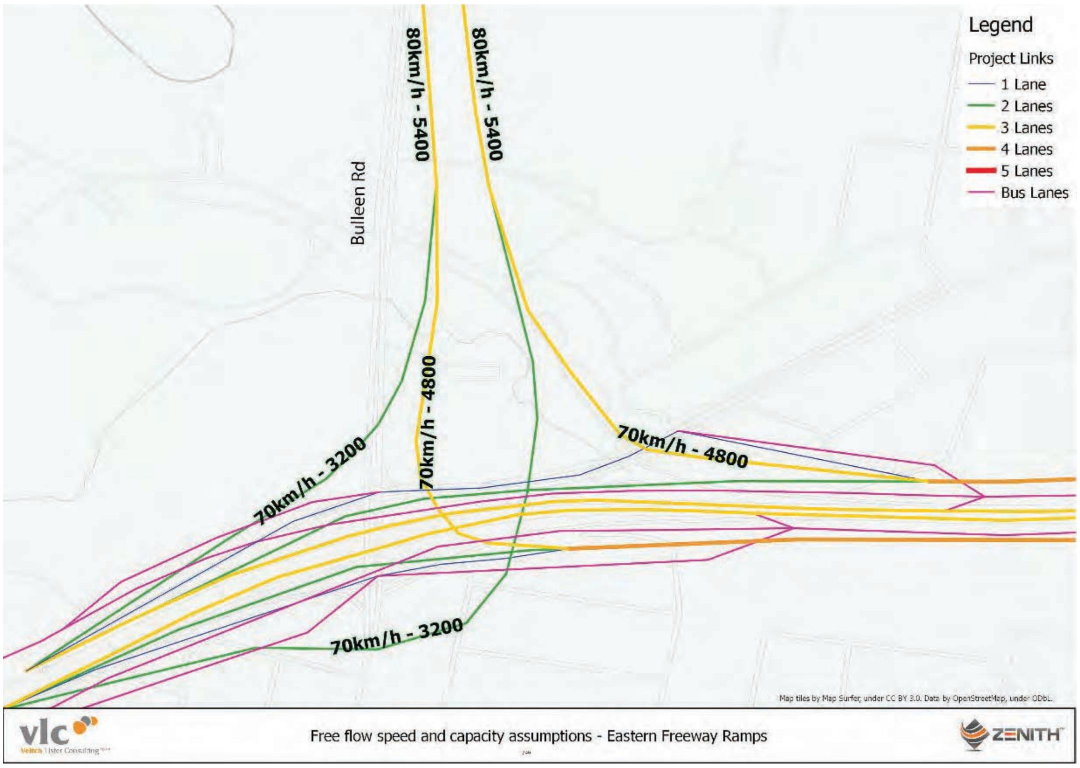
Appendix Figure C.22 - NEL network coding assumptions – Lower Plenty Rd interchange



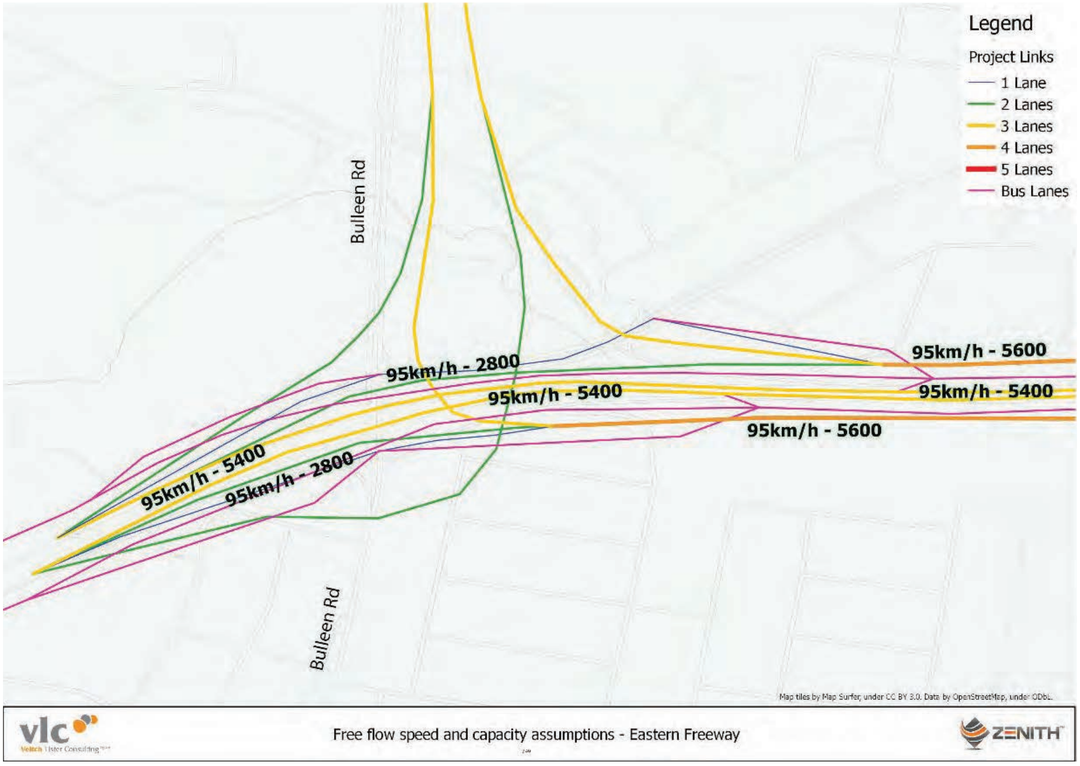
Appendix Figure C.23 - NEL network coding assumptions – Manningham Rd / Bulleen Rd interchange



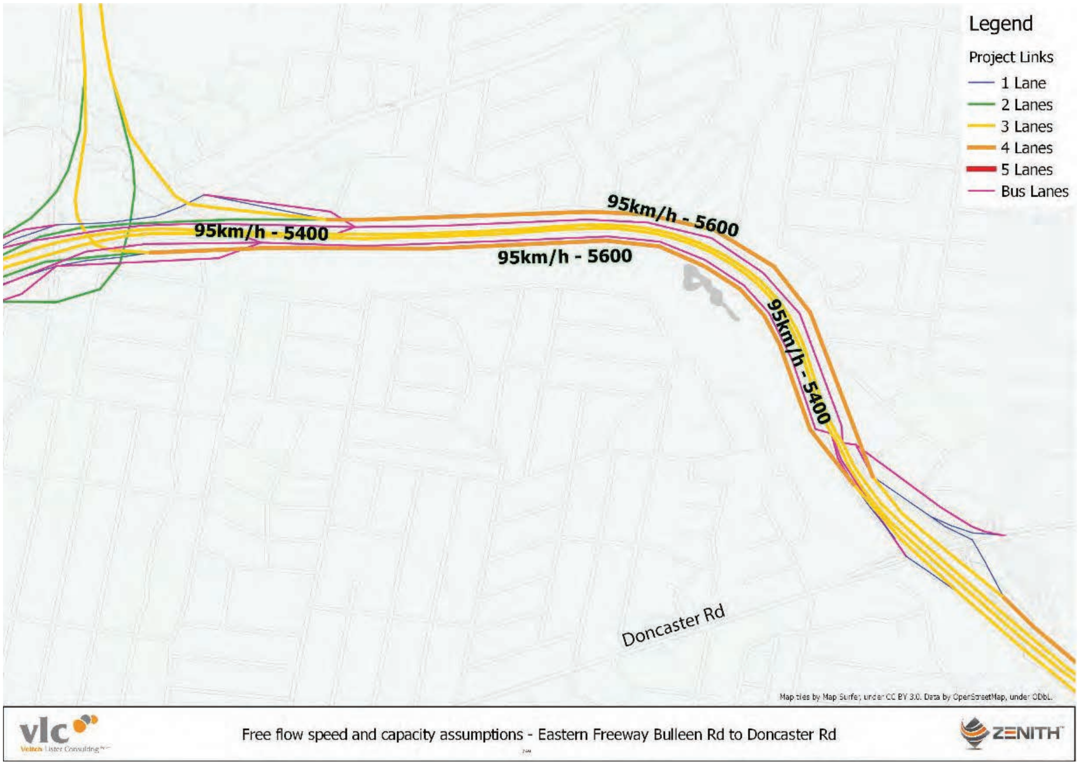
Appendix Figure C.24 - NEL network coding assumptions – NEL & Eastern Freeway Ramps



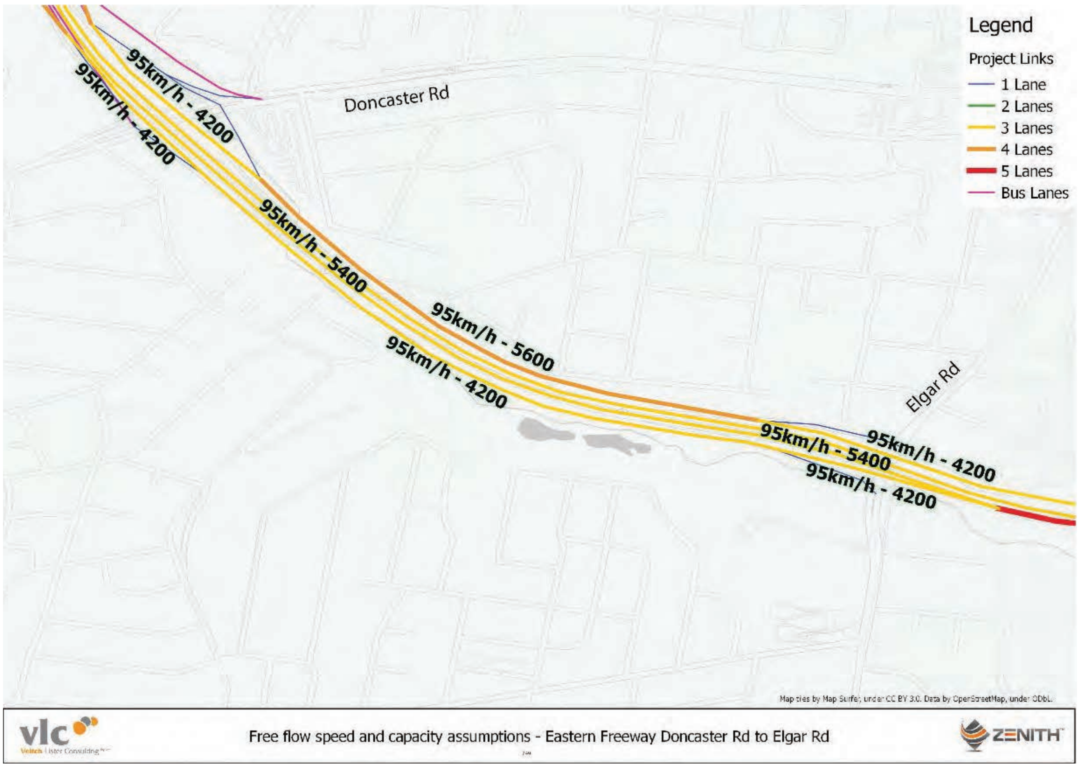
Appendix Figure C.25 - NEL network coding assumptions – Eastern Freeway at Bullen Rd



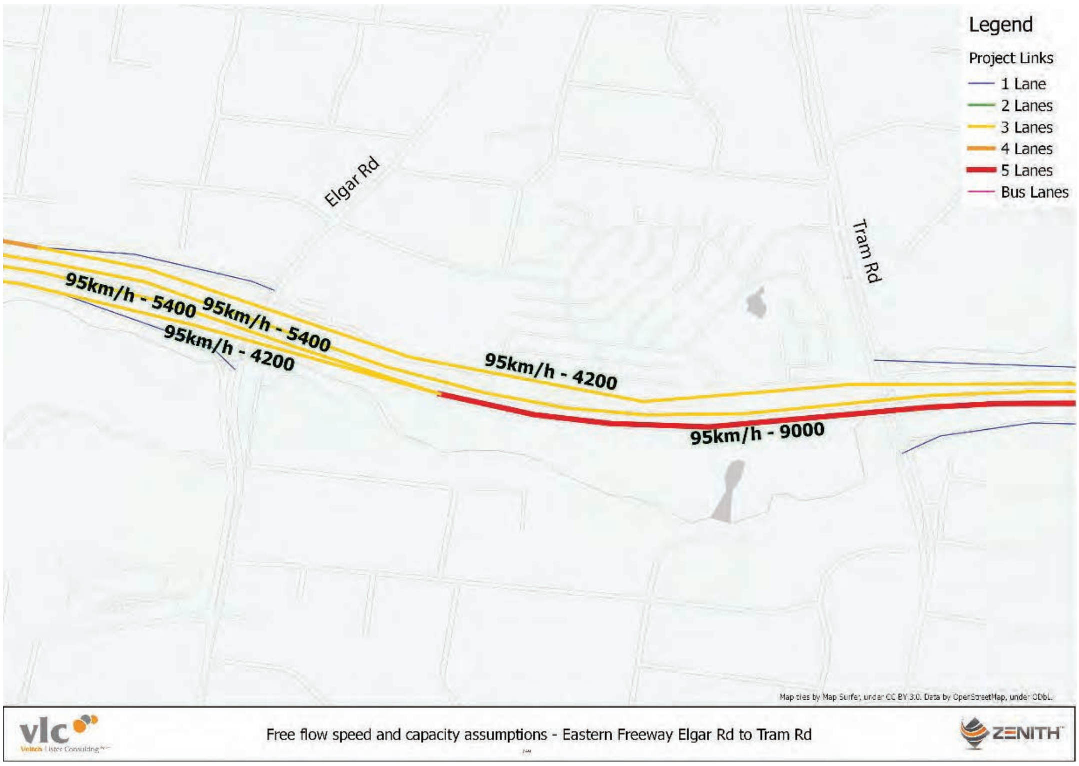
Appendix Figure C.26 - NEL network coding assumptions – Eastern Freeway between Bulleen Rd and Doncaster Rd



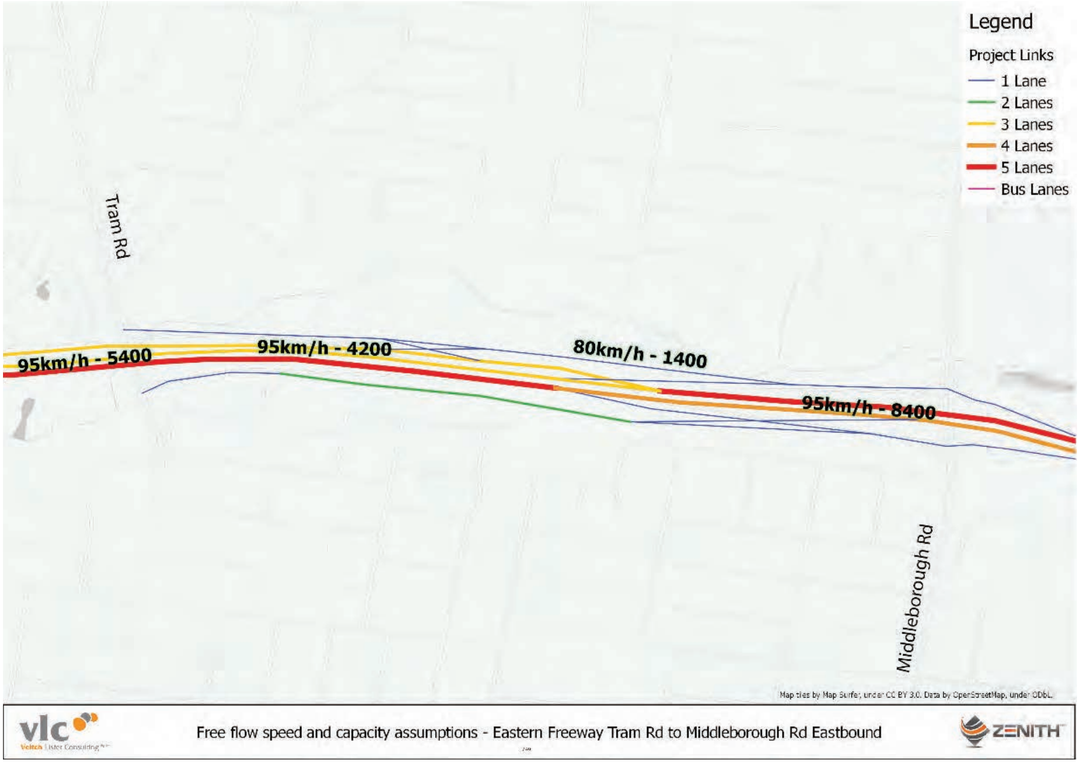
Appendix Figure C.27 - NEL network coding assumptions – Eastern Freeway between Doncaster Rd and Elgar Rd



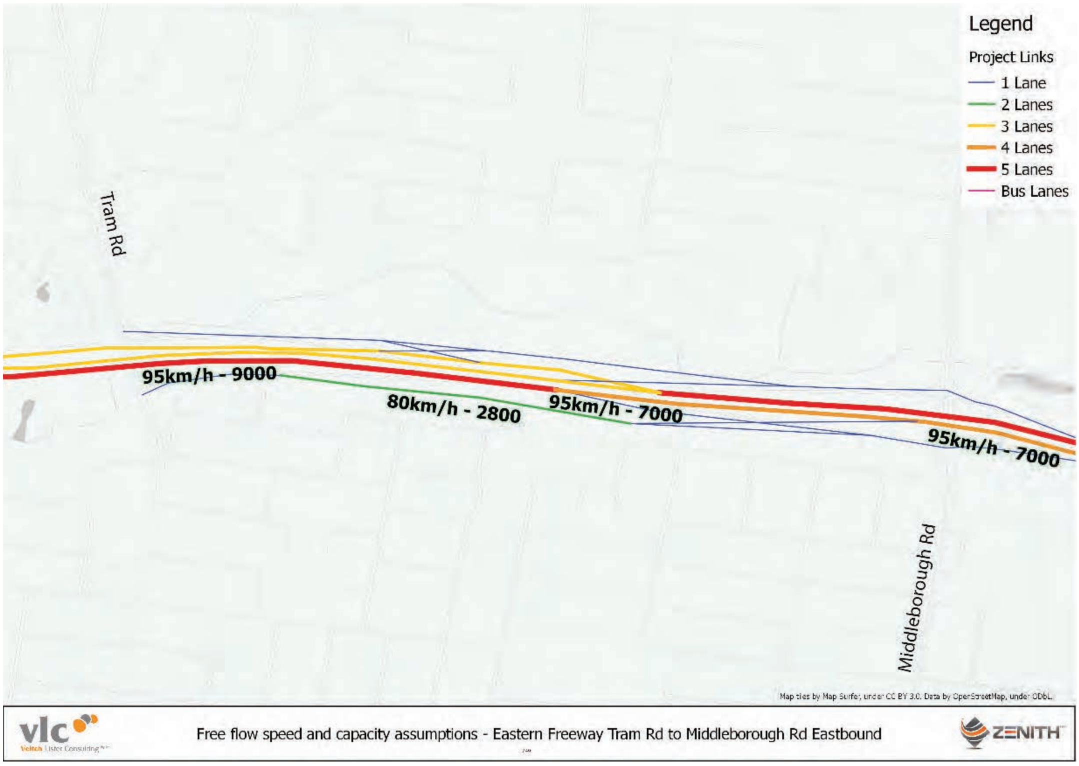
Appendix Figure C.28 - NEL network coding assumptions – Eastern Fwy between Elgar Rd and Tram Rd



Appendix Figure C.29 - NEL network coding assumptions – Eastern Fwy between Tram Rd and Middleborough Rd eastbound

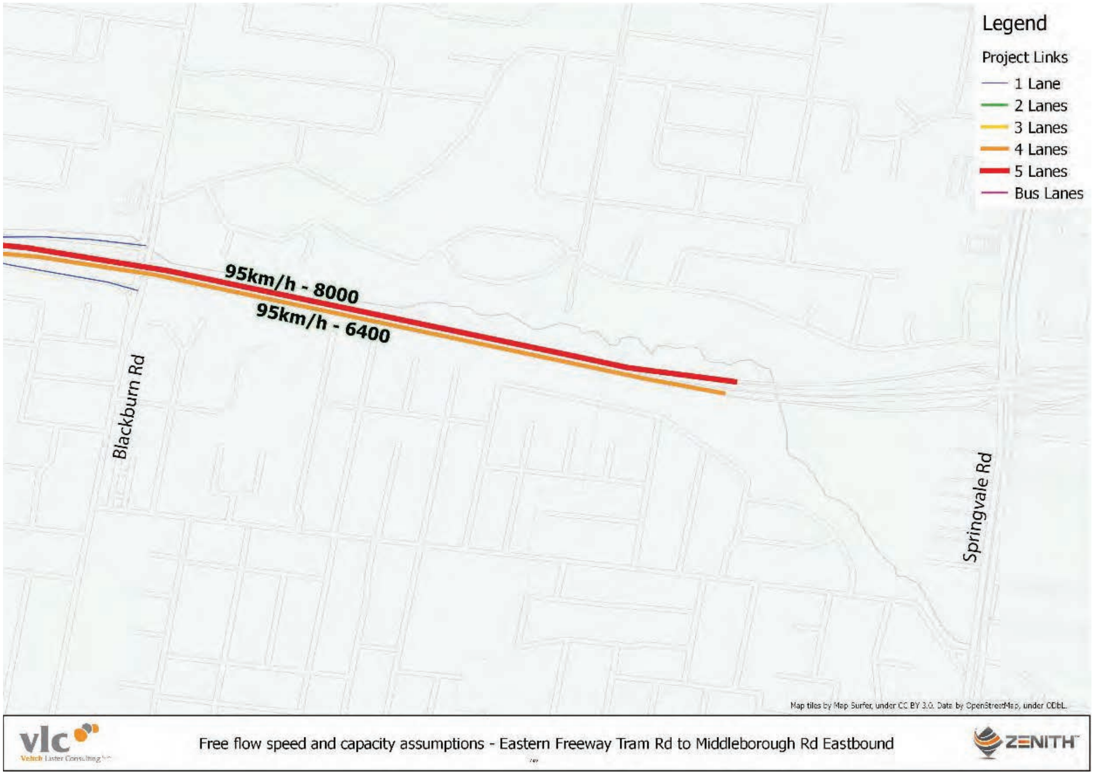


Appendix Figure C.30 - NEL network coding assumptions – Eastern Fwy between Tram Rd and Middleborough Rd westbound



Appendix Figure C.31 - NEL network coding assumptions – Eastern Fwy between Middleborough Rd and Blackburn Rd

Appendix Figure C.32 - NEL network coding assumptions – Eastern Fwy between Blackburn Rd and Springvale Rd



Redacted - commercial-in-confidence

Appendix C – Risk assessment

Risk assessment

Risk ID	Potential threat and effect on the environment	Initial risk: Initial EPR	Initial risk: Magnitude of consequence: Extent	Initial risk: Magnitude of consequence: Severity	Initial risk: Magnitude of consequence: Duration	Initial risk: Overall consequence	Initial risk: Likelihood	Initial risk: Risk level	Residual risk: Final EPR	Residual risk: Magnitude of consequence: Extent	Residual risk: Magnitude of consequence: Severity	Residual risk: Magnitude of consequence: Duration	Residual risk: Overall consequence	Residual risk: Likelihood	Residual risk: Risk level
Risk TR01	Traffic movements associated with construction site clearance and establishment impedes the safe and efficient movement of local traffic, including public transport movements and cyclists and pedestrians	**EPR T2 Transport Management Plan(s) (TMP)** Prior to commencement of relevant works, develop and implement Transport Management Plan(s) (TMP) to minimise disruption to affected local land uses, traffic, car parking, public transport (rail, tram and bus), pedestrian and bicycle movements and existing public facilities during all stages of construction. The TMP must be informed and supported by an appropriate level of transport modelling and must include: • A monitoring program to monitor impacts of construction activities to all modes of active and passive transport • Where monitoring identifies adverse impacts, practicable mitigation measures • Consideration of cumulative impacts of other major projects operating concurrently in the local area • Potential routes for construction vehicles travelling to and from the project construction site, recognising sensitive receptors and minimising the use of local streets where practicable • Suitable measures, developed in consultation with emergency services, to ensure emergency service access is not inhibited as a result of project construction activities • Provision of alternative parking where practicable to replace public and commuter parking lost as a result of project construction activities • Provision of car parking for construction workers where practicable • Measures to ensure connectivity and safety for pedestrians and cyclists during construction. • Consultation with VicTrack, Yarra Trams, PTV, DEDJTR (Transport) and MTM as relevant. • A TMP may be split into precincts or where appropriate.	Corridor	Medium	3 months to 2 years	Moderate	Possible	Medium		Corridor	Medium	3 months to 2 years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial risk								Residual risk						
		Initial EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level		Final EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level
			Extent	Severity	Duration						Extent	Severity	Duration			
Risk TR02	Traffic movements associated with construction activity impedes the safe and efficient movement of freeway traffic, including the disruption associated with the potential closure of traffic lanes	EPR T2	Corridor	High	2–7 years	Major	Possible	High		Additional requirements: • Maintaining transport capacity in the peak periods • Limiting the amount of construction haulage during the peak periods • Amended requirement: • Measures to ensure connectivity and safety for transport network users during construction.	Corridor	Medium	2–7 years	Moderate	Possible	Medium
Risk TR03	Normal traffic flows on the freeway are impeded by narrowing of traffic lanes to accommodate construction activity and by driver behaviour around construction activity within the freeway	EPR T2	Corridor	Medium	2–7 years	Moderate	Possible	Medium			Corridor	Medium	2–7 years	Moderate	Possible	Medium
Risk TR04	Public transport impeded by traffic movements associated with construction of surface roads and other civil infrastructure works, including potential temporary closures of bus routes and rail lines, and incidental damage to public transport infrastructure	EPR T2	Corridor	High	2–7 years	Major	Possible	High		Additional requirements: • Maintaining transport capacity in the peak periods • Limiting the amount of construction haulage during the peak periods • Amended requirement: • Measures to ensure connectivity and safety for transport network users during construction.	Corridor	Medium	2–7 years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial risk								Residual risk						
		Initial EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
Risk TR05	Cyclists and pedestrians impeded by traffic movements and activities associated with construction of surface roads and other civil infrastructure works.	EPR T2	Corridor	Very low	2–7 years	Minor	Unlikely	Low		Corridor	Very low	2–7 years	Minor	Unlikely	Low
Risk TR06	Traffic movements associated with construction activity impede freight accessibility and increase travel times for freight traffic generally	EPR T2	Corridor	Medium	2–7 years	Moderate	Possible	Medium		Corridor	Medium	2–7 years	Moderate	Possible	Medium
Risk TR07	Traffic movements associated with construction activity affect access and egress to industrial and commercial premises through increased congestion and temporary road closures	EPR T2	Corridor	Very low	2–7 years	Minor	Unlikely	Low		Corridor	Very low	2–7 years	Minor	Unlikely	Low
Risk TR08	Traffic movements associated with construction activity affect access and egress to recreational facilities and public open space through increased congestion and temporary road closures	EPR T2	Corridor	Very low	2–7 years	Minor	Possible	Low		Corridor	Very low	2–7 years	Minor	Possible	Low
Risk TR09	Traffic movements associated with construction activity on the freeways generate additional traffic and congestion of the surrounding road network through road users seeking diversions around the freeways	EPR T2	Corridor	Medium	2–7 years	Moderate	Likely	Medium		Corridor	Medium	2–7 years	Moderate	Likely	Medium

Risk ID	Potential threat and effect on the environment	Initial risk							Residual risk						
		Initial EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
Risk TR10	Traffic associated with the construction of the ramp connections to the Eastern Freeway impedes the safe and efficient movement of traffic, including public transport movements, on the Eastern Freeway through temporary lane closures	EPR T2	Local	High	2–7 years	Moderate	Possible	Medium		Local	High	2–7 years	Moderate	Possible	Medium
Risk TR11	Construction works associated with the ramp connections to the Eastern Freeway results in temporary closure or diversion of pedestrian and bicycle paths, due to proximity to construction activities	EPR T2	Local	Medium	2–7 years	Negligible	Unlikely	Low		Local	Medium	2–7 years	Negligible	Unlikely	Low
Risk TR12	Construction traffic associated with the removal of spoil generated by tunnelling or trenching activities impedes the safe and efficient movement of traffic and public transport movements on arterial and local roads in the vicinity of the work zones	EPR T2	Corridor	High	2–7 years	Major	Possible	High	Additional requirements: • Maintaining transport capacity in the peak periods • Limiting the amount of construction haulage during the peak periods • Amended requirement: • Measures to ensure connectivity and safety for transport network users during construction.	Corridor	Medium	2–7 years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial risk							Residual risk						
			Magnitude of consequence							Magnitude of consequence					
		Initial EPR	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Final EPR	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
Risk TR13	Construction traffic associated with the removal of spoil generated by tunnelling or trenching activities impedes safe and efficient pedestrian and bicycle movement on arterial and local roads, including dedicated pedestrian and bicycle paths in the vicinity of the work zones	EPR T2	Corridor	Very low	2–7 years	Minor	Possible	Low		Corridor	Very low	2–7 years	Minor	Possible	Low
Risk TR14	Traffic patterns on arterial and local roads in surrounding residential neighbourhoods are adversely impacted by traffic diverting to avoid tolls or temporary closures due to maintenance activity.	EPR T1 Optimise design performance Optimise the design of the works in consultation with appropriate road management authorities as part of the detailed design process to: • Minimise adverse impact on travel times for all transport modes, including walking and cycling • Maintain, and where practicable, enhance the existing traffic movements at interchanges • Design interchanges and intersections to meet relevant road and transport authority requirements • Maintain, and where practicable, enhance pedestrian movements, bicycle connectivity, and shared use paths • Work with relevant public transport authorities to minimise impacts on buses, trams and rail and, where practicable, enhance public transport facilities and services that cross or run parallel to the alignment of the North East Link • Minimise loss of car parking in consultation with relevant local councils.	Wider region	Very low	7+ years	Moderate	Unlikely	Low		Wider region	Very low	7+ years	Moderate	Unlikely	Low
Risk TR15	Traffic patterns on arterial and local roads in surrounding residential neighbourhoods are adversely impacted by traffic diverting to avoid incidents on the Freeway, or temporary closures due to incident response.	Redundancy plan developed to divert traffic in an incident or lane closure scenario	Wider region	Very low	7+ years	Moderate	Unlikely	Low		Wider region	Very low	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial risk							Residual risk						
		Initial EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level	Final EPR	Magnitude of consequence			Overall consequence	Likelihood	Risk level
			Extent	Severity	Duration					Extent	Severity	Duration			
Risk TR16	Public transport services are adversely affected by delays or loss of travel time reliability due to additional traffic through key intersections, due to altered local traffic patterns or temporary closures due to maintenance activity.	EPR T1	Wider region	Very low	7+ years	Moderate	Possible	Medium		Wider region	Very low	7+ years	Moderate	Possible	Medium
Risk TR17	Pedestrians and cyclists are adversely affected by delays or loss of travel time reliability as a result of additional traffic through key intersections, due to altered local traffic patterns or temporary closures due to maintenance activity.	EPR T1	Wider region	Very low	7+ years	Moderate	Unlikely	Low		Wider region	Very low	7+ years	Moderate	Unlikely	Low
Risk TR18	Tunnel closures for emergencies or maintenance activity result in impacts on traffic patterns in residential neighbourhoods.	Advanced notice of maintenance activities. Redundancy plan developed to divert traffic in an incident or lane closure scenario.	Corridor	Very low	7+ years	Minor	Possible	Low		Corridor	Very low	7+ years	Minor	Possible	Low
Risk TR19	Tunnel closures for emergencies or maintenance activity result in temporary impacts on public transport services and on pedestrian and cycle movements on arterial and local roads	Advanced notice of maintenance activities. Redundancy plan developed to divert traffic in an incident or lane closure scenario.	Corridor	Very low	7+ years	Minor	Possible	Low		Corridor	Very low	7+ years	Minor	Possible	Low
Risk TR20	Placarded loads and over height vehicles are unable to be identified in sufficient time to avoid tunnel closures	Work with industry to inform them of what is restricted from entering the tunnel. Develop over-height detection plan and tunnel closure procedure.	Corridor	Very low	7+ years	Minor	Possible	Low		Corridor	Very low	7+ years	Minor	Possible	Low

Appendix D – Forecast traffic volumes

AM peak traffic volumes – two-hour volumes

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Albert St	Murray St to Bell St	Northbound	1,500–1,900	1,800–2,300	1,700–2,200
Albert St	Murray St to Bell St	Southbound	2,500–3,300	2,700–3,500	2,600–3,400
Albert St	Plenty Rd to Murray Rd	Northbound	1,400–1,800	1,700–2,200	1,500–1,900
Albert St	Plenty Rd to Murray Rd	Southbound	3,000–3,900	3,300–4,300	3,100–4,100
Alexandra Pde	Rathdowne St to Nicholson St	Eastbound	3,500–4,600	4,000–5,200	4,000–5,200
Alexandra Pde	Rathdowne St to Nicholson St	Westbound	4,400–5,700	4,400–5,700	4,600–6,000
Alexandra Pde	Nicholson St to Brunswick St	Eastbound	4,100–5,300	4,800–6,200	4,700–6,100
Alexandra Pde	Nicholson St to Brunswick St	Westbound	5,300–6,800	5,500–7,100	5,600–7,200
Alexandra Pde	Queens Pde to Hoddle St	Eastbound	3,900–5,100	4,300–5,600	4,300–5,500
Alexandra Pde	Queens Pde to Hoddle St	Westbound	2,900–3,800	3,000–3,900	3,400–4,400
Anderson St	James St to Porter St	Northbound	600–800	800–1,000	500–700
Anderson St	James St to Porter St	Southbound	1,400–1,900	1,500–2,000	1,400–1,800
Andersons Creek Rd	Reynolds Rd to Warrandyte Rd	Northbound	400–500	500–600	300–400
Andersons Creek Rd	Reynolds Rd to Warrandyte Rd	Southbound	1,100–1,400	1,200–1,500	1,100–1,400
Andersons Creek Rd	Blackburn Rd to Reynolds Rd	Northbound	400–600	500–600	600–700
Andersons Creek Rd	Blackburn Rd to Reynolds Rd	Southbound	1,000–1,300	1,000–1,300	1,000–1,400
Balwyn Rd	Belmore Rd to Whitehorse Rd	Northbound	1,600–2,000	1,700–2,200	1,700–2,200
Balwyn Rd	Belmore Rd to Whitehorse Rd	Southbound	900–1,200	1,000–1,300	1,000–1,300
Balwyn Rd	Doncaster Rd to Belmore Rd	Northbound	700–1,000	900–1,100	900–1,200
Balwyn Rd	Doncaster Rd to Belmore Rd	Southbound	1,400–1,800	1,500–2,000	1,700–2,100
Banksia St	Mount St to Hawdon St	Eastbound	2,600–3,300	2,600–3,300	2,600–3,300
Banksia St	Mount St to Hawdon St	Westbound	3,900–5,100	4,100–5,300	4,200–5,400
Banksia St/Manningham Rd	At Yarra River	Eastbound	4,400–5,700	4,500–5,900	3,700–4,800
Banksia St/Manningham Rd	At Yarra River	Westbound	4,400–5,700	4,900–6,300	4,600–6,000
Bell St	Station St to Oriel Rd	Eastbound	2,800–3,600	3,100–4,000	3,000–3,900
Bell St	Station St to Oriel Rd	Westbound	3,300–4,300	3,600–4,700	3,600–4,700
Bell St	Studley Rd to rail line	Eastbound	2,700–3,600	2,900–3,700	2,900–3,800
Bell St	Studley Rd to rail line	Westbound	3,800–4,900	3,800–4,900	3,800–4,900
Bell St	Plenty Rd to Albert St	Eastbound	2,500–3,300	2,900–3,700	2,800–3,700
Bell St	Plenty Rd to Albert St	Westbound	2,400–3,100	2,800–3,600	2,700–3,500

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Bell St	Oriel Rd to Waterdale Rd	Eastbound	2,600–3,400	2,800–3,700	2,800–3,600
Bell St	Oriel Rd to Waterdale Rd	Westbound	3,000–3,800	3,200–4,200	3,100–4,000
Bell St	Waterdale Rd to Upper Heidelberg Rd	Eastbound	3,600–4,600	3,800–4,900	3,700–4,800
Bell St	Waterdale Rd to Upper Heidelberg Rd	Westbound	3,700–4,800	4,000–5,100	4,100–5,300
Bell St	High St to Plenty Rd	Eastbound	3,100–4,000	3,400–4,400	3,400–4,500
Bell St	High St to Plenty Rd	Westbound	3,000–3,900	3,300–4,300	3,400–4,400
Belmore Rd	Union Rd to Winfield Rd	Northbound	600–700	600–800	600–800
Belmore Rd	Union Rd to Winfield Rd	Southbound	1,200–1,600	1,400–1,800	1,400–1,900
Belmore Rd	Burke Rd to Balwyn Rd	Eastbound	1,100–1,500	1,500–1,900	1,400–1,800
Belmore Rd	Burke Rd to Balwyn Rd	Westbound	1,600–2,100	1,800–2,400	1,600–2,100
Blackburn Rd	Eastern Fwy to Doncaster Rd	Northbound	900–1,100	900–1,200	1,000–1,200
Blackburn Rd	Eastern Fwy to Doncaster Rd	Southbound	1,900–2,500	2,200–2,900	2,300–2,900
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Northbound	1,300–1,600	1,200–1,600	1,100–1,400
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Southbound	2,300–3,000	2,400–3,100	2,300–3,000
Blackburn Rd	Reynolds Rd to Andersons Creek Rd	Northbound	800–1,100	900–1,200	700–900
Blackburn Rd	Reynolds Rd to Andersons Creek Rd	Southbound	1,300–1,700	1,400–1,800	1,300–1,700
Bolton St	Bridge St to Main Rd	Northbound	1,100–1,500	1,200–1,600	900–1,200
Bolton St	Bridge St to Main Rd	Southbound	1,000–1,200	1,000–1,300	1,000–1,200
Bridge St	Bolton St to Main Rd	Eastbound	900–1,100	1,000–1,300	1,000–1,400
Bridge St	Bolton St to Main Rd	Westbound	1,000–1,300	1,200–1,500	1,200–1,600
Bridge St	Manningham St to Templestowe Rd	Eastbound	600–800	800–1,000	800–1,000
Bridge St	Manningham St to Templestowe Rd	Westbound	900–1,200	1,700–2,300	1,600–2,000
Broadway	High St to Boldrewood Pde	Eastbound	1,400–1,900	1,500–1,900	1,500–1,900
Broadway	High St to Boldrewood Pde	Westbound	2,000–2,600	1,900–2,400	1,900–2,400
Bulleen Rd	Eastern Fwy to Manningham Rd	Northbound	2,300–3,000	2,100–2,700	2,300–3,000
Bulleen Rd	Eastern Fwy to Manningham Rd	Southbound	2,700–3,600	2,900–3,700	2,700–3,400
Bulleen Rd	Doncaster Rd to Eastern Fwy	Northbound	800–1,100	900–1,100	1,100–1,400
Bulleen Rd	Doncaster Rd to Eastern Fwy	Southbound	1,200–1,600	1,500–2,000	1,600–2,100
Burgundy St	Rosanna Rd to Upper Heidelberg Rd	Eastbound	900–1,200	900–1,200	1,000–1,300
Burgundy St	Rosanna Rd to Upper Heidelberg Rd	Westbound	700–900	700–1,000	700–1,000
Burke Rd	Harp Rd to Cotham Rd	Northbound	1,600–2,000	1,700–2,200	1,700–2,200

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Burke Rd	Harp Rd to Cotham Rd	Southbound	1,600–2,000	1,600–2,100	1,700–2,200
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Northbound	2,300–3,000	2,700–3,500	2,400–3,100
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Southbound	3,000–3,900	2,900–3,700	2,700–3,500
Burke Rd	Doncaster Rd to Eastern Fwy	Northbound	1,700–2,200	1,800–2,400	1,600–2,100
Burke Rd	Doncaster Rd to Eastern Fwy	Southbound	2,500–3,300	2,500–3,200	2,400–3,200
Burke Rd	High St to Harp Rd	Northbound	1,500–2,000	1,700–2,200	1,700–2,200
Burke Rd	High St to Harp Rd	Southbound	1,900–2,400	2,000–2,600	2,100–2,700
Bush Blvd	McDonalds Rd to Plenty Rd	Northbound	700–900	900–1,200	1,000–1,300
Bush Blvd	McDonalds Rd to Plenty Rd	Southbound	400–500	700–900	700–900
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Northbound	2,600–3,400	4,300–5,600	4,100–5,300
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Southbound	2,600–3,400	5,000–6,500	4,500–5,900
Chapman St	Ellesmere Pde to Thomson Dr	Eastbound	600–800	800–1,000	1,100–1,400
Chapman St	Ellesmere Pde to Thomson Dr	Westbound	1,500–1,900	1,600–2,100	1,600–2,100
Cherry St	Waiora Rd to Wungan St	Eastbound	300–400	700–900	800–1,000
Cherry St	Waiora Rd to Wungan St	Westbound	1,000–1,300	1,000–1,300	1,100–1,400
Childs Rd	Dalton Rd to Plenty Rd	Eastbound	900–1,100	1,500–2,000	1,700–2,100
Childs Rd	Dalton Rd to Plenty Rd	Westbound	2,400–3,100	3,400–4,400	3,400–4,400
Cooper St	Edgars Rd to High St	Eastbound	2,400–3,100	2,500–3,300	2,600–3,300
Cooper St	Edgars Rd to High St	Westbound	3,000–3,900	2,500–3,200	2,500–3,200
Cooper St	Hume Fwy to Edgars Rd	Eastbound	2,500–3,300	2,700–3,500	2,800–3,700
Cooper St	Hume Fwy to Edgars Rd	Westbound	2,900–3,700	2,900–3,800	3,000–3,900
Cotham Rd	Glenferrie Rd to Burke Rd	Eastbound	800–1,000	1,100–1,400	1,100–1,400
Cotham Rd	Glenferrie Rd to Burke Rd	Westbound	1,500–1,900	1,600–2,100	1,500–2,000
Cotham Rd	High St to Glenferrie Rd	Eastbound	700–900	900–1,100	900–1,100
Cotham Rd	High St to Glenferrie Rd	Westbound	1,300–1,600	1,400–1,800	1,400–1,800
Dalton Rd	North of M80 Ring Road	Northbound	1,700–2,200	2,100–2,800	2,100–2,800
Dalton Rd	North of M80 Ring Road	Southbound	4,000–5,200	4,400–5,700	4,400–5,700
Dalton Rd	Childs Rd to McKimmies Rd	Northbound	1,600–2,000	1,900–2,500	1,800–2,400
Dalton Rd	Childs Rd to McKimmies Rd	Southbound	2,800–3,600	3,400–4,400	3,400–4,400
Dalton Rd	Keon Pde to Settlement Rd	Northbound	1,700–2,300	2,100–2,800	2,000–2,500
Dalton Rd	Keon Pde to Settlement Rd	Southbound	3,300–4,300	3,600–4,700	3,500–4,500

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Dalton Rd	Settlement Rd to M80 Ring Road	Northbound	2,200–2,800	2,600–3,400	2,600–3,300
Dalton Rd	Settlement Rd to M80 Ring Road	Southbound	4,300–5,600	4,700–6,100	4,700–6,100
Dalton Rd	South of Cooper St	Northbound	1,300–1,700	1,500–1,900	1,400–1,900
Dalton Rd	South of Cooper St	Southbound	800–1,100	1,200–1,600	1,200–1,600
Darebin Rd	At Darebin Creek	Eastbound	1,200–1,600	1,500–2,000	1,500–1,900
Darebin Rd	At Darebin Creek	Westbound	1,500–1,900	1,600–2,100	1,500–2,000
Darebin Rd	High St to Station St	Eastbound	900–1,200	1,100–1,400	1,100–1,500
Darebin Rd	High St to Station St	Westbound	900–1,200	1,000–1,400	1,000–1,300
Darebin Rd	Station St to Grange Rd	Eastbound	1,700–2,200	1,900–2,500	1,900–2,500
Darebin Rd	Station St to Grange Rd	Westbound	1,500–1,900	1,700–2,200	1,700–2,200
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Eastbound	1,500–1,900	1,700–2,200	1,900–2,400
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Westbound	3,600–4,700	4,200–5,400	5,100–6,600
Diamond Creek Rd	St Helena Rd to Greensborough Bypass	Northbound	1,700–2,200	2,200–2,800	2,100–2,700
Diamond Creek Rd	St Helena Rd to Greensborough Bypass	Southbound	1,900–2,500	2,000–2,600	1,900–2,500
Diamond Creek Rd	Yan Yean Rd to Ryans Rd	Eastbound	1,100–1,500	1,200–1,600	1,300–1,700
Diamond Creek Rd	Yan Yean Rd to Ryans Rd	Westbound	3,400–4,400	3,500–4,600	3,700–4,800
Doncaster Rd	East of Eastern Fwy	Eastbound	1,000–1,200	1,200–1,500	900–1,200
Doncaster Rd	East of Eastern Fwy	Westbound	1,600–2,100	2,000–2,600	1,800–2,300
Doncaster Rd	Middleborough Rd to Station St	Eastbound	1,100–1,400	1,200–1,600	1,100–1,400
Doncaster Rd	Middleborough Rd to Station St	Westbound	2,300–2,900	2,400–3,000	2,300–2,900
Doncaster Rd	Balwyn Rd to Eastern Fwy	Eastbound	1,100–1,500	1,100–1,500	1,200–1,600
Doncaster Rd	Balwyn Rd to Eastern Fwy	Westbound	2,800–3,700	2,300–3,000	2,300–3,000
Doncaster Rd	Blackburn Rd to Springvale Rd	Eastbound	1,500–1,900	1,700–2,200	1,600–2,100
Doncaster Rd	Blackburn Rd to Springvale Rd	Westbound	2,200–2,800	2,500–3,200	2,400–3,100
Doncaster Rd	Blackburn Rd to Wetherby Rd	Eastbound	1,000–1,300	1,200–1,600	1,100–1,400
Doncaster Rd	Blackburn Rd to Wetherby Rd	Westbound	2,100–2,700	2,200–2,900	2,200–2,800
Doncaster Rd	Balwyn Rd to Bulleen Rd	Eastbound	800–1,100	900–1,200	800–1,100
Doncaster Rd	Balwyn Rd to Bulleen Rd	Westbound	1,600–2,100	1,800–2,400	1,600–2,000
Drysdale St	Greensborough Rd to Borlase St	Eastbound	10–100	10–100	
Drysdale St	Greensborough Rd to Borlase St	Westbound	10–100	150–250	50–150
Dunne St	At Darebin Creek	Eastbound	700–900	900–1,200	900–1,200

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Dunne St	At Darebin Creek	Westbound	500–700	800–1,100	800–1,100
Earl St	Princess St to Willsmere Rd	Northbound	700–900	1,300–1,700	1,100–1,400
Earl St	Princess St to Willsmere Rd	Southbound	1,300–1,700	1,800–2,300	2,000–2,600
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Eastbound	8,600–10,000	9,400–11,000	12,000–14,100
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Westbound	10,000–11,700	9,700–11,400	11,300–13,200
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Eastbound	8,800–10,300	10,200–11,900	13,500–15,800
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Westbound	11,700–13,700	11,400–13,300	13,700–15,900
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Eastbound	9,600–11,200	10,300–12,000	14,700–17,100
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Westbound	12,200–14,200	11,800–13,800	15,900–18,500
Eastern Fwy Mid-block	Tram Rd to Elgar Rd	Eastbound	8,000–9,400	8,700–10,100	13,100–15,200
Eastern Fwy Mid-block	Tram Rd to Elgar Rd	Westbound	10,100–11,700	9,800–11,400	14,000–16,400
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Eastbound	9,400–11,000	10,100–11,800	15,100–17,700
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Westbound	10,900–12,700	10,700–12,500	15,700–18,300
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Eastbound	8,600–10,000	9,800–11,400	15,100–17,700
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Westbound	10,700–12,500	10,500–12,300	16,300–19,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Eastbound	6,400–7,400	8,000–9,300	8,900–10,400
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Westbound	10,900–12,700	11,000–12,900	14,100–16,400
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Eastbound	7,400–8,600	9,000–10,500	10,000–11,700
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Westbound	11,500–13,400	11,800–13,700	14,800–17,300
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Eastbound	6,800–7,900	8,200–9,600	8,700–10,100
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Westbound	8,800–10,300	9,200–10,700	11,000–12,800
Edgars Rd	South of Cooper St	Northbound	1,000–1,300	1,700–2,200	1,700–2,200
Edgars Rd	South of Cooper St	Southbound	700–900	1,900–2,400	1,900–2,400
Edgars Rd	North of M80 Ring Road	Northbound	1,200–1,500	2,000–2,600	2,000–2,600
Edgars Rd	North of M80 Ring Road	Southbound	2,700–3,500	3,100–4,000	3,100–4,000
Elder St	Papua St to Longmuir Rd	Eastbound	300–400	400–600	150–250
Elder St	Papua St to Longmuir Rd	Westbound	700–900	800–1,000	600–800
Elgar Rd	North of Eastern Fwy	Northbound	1,000–1,200	900–1,200	700–900
Elgar Rd	North of Eastern Fwy	Southbound	1,700–2,200	1,900–2,400	1,500–2,000
Elgar Rd	Belmore Rd to Eastern Fwy	Northbound	1,600–2,100	1,500–1,900	1,900–2,500
Elgar Rd	Belmore Rd to Eastern Fwy	Southbound	2,800–3,600	3,000–3,800	3,200–4,100

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Elgar Rd	Belmore Rd to Whitehorse Rd	Northbound	1,900–2,400	1,400–1,900	1,700–2,200
Elgar Rd	Belmore Rd to Whitehorse Rd	Southbound	1,600–2,000	2,200–2,800	2,100–2,800
Eltham-Yarra Glen Rd	North of Donaldson Rd	Northbound	500–600	600–800	500–600
Eltham-Yarra Glen Rd	North of Donaldson Rd	Southbound	1,100–1,400	1,300–1,700	1,200–1,500
Eltham-Yarra Glen Rd	North of Henley Rd	Northbound	200–300	250–350	200–300
Eltham-Yarra Glen Rd	North of Henley Rd	Southbound	300–400	300–400	300–400
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Eastbound	300–400	300–400	300–400
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Westbound	400–500	400–600	400–600
Erskine Rd	Ferguson St to Argyle St	Eastbound	300–400	500–700	700–800
Erskine Rd	Ferguson St to Argyle St	Westbound	600–700	1,200–1,600	1,400–1,800
Fitzsimons Ln	At Yarra River	Northbound	3,400–4,400	3,700–4,800	2,900–3,700
Fitzsimons Ln	At Yarra River	Southbound	4,700–6,000	5,000–6,500	4,200–5,500
Foote St	West of Fitzsimons Ln	Eastbound	900–1,100	1,100–1,400	1,000–1,300
Foote St	West of Fitzsimons Ln	Westbound	1,700–2,200	2,200–2,800	1,900–2,400
Gorge Rd	At Plenty River	Eastbound	1,100–1,400	1,300–1,600	1,200–1,500
Gorge Rd	At Plenty River	Westbound	900–1,200	1,100–1,500	1,000–1,300
Grange Rd	Darebin Rd to Heidelberg Rd	Northbound	1,100–1,500	1,600–2,100	1,600–2,100
Grange Rd	Darebin Rd to Heidelberg Rd	Southbound	600–800	800–1,100	800–1,000
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Eastbound	2,100–2,700	2,200–2,900	2,500–3,200
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Westbound	4,500–5,800	5,700–7,400	6,900–9,000
Greensborough Bypass	Grimshaw St to M80 Ring Road	Northbound	3,800–4,900	4,600–5,900	4,500–5,800
Greensborough Bypass	Grimshaw St to M80 Ring Road	Southbound	3,800–5,000	5,400–7,000	4,200–5,400
Greensborough Rd	South of Watsonia Rd	Northbound	2,800–3,700	3,300–4,300	2,500–3,200
Greensborough Rd	South of Watsonia Rd	Southbound	3,800–4,900	4,100–5,300	3,000–3,900
Greenwood Dr	Gresswell Park Dr to Ladd St	Eastbound	500–600	400–600	500–700
Greenwood Dr	Gresswell Park Dr to Ladd St	Westbound	400–500	400–600	300–400
Grimshaw St	Plenty Rd to Watsonia Rd	Eastbound	1,600–2,100	1,600–2,100	1,700–2,200
Grimshaw St	Plenty Rd to Watsonia Rd	Westbound	1,700–2,100	1,700–2,200	1,600–2,000
Grimshaw St	Greensborough Hwy to The Circuit	Eastbound	1,500–1,900	2,400–3,000	2,300–2,900
Grimshaw St	Greensborough Hwy to The Circuit	Westbound	1,900–2,500	3,300–4,200	3,400–4,400
Grimshaw St	Watsonia Rd to Greensborough Hwy	Eastbound	1,600–2,000	1,300–1,700	2,200–2,800

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Grimshaw St	Watsonia Rd to Greensborough Hwy	Westbound	1,600–2,000	2,400–3,100	2,500–3,200
Grimshaw St	Main St to Para Rd	Eastbound	100–200	250–350	50–150
Grimshaw St	Main St to Para Rd	Westbound	1,500–2,000	1,700–2,200	1,700–2,200
Heidelberg Rd	At Darebin Creek	Northbound	900–1,100	1,300–1,600	1,200–1,600
Heidelberg Rd	At Darebin Creek	Southbound	2,500–3,200	2,700–3,500	2,500–3,200
Heidelberg Rd	Hoddle St to Station St	Eastbound	1,300–1,700	1,700–2,300	1,700–2,200
Heidelberg Rd	Hoddle St to Station St	Westbound	3,500–4,500	3,500–4,500	3,400–4,400
Heidelberg-Kinglake Rd	North of Cherry Tree Rd	Northbound	150–250	200–300	200–300
Heidelberg-Kinglake Rd	North of Cherry Tree Rd	Southbound	200–300	300–400	300–400
Heidelberg-Kinglake Rd	Kangaroo Ground-Wattle Glen Rd to Wilson Rd	Northbound	500–600	600–700	500–700
Heidelberg-Kinglake Rd	Kangaroo Ground-Wattle Glen Rd to Wilson Rd	Southbound	1,200–1,500	1,400–1,800	1,400–1,800
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Northbound	400–500	500–600	500–600
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Southbound	1,000–1,300	1,400–1,800	1,200–1,600
High St	South of Cooper St	Northbound	1,500–1,900	1,700–2,200	1,700–2,200
High St	South of Cooper St	Southbound	2,600–3,400	3,400–4,400	3,400–4,400
High St	North of Settlement Rd	Northbound	1,200–1,500	1,600–2,100	1,700–2,200
High St	North of Settlement Rd	Southbound	2,300–3,000	3,000–3,900	3,000–3,900
High St	Doncaster Rd to Manningham Rd	Northbound	800–1,000	1,100–1,400	800–1,100
High St	Doncaster Rd to Manningham Rd	Southbound	1,900–2,400	2,100–2,800	2,000–2,600
High St	Keon Pde to Broadway	Northbound	2,000–2,600	2,200–2,800	2,100–2,700
High St	Keon Pde to Broadway	Southbound	2,600–3,400	2,900–3,800	2,800–3,600
High St	Mahoneys Rd to Settlement Rd	Northbound	1,300–1,700	1,800–2,300	1,800–2,300
High St	Mahoneys Rd to Settlement Rd	Southbound	2,400–3,100	2,800–3,600	2,800–3,600
High St	Westgarth St to Queens Pde	Northbound	1,200–1,600	1,600–2,100	1,500–2,000
High St	Westgarth St to Queens Pde	Southbound	2,200–2,800	2,200–2,800	2,100–2,700
High St	Cotham Rd to Parkhill Rd	Eastbound	900–1,200	1,300–1,700	1,200–1,600
High St	Cotham Rd to Parkhill Rd	Westbound	2,100–2,700	2,200–2,800	2,200–2,800
High St	Harp Rd to Burke Rd	Eastbound	600–800	700–1,000	700–900
High St	Harp Rd to Burke Rd	Westbound	1,700–2,200	1,900–2,400	1,800–2,300
Hoddle St	Heidelberg Rd to Eastern Fwy	Northbound	1,800–2,300	1,900–2,500	1,800–2,300
Hoddle St	Heidelberg Rd to Eastern Fwy	Southbound	1,200–1,500	1,200–1,600	1,200–1,500

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Hoddle St	Eastern Fwy to Johnston St	Northbound	2,800–3,700	3,600–4,700	3,800–4,900
Hoddle St	Eastern Fwy to Johnston St	Southbound	5,100–6,600	4,900–6,400	5,200–6,700
Hoddle St	Johnston St to Victoria St	Northbound	3,000–3,900	3,800–4,900	3,900–5,100
Hoddle St	Johnston St to Victoria St	Southbound	5,500–7,200	5,500–7,100	5,700–7,400
Hoddle St	Victoria St to Bridge Rd	Northbound	3,200–4,200	3,500–4,500	3,500–4,600
Hoddle St	Victoria St to Bridge Rd	Southbound	3,700–4,700	3,800–4,900	3,900–5,100
Hume Fwy	M80 Ring Road to Cooper St	Northbound	4,900–5,700	6,600–7,700	6,900–8,100
Hume Fwy	M80 Ring Road to Cooper St	Southbound	5,800–6,800	6,800–8,000	6,800–8,000
Hume Fwy	North of Cooper St	Northbound	2,700–3,200	4,900–5,700	5,000–5,900
Hume Fwy	North of Cooper St	Southbound	5,600–6,600	6,800–8,000	6,800–8,000
Jika St	Rosanna Rd to Banksia St	Northbound	900–1,100	1,000–1,300	1,000–1,300
Jika St	Rosanna Rd to Banksia St	Southbound	2,000–2,600	1,900–2,400	1,700–2,200
Johnston St	Wellington St to Hoddle St	Eastbound	600–700	600–800	700–900
Johnston St	Wellington St to Hoddle St	Westbound	1,500–2,000	1,500–2,000	1,600–2,100
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Northbound	150–250	150–250	150–250
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Southbound	400–600	500–700	500–700
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Northbound	300–400	400–500	300–400
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Southbound	700–900	800–1,000	700–900
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Northbound	900–1,100	1,200–1,600	900–1,100
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Southbound	1,700–2,200	1,900–2,500	1,700–2,100
Kangaroo Ground-Wattle Glen Rd	Heidelberg-Kinglake Rd to Kangaroo Ground-St Andrews Rd	Eastbound	600–800	800–1,100	500–700
Kangaroo Ground-Wattle Glen Rd	Heidelberg-Kinglake Rd to Kangaroo Ground-St Andrews Rd	Westbound	500–600	600–800	400–600
Karingal Drive	East of St Helena Rd	Northbound	1,500–2,000	1,600–2,100	1,400–1,800
Karingal Drive	East of St Helena Rd	Southbound	1,400–1,800	1,700–2,200	1,400–1,800
Keon Pde	High St to Dalton Rd	Eastbound	900–1,100	1,300–1,700	1,400–1,800
Keon Pde	High St to Dalton Rd	Westbound	1,200–1,600	1,400–1,800	1,500–2,000
King St	East of Williamsons Rd	Eastbound	800–1,100	1,000–1,300	900–1,200
King St	East of Williamsons Rd	Westbound	1,000–1,200	1,100–1,400	1,000–1,300
Kingsbury Drive	East of Waterdale Rd	Eastbound	900–1,200	1,100–1,500	1,200–1,500
Kingsbury Drive	East of Waterdale Rd	Westbound	1,300–1,700	1,500–1,900	1,400–1,900

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Kingsbury Drive	West of Waterdale Rd	Eastbound	2,300–2,900	2,400–3,100	2,300–3,000
Kingsbury Drive	West of Waterdale Rd	Westbound	1,600–2,000	1,700–2,200	1,600–2,100
Livingstone St	Oriel Rd to Waterdale Rd	Eastbound	1,100–1,400	1,100–1,400	1,100–1,500
Livingstone St	Oriel Rd to Waterdale Rd	Westbound	700–1,000	800–1,000	800–1,000
Lower Heidelberg Rd	Maltravers Rd to The Eyrie	Northbound	2,000–2,600	2,200–2,900	2,100–2,800
Lower Heidelberg Rd	Maltravers Rd to The Eyrie	Southbound	1,700–2,200	1,900–2,400	1,700–2,200
Lower Heidelberg Rd	Near Ivanhoe Park	Eastbound	900–1,200	1,000–1,300	1,000–1,300
Lower Heidelberg Rd	Near Ivanhoe Park	Westbound	700–1,000	800–1,000	800–1,000
Lower Plenty Rd	Greensborough Rd to Para Rd	Eastbound	1,200–1,600	1,600–2,000	1,700–2,200
Lower Plenty Rd	Greensborough Rd to Para Rd	Westbound	3,100–4,100	3,700–4,800	3,700–4,800
Lower Plenty Rd	Rosanna Rd to Greensborough Rd	Eastbound	2,500–3,200	2,800–3,700	2,400–3,100
Lower Plenty Rd	Rosanna Rd to Greensborough Rd	Westbound	5,200–6,700	5,600–7,300	5,200–6,700
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Eastbound	700–900	1,000–1,200	900–1,200
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Westbound	2,100–2,700	2,100–2,700	2,100–2,700
M80 Ring Road	Dalton Rd to Plenty Rd	Eastbound	5,000–5,900	7,000–8,100	7,900–9,200
M80 Ring Road	Dalton Rd to Plenty Rd	Westbound	7,700–8,900	8,900–10,300	9,600–11,100
M80 Ring Road	Dalton Rd to Edgars Rd	Eastbound	7,400–8,600	10,100–11,700	10,800–12,600
M80 Ring Road	Dalton Rd to Edgars Rd	Westbound	7,800–9,100	10,100–11,800	10,100–11,800
M80 Ring Road	Edgars Rd to Hume Fwy	Eastbound	7,900–9,200	12,500–14,600	13,200–15,400
M80 Ring Road	Edgars Rd to Hume Fwy	Westbound	7,500–8,700	11,000–12,800	11,000–12,800
M80 Ring Road	Hume Fwy to Sydney Rd	Eastbound	8,100–9,400	12,600–14,700	13,000–15,100
M80 Ring Road	Hume Fwy to Sydney Rd	Westbound	9,100–10,600	12,500–14,600	12,300–14,400
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Eastbound	4,200–4,900	5,800–6,800	9,900–11,600
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Westbound	6,300–7,400	8,600–10,000	13,000–15,100
Main Hurstbridge Rd	At Diamond Creek	Eastbound	900–1,200	900–1,200	900–1,200
Main Hurstbridge Rd	At Diamond Creek	Westbound	1,700–2,200	1,800–2,300	1,900–2,400
Main Hurstbridge Rd	East of Diamond Creek town centre	Eastbound	600–800	600–800	600–800
Main Hurstbridge Rd	East of Diamond Creek town centre	Westbound	1,200–1,600	1,300–1,700	1,300–1,700
Main Rd	At Plenty River	Eastbound	1,200–1,500	1,300–1,700	1,200–1,600
Main Rd	At Plenty River	Westbound	2,800–3,600	3,200–4,100	3,000–3,900
Main Rd	East of Ingrams Rd	Eastbound	500–700	500–600	600–700

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Main Rd	East of Ingrams Rd	Westbound	700–900	800–1,000	800–1,100
Main Rd	Para Rd to Bolton St	Eastbound	1,400–1,800	1,500–1,900	1,300–1,600
Main Rd	Para Rd to Bolton St	Westbound	2,600–3,400	2,800–3,700	2,500–3,200
Main Rd	Wattletree Rd to Bridge St	Northbound	900–1,200	1,100–1,400	900–1,200
Main Rd	Wattletree Rd to Bridge St	Southbound	1,900–2,500	2,100–2,700	2,000–2,600
Main Rd	East of Wattletree Rd	Eastbound	1,000–1,300	1,000–1,200	1,000–1,400
Main Rd	East of Wattletree Rd	Westbound	1,900–2,400	1,800–2,300	1,900–2,500
Main Rd	At Diamond Creek	Northbound	900–1,100	1,000–1,300	1,000–1,300
Main Rd	At Diamond Creek	Southbound	1,700–2,200	1,900–2,500	1,800–2,300
Main Rd	Fitzsimons La to Bolton St	Eastbound	2,600–3,400	2,800–3,600	2,300–3,000
Main Rd	Fitzsimons La to Bolton St	Westbound	2,500–3,200	2,600–3,400	2,000–2,600
Main St	Para Rd to St Helena Rd	Northbound	2,700–3,500	2,900–3,700	2,900–3,800
Main St	Para Rd to St Helena Rd	Southbound	1,000–1,300	1,000–1,300	1,000–1,300
Manningham Rd	High St to Williamsons Rd	Eastbound	2,400–3,100	2,700–3,500	2,300–3,000
Manningham Rd	High St to Williamsons Rd	Westbound	2,000–2,600	2,200–2,900	1,900–2,500
Manningham Rd	Thompsons Rd to High St	Eastbound	2,300–3,000	2,500–3,300	2,200–2,800
Manningham Rd	Thompsons Rd to High St	Westbound	2,000–2,600	2,100–2,700	1,700–2,200
Manningham Rd	Bulleen Rd to Thompsons Rd	Eastbound	2,400–3,100	2,500–3,200	2,000–2,600
Manningham Rd	Bulleen Rd to Thompsons Rd	Westbound	1,800–2,400	2,600–3,400	2,100–2,700
Maroondah Hwy	East of Eastlink	Eastbound	1,400–1,900	1,900–2,500	2,000–2,500
Maroondah Hwy	East of Eastlink	Westbound	2,800–3,600	3,300–4,300	3,300–4,300
Maroondah Hwy	Ringwood St to Warrandyte Rd	Eastbound	900–1,200	1,000–1,300	1,000–1,300
Maroondah Hwy	Ringwood St to Warrandyte Rd	Westbound	2,400–3,200	2,800–3,600	2,800–3,600
Maroondah Hwy	Mitcham Rd to Eastlink	Eastbound	2,400–3,100	2,900–3,800	3,000–3,900
Maroondah Hwy	Mitcham Rd to Eastlink	Westbound	4,600–6,000	5,000–6,500	5,100–6,500
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Northbound	2,400–3,100	2,800–3,600	2,800–3,600
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Southbound	4,700–6,100	5,000–6,500	5,000–6,500
McDonalds Rd	West of Pindari Ave	Eastbound	800–1,000	900–1,200	1,000–1,300
McDonalds Rd	West of Pindari Ave	Westbound	1,500–1,900	1,400–1,800	1,500–1,900
Merri Pde	St Georges Rd to Westgarth St	Eastbound	600–700	700–800	600–800
Merri Pde	St Georges Rd to Westgarth St	Westbound	1,000–1,300	1,200–1,500	1,200–1,500

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Middleborough Rd	North of Eastern Fwy	Northbound	1,700–2,200	1,300–1,700	1,000–1,300
Middleborough Rd	North of Eastern Fwy	Southbound	1,600–2,100	2,200–2,800	2,300–3,000
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Northbound	1,800–2,300	1,500–2,000	1,700–2,200
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Southbound	2,200–2,900	2,000–2,600	2,000–2,600
Mitcham Rd	At Eastern Fwy	Northbound	1,900–2,500	2,000–2,600	2,100–2,800
Mitcham Rd	At Eastern Fwy	Southbound	1,500–2,000	1,700–2,200	2,000–2,600
Mt Dandenong Rd	Maroondah Hwy to Dublin Rd	Eastbound	1,700–2,200	2,000–2,600	2,100–2,700
Mt Dandenong Rd	Maroondah Hwy to Dublin Rd	Westbound	2,900–3,800	3,200–4,200	3,200–4,100
Murray Rd	High St to Plenty Rd	Eastbound	700–900	800–1,000	800–1,000
Murray Rd	High St to Plenty Rd	Westbound	800–1,000	900–1,200	900–1,100
Murray Rd	Plenty Rd to Albert St	Eastbound	700–900	700–1,000	700–1,000
Murray Rd	Plenty Rd to Albert St	Westbound	700–900	800–1,000	800–1,000
Murray Rd	At Darebin Creek	Eastbound	1,200–1,500	1,400–1,700	1,300–1,700
Murray Rd	At Darebin Creek	Westbound	1,400–1,800	1,600–2,000	1,500–2,000
Nell Street	Longmuir Rd to Greta Street	Eastbound	50–150	50–150	50–150
Nell Street	Longmuir Rd to Greta Street	Westbound	200–300	200–300	200–300
Oriel Rd	Bell St to Livingston St	Northbound	800–1,100	1,200–1,600	1,100–1,400
Oriel Rd	Bell St to Livingston St	Southbound	1,300–1,600	1,700–2,200	1,400–1,900
Para Rd	Rattray Rd to Main Rd	Northbound	1,200–1,600	1,300–1,600	1,200–1,500
Para Rd	Rattray Rd to Main Rd	Southbound	1,300–1,600	1,300–1,700	1,200–1,600
Parker St	Reynolds Rd to Swilk St	Eastbound	500–700	700–800	600–800
Parker St	Reynolds Rd to Swilk St	Westbound	1,400–1,800	1,700–2,200	1,700–2,100
Plenty Rd	At Darebin Creek	Eastbound	1,600–2,100	2,000–2,600	2,000–2,600
Plenty Rd	At Darebin Creek	Westbound	2,500–3,200	2,700–3,500	2,700–3,500
Plenty Rd	Main Dr to Greenwood Dr	Northbound	2,400–3,100	3,100–4,000	2,200–2,800
Plenty Rd	Main Dr to Greenwood Dr	Southbound	4,600–6,000	4,900–6,300	4,100–5,300
Plenty Rd	McDonalds Rd to Bush Blvd	Northbound	1,500–1,900	2,500–3,200	2,300–2,900
Plenty Rd	McDonalds Rd to Bush Blvd	Southbound	3,000–3,900	5,100–6,600	5,100–6,600
Plenty Rd	North of Mckimmies Rd	Northbound	2,100–2,700	4,700–6,100	5,000–6,400
Plenty Rd	North of Mckimmies Rd	Southbound	3,500–4,500	5,600–7,300	5,500–7,100

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Plenty Rd	Albert St to Murray Rd	Northbound	800–1,000	800–1,100	800–1,100
Plenty Rd	Albert St to Murray Rd	Southbound	1,700–2,100	1,800–2,300	1,700–2,200
Plenty Rd	Murray St to Bell St	Northbound	800–1,000	900–1,200	900–1,200
Plenty Rd	Murray St to Bell St	Southbound	1,700–2,200	1,900–2,400	1,800–2,300
Princess St	Duke St to Wills St	Northbound	900–1,100	900–1,100	900–1,200
Princess St	Duke St to Wills St	Southbound	1,900–2,400	2,000–2,600	2,200–2,900
Queens Pde	Hoddle St to Alexandra Pde	Northbound	400–500	600–700	600–700
Queens Pde	Hoddle St to Alexandra Pde	Southbound	1,400–1,800	1,400–1,900	1,400–1,700
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Northbound	700–900	900–1,200	700–900
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Southbound	500–700	600–800	500–600
Reynolds Rd	Blackburn Rd to Williamsons Rd	Eastbound	1,600–2,000	1,900–2,500	1,600–2,100
Reynolds Rd	Blackburn Rd to Williamsons Rd	Westbound	2,800–3,600	3,100–4,000	2,900–3,800
Reynolds Rd	Blackburn Rd to Andersons Creek Rd	Eastbound	1,400–1,800	1,800–2,300	1,300–1,700
Reynolds Rd	Blackburn Rd to Andersons Creek Rd	Westbound	2,600–3,300	2,900–3,700	2,900–3,800
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Northbound	600–800	800–1,100	700–900
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Southbound	1,500–1,900	1,600–2,100	1,500–2,000
Ringwood-Warrandyte Rd	Milne Rd to Tortice Dr	Northbound	1,200–1,500	1,400–1,800	1,400–1,900
Ringwood-Warrandyte Rd	Milne Rd to Tortice Dr	Southbound	1,700–2,200	1,700–2,300	1,800–2,300
Rosanna Rd	Brown St to Reid St	Northbound	1,800–2,300	1,800–2,300	1,300–1,700
Rosanna Rd	Brown St to Reid St	Southbound	2,300–3,000	2,800–3,600	2,600–3,300
Ryans Rd	Diamond Creek Rd to Allendale Rd	Northbound	600–800	700–1,000	600–800
Ryans Rd	Diamond Creek Rd to Allendale Rd	Southbound	1,200–1,600	1,400–1,900	1,400–1,800
Settlement Rd	At Darebin Creek	Eastbound	1,000–1,300	1,100–1,400	1,100–1,500
Settlement Rd	At Darebin Creek	Westbound	1,200–1,600	1,500–1,900	1,600–2,000
Settlement Rd	Dalton Rd to High St	Eastbound	300–400	500–600	500–700
Settlement Rd	Dalton Rd to High St	Westbound	800–1,000	900–1,200	1,000–1,300
Southern Rd	Waterdale Rd to Waiora Rd	Eastbound	500–600	600–800	500–600
Southern Rd	Waterdale Rd to Waiora Rd	Westbound	900–1,200	1,000–1,300	900–1,200
Spring St	Broadway to Murray Rd	Northbound	1,000–1,300	1,300–1,700	1,200–1,500
Spring St	Broadway to Murray Rd	Southbound	1,800–2,300	2,000–2,600	1,900–2,500

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Springvale Rd	North of Eastlink	Northbound	2,200–2,800	2,200–2,900	2,700–3,500
Springvale Rd	North of Eastlink	Southbound	2,800–3,700	2,800–3,600	2,900–3,700
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Northbound	1,300–1,700	1,400–1,900	1,200–1,500
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Southbound	1,600–2,100	1,900–2,400	1,500–1,900
Springvale Rd	Whitehorse Rd to Eastern Fwy	Northbound	2,900–3,700	3,000–3,900	3,700–4,800
Springvale Rd	Whitehorse Rd to Eastern Fwy	Southbound	3,900–5,000	4,100–5,300	4,200–5,500
St Georges Rd	Bell St to Normanby Ave	Northbound	1,800–2,300	2,000–2,600	2,000–2,500
St Georges Rd	Bell St to Normanby Ave	Southbound	2,900–3,700	3,000–3,900	2,900–3,800
St Georges Rd	Holden St to Alexandra Pde	Northbound	600–700	800–1,000	800–1,000
St Georges Rd	Holden St to Alexandra Pde	Southbound	1,700–2,100	1,800–2,300	1,700–2,200
St Georges Rd	Murray St to Bell St	Northbound	1,700–2,200	2,100–2,700	2,000–2,600
St Georges Rd	Murray St to Bell St	Southbound	2,000–2,600	2,200–2,900	2,100–2,800
St Georges Rd	Normanby Ave to Merri Pde	Northbound	1,900–2,400	2,100–2,700	2,000–2,600
St Georges Rd	Normanby Ave to Merri Pde	Southbound	2,700–3,500	2,700–3,500	2,600–3,400
Station St	Whitehorse Rd to Eastern Fwy	Northbound	1,200–1,600	1,500–2,000	1,500–2,000
Station St	Whitehorse Rd to Eastern Fwy	Southbound	2,400–3,100	2,600–3,300	2,600–3,400
Station St	Bell St to Darebin Rd	Northbound	1,600–2,100	1,900–2,400	1,800–2,400
Station St	Bell St to Darebin Rd	Southbound	2,400–3,100	2,700–3,500	2,500–3,200
Station St	Darebin Rd to Heidelberg Rd	Northbound	1,000–1,200	1,100–1,500	1,100–1,400
Station St	Darebin Rd to Heidelberg Rd	Southbound	1,100–1,500	1,200–1,500	1,100–1,400
Studley Park Road	At Yarra River	Eastbound	1,000–1,200	1,200–1,500	1,100–1,500
Studley Park Road	At Yarra River	Westbound	2,600–3,400	2,800–3,700	2,800–3,600
Surrey Rd	Whitehorse Rd to Eastern Fwy	Northbound	1,200–1,500	1,300–1,700	1,500–2,000
Surrey Rd	Whitehorse Rd to Eastern Fwy	Southbound	1,700–2,200	1,700–2,200	1,800–2,400
Templestowe Rd	Near Birrarrung Park	Eastbound	700–900	1,300–1,700	900–1,200
Templestowe Rd	Near Birrarrung Park	Westbound	1,700–2,200	3,000–3,900	2,700–3,500
Thompsons Rd	Manningham Rd to Foote St	Northbound	400–600	500–600	500–600
Thompsons Rd	Manningham Rd to Foote St	Southbound	1,300–1,700	1,300–1,700	1,200–1,500
Thompsons Rd	North-east of Eastern Fwy	Eastbound	700–900	700–1,000	900–1,200
Thompsons Rd	North-east of Eastern Fwy	Westbound	2,400–3,200	2,600–3,400	2,400–3,100
Tram Rd	North of Eastern Fwy	Northbound	1,900–2,500	1,900–2,400	1,600–2,100

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Tram Rd	North of Eastern Fwy	Southbound	2,600–3,400	2,800–3,600	2,800–3,600
Upper Heidelberg Rd	Banksia St to Studley Rd	Northbound	700–900	900–1,100	800–1,100
Upper Heidelberg Rd	Banksia St to Studley Rd	Southbound	1,600–2,100	1,700–2,200	1,500–2,000
Upper Heidelberg Rd	Burgundy St to Waiora Rd	Northbound	1,300–1,700	1,600–2,100	1,400–1,900
Upper Heidelberg Rd	Burgundy St to Waiora Rd	Southbound	2,400–3,100	2,500–3,300	2,300–3,000
Victoria Pde	Hoddle St to Lansdown St	Eastbound	2,400–3,100	2,900–3,700	2,800–3,700
Victoria Pde	Hoddle St to Lansdown St	Westbound	3,200–4,200	3,000–3,900	3,000–3,900
Waiora Rd	Southern Rd to Dougharty Rd	Northbound	1,000–1,300	1,400–1,800	1,100–1,400
Waiora Rd	Southern Rd to Dougharty Rd	Southbound	1,800–2,300	2,100–2,700	1,700–2,200
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Eastbound	800–1,100	1,000–1,300	700–900
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Westbound	800–1,000	900–1,200	700–900
Waterdale Rd	Southern Rd to Dougharty Rd	Northbound	1,300–1,600	1,400–1,800	1,300–1,700
Waterdale Rd	Southern Rd to Dougharty Rd	Southbound	1,300–1,700	1,400–1,900	1,400–1,800
Waterdale Rd	Southern Rd to Bell St	Northbound	1,100–1,400	1,300–1,600	1,100–1,400
Waterdale Rd	Southern Rd to Bell St	Southbound	1,700–2,100	1,800–2,400	1,600–2,100
Watsonia Rd	Princes St to Bungay St	Northbound	1,000–1,200	1,000–1,300	1,200–1,500
Watsonia Rd	Princes St to Bungay St	Southbound	1,000–1,300	1,100–1,400	1,100–1,400
Watsonia Rd	Greensborough Rd to rail line	Northbound	1,300–1,700	1,400–1,800	1,200–1,600
Watsonia Rd	Greensborough Rd to rail line	Southbound	700–1,000	900–1,200	1,100–1,400
Wattletree Rd	At Diamond Creek	Northbound	1,100–1,400	1,000–1,300	1,100–1,400
Wattletree Rd	At Diamond Creek	Southbound	1,300–1,600	1,200–1,600	1,300–1,700
Westgarth St	High St to Heidelberg Rd	Eastbound	400–500	500–600	500–600
Westgarth St	High St to Heidelberg Rd	Westbound	600–700	600–800	600–800
Whitehorse Rd	Station St to Middleborough Rd	Eastbound	1,300–1,700	1,700–2,200	1,600–2,100
Whitehorse Rd	Station St to Middleborough Rd	Westbound	2,700–3,500	2,800–3,700	2,700–3,600
Whitehorse Rd	Elgar Rd to Station St	Eastbound	1,400–1,800	1,700–2,300	1,700–2,200
Whitehorse Rd	Elgar Rd to Station St	Westbound	1,600–2,100	1,800–2,300	1,800–2,300
Whitehorse Rd	Middleborough Rd to Surrey Rd	Eastbound	1,200–1,600	1,500–2,000	1,400–1,900
Whitehorse Rd	Middleborough Rd to Surrey Rd	Westbound	2,600–3,400	2,900–3,800	2,800–3,600
Whitehorse Rd	Surrey Rd to Springvale Rd	Eastbound	1,600–2,100	2,200–2,900	2,100–2,800
Whitehorse Rd	Surrey Rd to Springvale Rd	Westbound	3,100–4,100	3,700–4,800	3,600–4,700

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Whitehorse Rd	Springvale Rd to Mitcham Rd	Eastbound	2,100–2,700	2,500–3,200	2,400–3,100
Whitehorse Rd	Springvale Rd to Mitcham Rd	Westbound	3,900–5,000	4,200–5,400	4,200–5,400
Whitehorse Rd	Burke Rd to Balwyn Rd	Eastbound	700–1,000	1,000–1,300	900–1,200
Whitehorse Rd	Burke Rd to Balwyn Rd	Westbound	1,700–2,100	1,800–2,400	1,700–2,100
Whitehorse Rd	Union Rd to Elgar Rd	Eastbound	1,000–1,300	1,300–1,600	1,200–1,600
Whitehorse Rd	Union Rd to Elgar Rd	Westbound	1,500–1,900	1,800–2,300	1,600–2,100
Williamsons Rd	Doncaster Rd to Manningham Rd	Northbound	2,100–2,800	2,500–3,200	2,100–2,700
Williamsons Rd	Doncaster Rd to Manningham Rd	Southbound	3,500–4,500	3,800–4,900	3,600–4,700
Williamsons Rd	Foote St to Warrandyte Rd	Northbound	2,500–3,200	2,500–3,200	2,300–2,900
Williamsons Rd	Foote St to Warrandyte Rd	Southbound	2,500–3,200	2,600–3,300	2,400–3,100
Williamsons Rd	King St to Foote St	Northbound	1,300–1,700	1,400–1,800	1,200–1,600
Williamsons Rd	King St to Foote St	Southbound	2,500–3,200	2,600–3,300	2,400–3,100
Williamsons Rd	Manningham Rd to King St	Northbound	1,100–1,400	1,500–1,900	1,300–1,700
Williamsons Rd	Manningham Rd to King St	Southbound	2,100–2,700	2,200–2,800	2,100–2,800
Wungan St	Skye St to Nicholls St	Northbound	250–350	400–600	400–500
Wungan St	Skye St to Nicholls St	Southbound	1,100–1,400	1,200–1,500	800–1,000
Yallambie Rd	Joules Ct to Fresham Rd	Eastbound	100–200	100–200	150–250
Yallambie Rd	Joules Ct to Fresham Rd	Westbound	600–700	900–1,100	900–1,100
Yan Yean Rd	North of Diamond Creek Rd	Northbound	1,100–1,400	1,600–2,100	1,600–2,100
Yan Yean Rd	North of Diamond Creek Rd	Southbound	1,700–2,200	3,000–3,800	3,300–4,300
Yarra St	Cape St to Hawden St	Eastbound	400–500	500–700	400–500
Yarra St	Cape St to Hawden St	Westbound	300–400	400–500	400–500

PM peak traffic volumes – two-hour volumes

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Albert St	Murray St to Bell St	Northbound	2,600–3,400	2,900–3,700	2,700–3,500
Albert St	Murray St to Bell St	Southbound	1,900–2,500	2,300–2,900	2,200–2,800
Albert St	Plenty Rd to Murray Rd	Northbound	3,200–4,200	3,600–4,600	3,400–4,500
Albert St	Plenty Rd to Murray Rd	Southbound	2,000–2,600	2,400–3,100	2,200–2,800
Alexandra Pde	Rathdowne St to Nicholson St	Eastbound	3,500–4,600	3,600–4,600	3,700–4,800
Alexandra Pde	Rathdowne St to Nicholson St	Westbound	2,800–3,600	3,100–4,100	3,200–4,200
Alexandra Pde	Nicholson St to Brunswick St	Eastbound	4,600–6,000	4,700–6,100	4,800–6,200
Alexandra Pde	Nicholson St to Brunswick St	Westbound	3,500–4,500	3,900–5,100	3,900–5,100
Alexandra Pde	Queens Pde to Hoddle St	Eastbound	4,100–5,400	4,200–5,500	4,500–5,800
Alexandra Pde	Queens Pde to Hoddle St	Westbound	3,000–3,900	3,200–4,200	3,300–4,300
Anderson St	James St to Porter St	Northbound	800–1,100	900–1,100	800–1,000
Anderson St	James St to Porter St	Southbound	600–800	800–1,100	600–800
Andersons Creek Rd	Reynolds Rd to Warrandyte Rd	Northbound	900–1,200	1,000–1,200	900–1,200
Andersons Creek Rd	Reynolds Rd to Warrandyte Rd	Southbound	500–700	700–900	400–500
Andersons Creek Rd	Blackburn Rd to Reynolds Rd	Northbound	800–1,100	900–1,200	900–1,200
Andersons Creek Rd	Blackburn Rd to Reynolds Rd	Southbound	500–700	600–800	700–900
Balwyn Rd	Belmore Rd to Whitehorse Rd	Northbound	1,200–1,500	1,200–1,600	1,300–1,600
Balwyn Rd	Belmore Rd to Whitehorse Rd	Southbound	1,600–2,000	1,700–2,300	1,700–2,300
Balwyn Rd	Doncaster Rd to Belmore Rd	Northbound	1,300–1,600	1,400–1,800	1,600–2,000
Balwyn Rd	Doncaster Rd to Belmore Rd	Southbound	1,000–1,200	1,000–1,400	1,100–1,400
Banksia St	Mount St to Hawdon St	Eastbound	2,800–3,600	2,900–3,800	3,000–3,800
Banksia St	Mount St to Hawdon St	Westbound	2,900–3,800	2,900–3,800	3,000–3,900
Banksia St/Manningham Rd	At Yarra River	Eastbound	5,300–6,900	5,900–7,600	5,600–7,200
Banksia St/Manningham Rd	At Yarra River	Westbound	3,900–5,000	4,100–5,300	3,400–4,400
Bell St	Station St to Oriel Rd	Eastbound	3,300–4,200	3,600–4,600	3,500–4,500
Bell St	Station St to Oriel Rd	Westbound	3,100–4,000	3,500–4,600	3,400–4,400
Bell St	Studley Rd to rail line	Eastbound	2,700–3,500	2,800–3,600	2,800–3,600
Bell St	Studley Rd to rail line	Westbound	2,900–3,800	3,100–4,000	3,100–4,000
Bell St	Plenty Rd to Albert St	Eastbound	2,600–3,300	3,100–4,000	2,900–3,800
Bell St	Plenty Rd to Albert St	Westbound	2,500–3,200	2,900–3,700	2,800–3,700

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Bell St	Oriel Rd to Waterdale Rd	Eastbound	2,900–3,800	3,300–4,200	3,100–4,100
Bell St	Oriel Rd to Waterdale Rd	Westbound	2,800–3,600	3,100–4,000	3,000–3,900
Bell St	Waterdale Rd to Upper Heidelberg Rd	Eastbound	3,200–4,200	3,500–4,500	3,500–4,500
Bell St	Waterdale Rd to Upper Heidelberg Rd	Westbound	3,300–4,300	3,600–4,700	3,600–4,600
Bell St	High St to Plenty Rd	Eastbound	3,000–3,900	3,500–4,500	3,500–4,500
Bell St	High St to Plenty Rd	Westbound	2,600–3,400	2,900–3,800	2,900–3,700
Belmore Rd	Union Rd to Winfield Rd	Northbound	1,400–1,800	1,400–1,800	1,500–2,000
Belmore Rd	Union Rd to Winfield Rd	Southbound	700–900	700–900	800–1,000
Belmore Rd	Burke Rd to Balwyn Rd	Eastbound	1,700–2,300	1,900–2,500	1,700–2,200
Belmore Rd	Burke Rd to Balwyn Rd	Westbound	900–1,200	1,200–1,600	1,200–1,500
Blackburn Rd	Eastern Fwy to Doncaster Rd	Northbound	1,900–2,500	2,500–3,200	2,500–3,300
Blackburn Rd	Eastern Fwy to Doncaster Rd	Southbound	1,300–1,600	1,600–2,100	1,700–2,200
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Northbound	2,200–2,900	2,200–2,900	2,100–2,700
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Southbound	1,800–2,400	1,800–2,300	1,600–2,100
Blackburn Rd	Reynolds Rd to Andersons Creek Rd	Northbound	1,700–2,100	1,700–2,300	1,500–2,000
Blackburn Rd	Reynolds Rd to Andersons Creek Rd	Southbound	1,100–1,400	1,200–1,500	900–1,100
Bolton St	Bridge St to Main Rd	Northbound	1,600–2,100	1,800–2,300	1,700–2,100
Bolton St	Bridge St to Main Rd	Southbound	1,400–1,800	1,500–2,000	1,100–1,400
Bridge St	Bolton St to Main Rd	Eastbound	1,400–1,800	1,500–1,900	1,600–2,100
Bridge St	Bolton St to Main Rd	Westbound	1,200–1,600	1,200–1,600	1,300–1,700
Bridge St	Manningham St to Templestowe Rd	Eastbound	1,200–1,600	1,700–2,200	2,000–2,600
Bridge St	Manningham St to Templestowe Rd	Westbound	600–800	1,000–1,300	800–1,100
Broadway	High St to Boldrewood Pde	Eastbound	1,400–1,800	1,500–1,900	1,400–1,900
Broadway	High St to Boldrewood Pde	Westbound	1,800–2,300	1,900–2,500	1,900–2,500
Bulleen Rd	Eastern Fwy to Manningham Rd	Northbound	3,400–4,400	3,200–4,100	2,700–3,400
Bulleen Rd	Eastern Fwy to Manningham Rd	Southbound	1,800–2,400	1,900–2,500	2,400–3,100
Bulleen Rd	Doncaster Rd to Eastern Fwy	Northbound	1,400–1,800	1,600–2,100	1,800–2,300
Bulleen Rd	Doncaster Rd to Eastern Fwy	Southbound	800–1,000	1,000–1,300	1,200–1,600
Burgundy St	Rosanna Rd to Upper Heidelberg Rd	Eastbound	1,100–1,400	1,200–1,500	1,100–1,500
Burgundy St	Rosanna Rd to Upper Heidelberg Rd	Westbound	500–600	500–600	600–800
Burke Rd	Harp Rd to Cotham Rd	Northbound	2,200–2,900	2,300–3,000	2,400–3,100

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Burke Rd	Harp Rd to Cotham Rd	Southbound	2,200–2,900	2,400–3,100	2,500–3,200
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Northbound	2,600–3,300	2,500–3,300	2,200–2,800
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Southbound	2,300–3,000	2,400–3,200	2,200–2,800
Burke Rd	Doncaster Rd to Eastern Fwy	Northbound	1,700–2,200	2,100–2,700	2,000–2,600
Burke Rd	Doncaster Rd to Eastern Fwy	Southbound	1,800–2,400	2,200–2,800	2,100–2,700
Burke Rd	High St to Harp Rd	Northbound	1,800–2,300	1,900–2,500	2,000–2,600
Burke Rd	High St to Harp Rd	Southbound	1,600–2,100	1,800–2,400	1,800–2,300
Bush Blvd	McDonalds Rd to Plenty Rd	Northbound	900–1,200	1,500–2,000	1,500–2,000
Bush Blvd	McDonalds Rd to Plenty Rd	Southbound	700–900	1,100–1,400	1,200–1,600
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Northbound	3,000–3,900	5,400–6,900	4,600–6,000
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Southbound	2,400–3,100	4,400–5,800	4,100–5,400
Chapman St	Ellesmere Pde to Thomson Dr	Eastbound	1,600–2,100	1,800–2,300	1,800–2,300
Chapman St	Ellesmere Pde to Thomson Dr	Westbound	800–1,000	1,000–1,200	1,300–1,700
Cherry St	Waiora Rd to Wungan St	Eastbound	1,100–1,400	1,200–1,500	1,200–1,500
Cherry St	Waiora Rd to Wungan St	Westbound	400–500	700–900	800–1,000
Childs Rd	Dalton Rd to Plenty Rd	Eastbound	3,000–3,900	3,400–4,400	3,400–4,400
Childs Rd	Dalton Rd to Plenty Rd	Westbound	1,300–1,700	2,200–2,900	2,400–3,100
Cooper St	Edgars Rd to High St	Eastbound	3,300–4,300	2,700–3,500	2,800–3,600
Cooper St	Edgars Rd to High St	Westbound	2,900–3,700	3,000–3,800	3,000–3,900
Cooper St	Hume Fwy to Edgars Rd	Eastbound	2,600–3,400	2,700–3,500	2,800–3,600
Cooper St	Hume Fwy to Edgars Rd	Westbound	2,600–3,400	2,700–3,500	2,800–3,600
Cotham Rd	Glenferrie Rd to Burke Rd	Eastbound	1,500–1,900	1,600–2,100	1,500–1,900
Cotham Rd	Glenferrie Rd to Burke Rd	Westbound	700–900	1,100–1,500	1,100–1,400
Cotham Rd	High St to Glenferrie Rd	Eastbound	1,100–1,400	1,300–1,700	1,200–1,500
Cotham Rd	High St to Glenferrie Rd	Westbound	900–1,100	1,200–1,500	1,100–1,500
Dalton Rd	North of M80 Ring Road	Northbound	3,900–5,000	4,300–5,500	4,300–5,500
Dalton Rd	North of M80 Ring Road	Southbound	2,400–3,100	3,100–4,000	3,200–4,100
Dalton Rd	Childs Rd to McKimmies Rd	Northbound	3,000–3,900	3,400–4,400	3,400–4,400
Dalton Rd	Childs Rd to McKimmies Rd	Southbound	1,700–2,200	2,100–2,800	2,100–2,800
Dalton Rd	Keon Pde to Settlement Rd	Northbound	2,700–3,500	3,000–3,900	2,700–3,500
Dalton Rd	Keon Pde to Settlement Rd	Southbound	2,700–3,500	3,200–4,100	3,000–3,800

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Dalton Rd	Settlement Rd to M80 Ring Road	Northbound	4,900–6,400	5,400–7,000	5,400–7,000
Dalton Rd	Settlement Rd to M80 Ring Road	Southbound	2,600–3,400	3,100–4,100	3,000–3,900
Dalton Rd	South of Cooper St	Northbound	1,800–2,300	2,500–3,300	2,700–3,500
Dalton Rd	South of Cooper St	Southbound	600–800	800–1,000	800–1,000
Darebin Rd	At Darebin Creek	Eastbound	1,900–2,400	2,000–2,600	1,900–2,500
Darebin Rd	At Darebin Creek	Westbound	1,200–1,500	1,500–1,900	1,500–1,900
Darebin Rd	High St to Station St	Eastbound	900–1,200	1,000–1,300	1,100–1,400
Darebin Rd	High St to Station St	Westbound	1,100–1,400	1,400–1,800	1,400–1,800
Darebin Rd	Station St to Grange Rd	Eastbound	1,700–2,300	1,900–2,500	1,900–2,500
Darebin Rd	Station St to Grange Rd	Westbound	1,700–2,200	1,900–2,400	1,900–2,400
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Eastbound	4,500–5,800	4,900–6,400	5,600–7,300
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Westbound	2,200–2,800	2,500–3,300	2,800–3,600
Diamond Creek Rd	St Helena Rd to Greensborough Bypass	Northbound	2,100–2,800	2,400–3,100	2,200–2,800
Diamond Creek Rd	St Helena Rd to Greensborough Bypass	Southbound	1,700–2,200	2,000–2,600	2,000–2,600
Diamond Creek Rd	Yan Yean Rd to Ryans Rd	Eastbound	3,300–4,300	3,300–4,300	3,600–4,700
Diamond Creek Rd	Yan Yean Rd to Ryans Rd	Westbound	1,900–2,500	2,000–2,600	2,100–2,800
Doncaster Rd	East of Eastern Fwy	Eastbound	1,700–2,100	2,000–2,500	1,600–2,000
Doncaster Rd	East of Eastern Fwy	Westbound	1,300–1,700	1,800–2,300	1,800–2,300
Doncaster Rd	Middleborough Rd to Station St	Eastbound	2,700–3,500	2,800–3,600	2,700–3,400
Doncaster Rd	Middleborough Rd to Station St	Westbound	1,700–2,300	2,000–2,600	1,900–2,400
Doncaster Rd	Balwyn Rd to Eastern Fwy	Eastbound	2,200–2,800	2,600–3,400	2,700–3,500
Doncaster Rd	Balwyn Rd to Eastern Fwy	Westbound	2,000–2,500	1,800–2,400	1,900–2,400
Doncaster Rd	Blackburn Rd to Springvale Rd	Eastbound	2,200–2,800	2,400–3,100	2,100–2,800
Doncaster Rd	Blackburn Rd to Springvale Rd	Westbound	1,900–2,400	2,100–2,800	2,100–2,700
Doncaster Rd	Blackburn Rd to Wetherby Rd	Eastbound	2,300–3,000	2,500–3,200	2,200–2,900
Doncaster Rd	Blackburn Rd to Wetherby Rd	Westbound	1,500–1,900	1,800–2,300	1,700–2,300
Doncaster Rd	Balwyn Rd to Bulleen Rd	Eastbound	1,800–2,400	1,900–2,500	1,800–2,300
Doncaster Rd	Balwyn Rd to Bulleen Rd	Westbound	900–1,200	1,100–1,400	800–1,100
Drysdale St	Greensborough Rd to Borlase St	Eastbound	100–200	100–200	10–100
Drysdale St	Greensborough Rd to Borlase St	Westbound	10–100	10–100	
Dunne St	At Darebin Creek	Eastbound	700–900	1,000–1,300	1,000–1,300

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Dunne St	At Darebin Creek	Westbound	900–1,100	1,200–1,500	1,200–1,600
Earl St	Princess St to Willsmere Rd	Northbound	600–800	1,100–1,500	1,400–1,800
Earl St	Princess St to Willsmere Rd	Southbound	1,000–1,300	1,700–2,200	1,500–2,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Eastbound	10,200–11,900	10,500–12,300	13,200–15,400
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Westbound	8,800–10,300	10,100–11,800	11,400–13,300
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Eastbound	11,200–13,000	12,300–14,300	15,600–18,200
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Westbound	10,000–11,600	11,400–13,300	13,400–15,700
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Eastbound	12,100–14,200	12,800–15,000	17,700–20,600
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Westbound	10,500–12,200	11,600–13,500	14,900–17,400
Eastern Fwy Mid-block	Tram Rd to Elgar Rd	Eastbound	9,500–11,100	9,900–11,600	15,000–17,500
Eastern Fwy Mid-block	Tram Rd to Elgar Rd	Westbound	8,800–10,200	9,800–11,400	13,200–15,400
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Eastbound	10,400–12,100	11,000–12,900	17,100–20,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Westbound	10,500–12,200	11,500–13,400	15,400–18,000
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Eastbound	9,900–11,500	10,200–12,000	16,800–19,500
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Westbound	9,600–11,200	10,900–12,700	15,900–18,600
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Eastbound	9,200–10,700	11,000–12,800	14,200–16,600
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Westbound	7,600–8,800	9,700–11,300	10,600–12,400
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Eastbound	10,700–12,400	12,100–14,100	15,300–17,900
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Westbound	8,700–10,200	10,800–12,600	11,700–13,700
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Eastbound	10,900–12,700	11,300–13,100	12,900–15,100
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Westbound	7,500–8,700	9,100–10,600	9,600–11,200
Edgars Rd	South of Cooper St	Northbound	900–1,200	2,600–3,400	2,700–3,400
Edgars Rd	South of Cooper St	Southbound	1,400–1,800	2,700–3,500	2,700–3,500
Edgars Rd	North of M80 Ring Road	Northbound	3,200–4,200	3,500–4,600	3,500–4,600
Edgars Rd	North of M80 Ring Road	Southbound	1,800–2,300	2,800–3,600	2,900–3,700
Elder St	Papua St to Longmuir Rd	Eastbound	900–1,200	900–1,100	1,000–1,300
Elder St	Papua St to Longmuir Rd	Westbound	300–400	400–500	150–250
Elgar Rd	North of Eastern Fwy	Northbound	1,800–2,300	2,100–2,700	2,000–2,500
Elgar Rd	North of Eastern Fwy	Southbound	1,100–1,400	1,400–1,800	800–1,100
Elgar Rd	Belmore Rd to Eastern Fwy	Northbound	3,000–3,900	3,400–4,500	3,700–4,800
Elgar Rd	Belmore Rd to Eastern Fwy	Southbound	1,700–2,200	2,100–2,700	2,500–3,200

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Elgar Rd	Belmore Rd to Whitehorse Rd	Northbound	1,700–2,300	2,500–3,300	2,500–3,200
Elgar Rd	Belmore Rd to Whitehorse Rd	Southbound	2,200–2,800	1,900–2,500	2,200–2,800
Eltham-Yarra Glen Rd	North of Donaldson Rd	Northbound	1,400–1,700	1,600–2,000	1,500–2,000
Eltham-Yarra Glen Rd	North of Donaldson Rd	Southbound	600–800	800–1,000	600–700
Eltham-Yarra Glen Rd	North of Henley Rd	Northbound	400–500	400–500	400–500
Eltham-Yarra Glen Rd	North of Henley Rd	Southbound	300–400	300–400	300–400
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Eastbound	500–600	500–700	500–700
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Westbound	400–500	400–500	400–500
Erskine Rd	Ferguson St to Argyle St	Eastbound	900–1,200	1,300–1,700	1,400–1,900
Erskine Rd	Ferguson St to Argyle St	Westbound	400–500	600–800	700–900
Fitzsimons Ln	At Yarra River	Northbound	5,300–6,800	5,800–7,500	4,900–6,400
Fitzsimons Ln	At Yarra River	Southbound	3,300–4,200	3,700–4,800	2,800–3,600
Foote St	West of Fitzsimons Ln	Eastbound	2,000–2,600	2,800–3,700	2,300–2,900
Foote St	West of Fitzsimons Ln	Westbound	900–1,200	1,100–1,500	1,100–1,400
Gorge Rd	At Plenty River	Eastbound	1,000–1,400	1,300–1,700	1,200–1,500
Gorge Rd	At Plenty River	Westbound	1,200–1,500	1,400–1,800	1,400–1,800
Grange Rd	Darebin Rd to Heidelberg Rd	Northbound	1,700–2,200	2,600–3,400	2,400–3,100
Grange Rd	Darebin Rd to Heidelberg Rd	Southbound	1,100–1,500	1,700–2,200	1,700–2,200
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Eastbound	4,600–6,000	5,500–7,100	6,900–8,900
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Westbound	2,400–3,100	2,900–3,800	3,200–4,100
Greensborough Bypass	Grimshaw St to M80 Ring Road	Northbound	4,600–5,900	5,600–7,200	4,900–6,300
Greensborough Bypass	Grimshaw St to M80 Ring Road	Southbound	4,000–5,200	5,600–7,200	4,600–5,900
Greensborough Rd	South of Watsonia Rd	Northbound	3,900–5,000	4,300–5,500	3,200–4,200
Greensborough Rd	South of Watsonia Rd	Southbound	3,100–4,000	3,800–5,000	2,600–3,400
Greenwood Dr	Gresswell Park Dr to Ladd St	Eastbound	500–600	500–700	400–600
Greenwood Dr	Gresswell Park Dr to Ladd St	Westbound	500–600	500–700	500–700
Grimshaw St	Plenty Rd to Watsonia Rd	Eastbound	1,800–2,300	1,800–2,400	1,700–2,200
Grimshaw St	Plenty Rd to Watsonia Rd	Westbound	1,400–1,800	1,400–1,900	1,500–1,900
Grimshaw St	Greensborough Hwy to The Circuit	Eastbound	2,900–3,800	3,600–4,600	3,500–4,600
Grimshaw St	Greensborough Hwy to The Circuit	Westbound	1,900–2,400	2,500–3,300	2,700–3,500
Grimshaw St	Watsonia Rd to Greensborough Hwy	Eastbound	1,900–2,400	2,600–3,300	2,800–3,700

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Grimshaw St	Watsonia Rd to Greensborough Hwy	Westbound	1,300–1,700	1,900–2,400	2,600–3,300
Grimshaw St	Main St to Para Rd	Eastbound	100–200	200–300	10–100
Grimshaw St	Main St to Para Rd	Westbound	1,200–1,500	1,400–1,800	1,100–1,400
Heidelberg Rd	At Darebin Creek	Northbound	2,200–2,900	2,400–3,200	2,200–2,800
Heidelberg Rd	At Darebin Creek	Southbound	1,300–1,700	1,800–2,400	1,700–2,300
Heidelberg Rd	Hoddle St to Station St	Eastbound	3,000–3,900	2,900–3,800	2,700–3,500
Heidelberg Rd	Hoddle St to Station St	Westbound	2,000–2,600	2,600–3,300	2,500–3,200
Heidelberg-Kinglake Rd	North of Cherry Tree Rd	Northbound	100–200	150–250	150–250
Heidelberg-Kinglake Rd	North of Cherry Tree Rd	Southbound	50–150	50–150	50–150
Heidelberg-Kinglake Rd	Kangaroo Ground-Wattle Glen Rd to Wilson Rd	Northbound	1,400–1,800	1,700–2,200	1,700–2,200
Heidelberg-Kinglake Rd	Kangaroo Ground-Wattle Glen Rd to Wilson Rd	Southbound	700–900	900–1,100	800–1,000
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Northbound	900–1,100	1,300–1,600	1,200–1,500
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Southbound	500–600	600–700	500–700
High St	South of Cooper St	Northbound	2,600–3,400	3,400–4,400	3,400–4,400
High St	South of Cooper St	Southbound	1,800–2,300	2,100–2,700	2,100–2,700
High St	North of Settlement Rd	Northbound	2,300–3,000	3,100–4,000	3,100–4,000
High St	North of Settlement Rd	Southbound	1,500–2,000	2,200–2,900	2,400–3,000
High St	Doncaster Rd to Manningham Rd	Northbound	1,900–2,500	2,200–2,800	1,900–2,500
High St	Doncaster Rd to Manningham Rd	Southbound	1,100–1,400	1,300–1,700	1,300–1,700
High St	Keon Pde to Broadway	Northbound	3,000–3,900	3,300–4,300	3,200–4,100
High St	Keon Pde to Broadway	Southbound	2,200–2,800	2,400–3,100	2,300–3,000
High St	Mahoneys Rd to Settlement Rd	Northbound	2,300–3,000	2,800–3,700	2,800–3,600
High St	Mahoneys Rd to Settlement Rd	Southbound	1,600–2,100	2,200–2,900	2,200–2,900
High St	Westgarth St to Queens Pde	Northbound	2,300–3,000	2,300–3,000	2,100–2,700
High St	Westgarth St to Queens Pde	Southbound	1,600–2,100	2,400–3,100	2,100–2,700
High St	Cotham Rd to Parkhill Rd	Eastbound	2,000–2,600	2,100–2,700	2,000–2,700
High St	Cotham Rd to Parkhill Rd	Westbound	1,000–1,300	1,300–1,700	1,400–1,800
High St	Harp Rd to Burke Rd	Eastbound	1,200–1,500	1,300–1,600	1,300–1,600
High St	Harp Rd to Burke Rd	Westbound	700–900	900–1,100	900–1,100
Hoddle St	Heidelberg Rd to Eastern Fwy	Northbound	3,000–3,900	2,900–3,700	2,600–3,400
Hoddle St	Heidelberg Rd to Eastern Fwy	Southbound	2,200–2,900	2,400–3,100	2,400–3,100

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Hoddle St	Eastern Fwy to Johnston St	Northbound	5,100–6,600	4,900–6,300	5,300–6,800
Hoddle St	Eastern Fwy to Johnston St	Southbound	4,400–5,700	5,500–7,100	5,500–7,100
Hoddle St	Johnston St to Victoria St	Northbound	4,500–5,800	4,400–5,700	4,600–6,000
Hoddle St	Johnston St to Victoria St	Southbound	4,000–5,100	5,000–6,500	5,100–6,600
Hoddle St	Victoria St to Bridge Rd	Northbound	2,200–2,900	2,400–3,100	2,500–3,200
Hoddle St	Victoria St to Bridge Rd	Southbound	2,800–3,600	3,100–4,100	3,100–4,000
Hume Fwy	M80 Ring Road to Cooper St	Northbound	6,800–8,000	7,500–8,800	7,500–8,800
Hume Fwy	M80 Ring Road to Cooper St	Southbound	6,000–7,000	6,800–8,000	6,800–8,000
Hume Fwy	North of Cooper St	Northbound	6,400–7,500	7,000–8,200	7,000–8,200
Hume Fwy	North of Cooper St	Southbound	3,300–3,900	6,500–7,600	6,700–7,800
Jika St	Rosanna Rd to Banksia St	Northbound	800–1,100	800–1,000	700–900
Jika St	Rosanna Rd to Banksia St	Southbound	1,700–2,200	2,000–2,600	1,900–2,500
Johnston St	Wellington St to Hoddle St	Eastbound	1,100–1,500	1,100–1,500	1,200–1,500
Johnston St	Wellington St to Hoddle St	Westbound	600–700	700–900	700–800
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Northbound	500–600	600–700	500–700
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Southbound	200–300	300–400	200–300
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Northbound	900–1,200	1,100–1,400	1,000–1,300
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Southbound	500–600	600–800	400–600
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Northbound	2,000–2,500	2,200–2,800	1,900–2,500
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Southbound	1,100–1,400	1,500–1,900	1,000–1,300
Kangaroo Ground-Wattle Glen Rd	Heidelberg-Kinglake Rd to Kangaroo Ground-St Andrews Rd	Eastbound	600–800	700–1,000	500–600
Kangaroo Ground-Wattle Glen Rd	Heidelberg-Kinglake Rd to Kangaroo Ground-St Andrews Rd	Westbound	1,000–1,300	1,200–1,500	900–1,100
Karingal Drive	East of St Helena Rd	Northbound	1,800–2,300	2,000–2,600	1,800–2,300
Karingal Drive	East of St Helena Rd	Southbound	1,600–2,000	1,700–2,200	1,500–1,900
Keon Pde	High St to Dalton Rd	Eastbound	1,400–1,800	1,900–2,400	1,800–2,400
Keon Pde	High St to Dalton Rd	Westbound	1,000–1,300	1,800–2,400	1,800–2,400
King St	East of Williamsons Rd	Eastbound	1,100–1,500	1,300–1,600	1,100–1,400
King St	East of Williamsons Rd	Westbound	700–900	900–1,200	900–1,100
Kingsbury Drive	East of Waterdale Rd	Eastbound	1,600–2,100	1,800–2,300	1,800–2,300
Kingsbury Drive	East of Waterdale Rd	Westbound	700–900	900–1,100	900–1,200

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Kingsbury Drive	West of Waterdale Rd	Eastbound	1,800–2,400	2,000–2,600	1,900–2,400
Kingsbury Drive	West of Waterdale Rd	Westbound	1,900–2,400	2,000–2,500	1,900–2,400
Livingstone St	Oriel Rd to Waterdale Rd	Eastbound	1,000–1,300	1,000–1,300	1,000–1,300
Livingstone St	Oriel Rd to Waterdale Rd	Westbound	900–1,200	900–1,200	900–1,200
Lower Heidelberg Rd	Maltravers Rd to The Eyrie	Northbound	2,200–2,900	2,400–3,100	2,300–2,900
Lower Heidelberg Rd	Maltravers Rd to The Eyrie	Southbound	1,800–2,400	2,100–2,800	2,100–2,700
Lower Heidelberg Rd	Near Ivanhoe Park	Eastbound	1,000–1,200	1,000–1,300	1,000–1,300
Lower Heidelberg Rd	Near Ivanhoe Park	Westbound	600–800	600–800	600–800
Lower Plenty Rd	Greensborough Rd to Para Rd	Eastbound	2,900–3,800	3,700–4,800	3,700–4,800
Lower Plenty Rd	Greensborough Rd to Para Rd	Westbound	1,400–1,800	1,700–2,300	1,900–2,500
Lower Plenty Rd	Rosanna Rd to Greensborough Rd	Eastbound	5,000–6,400	5,400–7,000	5,100–6,600
Lower Plenty Rd	Rosanna Rd to Greensborough Rd	Westbound	3,100–4,000	3,500–4,600	3,100–4,000
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Eastbound	1,700–2,200	2,200–2,800	2,200–2,800
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Westbound	800–1,000	1,200–1,600	1,200–1,500
M80 Ring Road	Dalton Rd to Plenty Rd	Eastbound	8,600–10,000	9,200–10,800	10,000–11,600
M80 Ring Road	Dalton Rd to Plenty Rd	Westbound	6,100–7,100	7,600–8,900	8,700–10,200
M80 Ring Road	Dalton Rd to Edgars Rd	Eastbound	10,000–11,700	11,300–13,200	11,300–13,200
M80 Ring Road	Dalton Rd to Edgars Rd	Westbound	7,400–8,600	9,900–11,600	10,800–12,600
M80 Ring Road	Edgars Rd to Hume Fwy	Eastbound	11,200–13,100	16,400–19,100	16,400–19,100
M80 Ring Road	Edgars Rd to Hume Fwy	Westbound	8,700–10,100	13,700–15,900	14,300–16,700
M80 Ring Road	Hume Fwy to Sydney Rd	Eastbound	12,400–14,500	13,700–15,900	13,700–15,900
M80 Ring Road	Hume Fwy to Sydney Rd	Westbound	9,100–10,700	13,000–15,100	13,000–15,100
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Eastbound	6,700–7,900	9,200–10,700	13,200–15,400
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Westbound	4,700–5,400	6,500–7,600	10,900–12,700
Main Hurstbridge Rd	At Diamond Creek	Eastbound	1,900–2,500	2,000–2,600	2,100–2,700
Main Hurstbridge Rd	At Diamond Creek	Westbound	1,400–1,800	1,400–1,800	1,400–1,800
Main Hurstbridge Rd	East of Diamond Creek town centre	Eastbound	1,400–1,800	1,500–1,900	1,500–2,000
Main Hurstbridge Rd	East of Diamond Creek town centre	Westbound	1,000–1,300	1,000–1,400	1,000–1,300
Main Rd	At Plenty River	Eastbound	2,600–3,400	3,100–4,000	2,800–3,700
Main Rd	At Plenty River	Westbound	1,500–1,900	1,500–2,000	1,500–1,900
Main Rd	East of Ingrams Rd	Eastbound	800–1,000	800–1,100	900–1,100

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Main Rd	East of Ingrams Rd	Westbound	600–700	500–700	600–700
Main Rd	Para Rd to Bolton St	Eastbound	2,200–2,900	2,500–3,200	2,200–2,800
Main Rd	Para Rd to Bolton St	Westbound	1,900–2,400	1,800–2,400	1,700–2,200
Main Rd	Wattletree Rd to Bridge St	Northbound	2,000–2,500	2,100–2,800	2,000–2,600
Main Rd	Wattletree Rd to Bridge St	Southbound	1,300–1,700	1,400–1,900	1,400–1,800
Main Rd	East of Wattletree Rd	Eastbound	1,900–2,500	1,900–2,400	2,000–2,600
Main Rd	East of Wattletree Rd	Westbound	1,300–1,700	1,300–1,600	1,300–1,700
Main Rd	At Diamond Creek	Northbound	2,400–3,200	2,600–3,400	2,500–3,200
Main Rd	At Diamond Creek	Southbound	1,400–1,800	1,600–2,000	1,500–1,900
Main Rd	Fitzsimons La to Bolton St	Eastbound	2,800–3,600	3,100–4,000	2,300–3,000
Main Rd	Fitzsimons La to Bolton St	Westbound	2,500–3,200	2,600–3,300	2,200–2,800
Main St	Para Rd to St Helena Rd	Northbound	1,600–2,100	1,800–2,400	1,700–2,200
Main St	Para Rd to St Helena Rd	Southbound	2,900–3,700	3,100–4,000	3,100–4,000
Manningham Rd	High St to Williamsons Rd	Eastbound	2,900–3,700	3,200–4,100	2,300–2,900
Manningham Rd	High St to Williamsons Rd	Westbound	2,500–3,200	2,900–3,700	2,500–3,300
Manningham Rd	Thompsons Rd to High St	Eastbound	2,900–3,700	3,100–4,000	2,200–2,800
Manningham Rd	Thompsons Rd to High St	Westbound	2,400–3,200	2,800–3,600	2,400–3,100
Manningham Rd	Bulleen Rd to Thompsons Rd	Eastbound	2,800–3,700	2,900–3,800	2,200–2,900
Manningham Rd	Bulleen Rd to Thompsons Rd	Westbound	1,700–2,200	2,400–3,100	1,800–2,400
Maroondah Hwy	East of Eastlink	Eastbound	2,500–3,200	2,900–3,800	2,900–3,800
Maroondah Hwy	East of Eastlink	Westbound	2,400–3,100	3,000–3,800	3,000–3,900
Maroondah Hwy	Ringwood St to Warrandyte Rd	Eastbound	2,300–3,000	2,500–3,300	2,500–3,300
Maroondah Hwy	Ringwood St to Warrandyte Rd	Westbound	1,500–1,900	1,600–2,100	1,600–2,100
Maroondah Hwy	Mitcham Rd to Eastlink	Eastbound	4,600–6,000	4,900–6,400	4,900–6,400
Maroondah Hwy	Mitcham Rd to Eastlink	Westbound	3,200–4,100	3,700–4,700	3,700–4,800
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Northbound	4,700–6,000	4,800–6,200	4,800–6,300
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Southbound	2,900–3,800	3,400–4,400	3,400–4,400
McDonalds Rd	West of Pindari Ave	Eastbound	1,600–2,100	1,500–2,000	1,600–2,000
McDonalds Rd	West of Pindari Ave	Westbound	1,000–1,300	1,100–1,400	1,100–1,500
Merri Pde	St Georges Rd to Westgarth St	Eastbound	800–1,100	900–1,200	1,000–1,200
Merri Pde	St Georges Rd to Westgarth St	Westbound	1,100–1,400	1,200–1,600	1,200–1,500

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Middleborough Rd	North of Eastern Fwy	Northbound	1,900–2,400	2,300–2,900	2,300–3,000
Middleborough Rd	North of Eastern Fwy	Southbound	1,800–2,300	1,700–2,200	1,600–2,000
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Northbound	2,500–3,300	2,000–2,600	1,900–2,500
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Southbound	1,900–2,500	2,000–2,600	2,000–2,600
Mitcham Rd	At Eastern Fwy	Northbound	1,700–2,200	1,900–2,400	2,100–2,700
Mitcham Rd	At Eastern Fwy	Southbound	2,200–2,800	2,300–3,000	2,600–3,300
Mt Dandenong Rd	Maroondah Hwy to Dublin Rd	Eastbound	3,300–4,300	3,600–4,600	3,600–4,600
Mt Dandenong Rd	Maroondah Hwy to Dublin Rd	Westbound	2,100–2,700	2,400–3,100	2,400–3,100
Murray Rd	High St to Plenty Rd	Eastbound	800–1,000	900–1,200	900–1,100
Murray Rd	High St to Plenty Rd	Westbound	1,000–1,300	1,100–1,500	1,200–1,500
Murray Rd	Plenty Rd to Albert St	Eastbound	700–1,000	900–1,100	800–1,100
Murray Rd	Plenty Rd to Albert St	Westbound	900–1,200	1,100–1,400	1,100–1,400
Murray Rd	At Darebin Creek	Eastbound	2,100–2,700	2,300–3,000	2,300–3,000
Murray Rd	At Darebin Creek	Westbound	1,600–2,100	1,800–2,400	1,800–2,300
Nell Street	Longmuir Rd to Greta Street	Eastbound	50–150	50–150	100–200
Nell Street	Longmuir Rd to Greta Street	Westbound	100–200	100–200	100–200
Oriel Rd	Bell St to Livingston St	Northbound	1,400–1,800	1,800–2,400	1,500–1,900
Oriel Rd	Bell St to Livingston St	Southbound	900–1,200	1,300–1,700	1,200–1,500
Para Rd	Rattray Rd to Main Rd	Northbound	1,600–2,100	1,800–2,300	1,500–1,900
Para Rd	Rattray Rd to Main Rd	Southbound	1,000–1,300	1,100–1,400	1,000–1,200
Parker St	Reynolds Rd to Swilk St	Eastbound	1,300–1,600	1,600–2,000	1,500–2,000
Parker St	Reynolds Rd to Swilk St	Westbound	600–800	900–1,100	800–1,000
Plenty Rd	At Darebin Creek	Eastbound	2,300–3,000	2,600–3,400	2,500–3,300
Plenty Rd	At Darebin Creek	Westbound	2,300–2,900	2,800–3,600	2,700–3,500
Plenty Rd	Main Dr to Greenwood Dr	Northbound	3,700–4,800	4,700–6,000	3,800–4,900
Plenty Rd	Main Dr to Greenwood Dr	Southbound	2,700–3,500	3,700–4,800	3,000–3,800
Plenty Rd	McDonalds Rd to Bush Blvd	Northbound	2,600–3,400	4,400–5,700	4,400–5,700
Plenty Rd	McDonalds Rd to Bush Blvd	Southbound	2,100–2,700	3,400–4,400	3,200–4,100
Plenty Rd	North of Mckimmies Rd	Northbound	3,900–5,000	5,600–7,300	5,400–7,000
Plenty Rd	North of Mckimmies Rd	Southbound	2,600–3,400	5,600–7,300	5,600–7,300

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Plenty Rd	Albert St to Murray Rd	Northbound	1,500–2,000	1,700–2,200	1,600–2,100
Plenty Rd	Albert St to Murray Rd	Southbound	1,200–1,500	1,300–1,700	1,300–1,700
Plenty Rd	Murray St to Bell St	Northbound	1,800–2,300	2,000–2,500	1,900–2,400
Plenty Rd	Murray St to Bell St	Southbound	1,000–1,300	1,200–1,600	1,200–1,500
Princess St	Duke St to Wills St	Northbound	1,400–1,800	1,500–1,900	1,700–2,200
Princess St	Duke St to Wills St	Southbound	1,700–2,200	1,900–2,400	2,000–2,500
Queens Pde	Hoddle St to Alexandra Pde	Northbound	1,000–1,400	1,000–1,400	1,000–1,300
Queens Pde	Hoddle St to Alexandra Pde	Southbound	700–900	1,100–1,400	1,000–1,300
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Northbound	700–900	800–1,100	700–900
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Southbound	600–800	900–1,200	600–800
Reynolds Rd	Blackburn Rd to Williamsons Rd	Eastbound	2,500–3,300	2,800–3,700	2,600–3,300
Reynolds Rd	Blackburn Rd to Williamsons Rd	Westbound	2,100–2,700	2,500–3,300	2,200–2,800
Reynolds Rd	Blackburn Rd to Andersons Creek Rd	Eastbound	2,500–3,300	2,800–3,600	2,800–3,600
Reynolds Rd	Blackburn Rd to Andersons Creek Rd	Westbound	1,900–2,400	2,500–3,200	1,900–2,500
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Northbound	1,500–2,000	1,700–2,100	1,600–2,100
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Southbound	800–1,100	1,000–1,300	900–1,100
Ringwood-Warrandyte Rd	Milne Rd to Tortice Dr	Northbound	1,900–2,500	2,000–2,600	2,000–2,600
Ringwood-Warrandyte Rd	Milne Rd to Tortice Dr	Southbound	1,400–1,800	1,600–2,100	1,600–2,100
Rosanna Rd	Brown St to Reid St	Northbound	2,900–3,800	3,000–3,900	2,700–3,500
Rosanna Rd	Brown St to Reid St	Southbound	2,200–2,900	2,100–2,700	1,600–2,100
Ryans Rd	Diamond Creek Rd to Allendale Rd	Northbound	1,300–1,600	1,500–2,000	1,500–1,900
Ryans Rd	Diamond Creek Rd to Allendale Rd	Southbound	800–1,000	900–1,200	800–1,000
Settlement Rd	At Darebin Creek	Eastbound	1,300–1,700	1,600–2,000	1,700–2,200
Settlement Rd	At Darebin Creek	Westbound	1,000–1,300	1,000–1,400	1,000–1,400
Settlement Rd	Dalton Rd to High St	Eastbound	800–1,100	1,000–1,200	1,000–1,300
Settlement Rd	Dalton Rd to High St	Westbound	500–600	800–1,000	900–1,100
Southern Rd	Waterdale Rd to Waiora Rd	Eastbound	1,000–1,300	1,100–1,500	1,100–1,400
Southern Rd	Waterdale Rd to Waiora Rd	Westbound	700–900	900–1,100	700–900
Spring St	Broadway to Murray Rd	Northbound	1,800–2,300	2,000–2,600	1,900–2,500
Spring St	Broadway to Murray Rd	Southbound	1,300–1,700	1,700–2,200	1,600–2,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Springvale Rd	North of Eastlink	Northbound	3,400–4,300	3,400–4,300	3,700–4,700
Springvale Rd	North of Eastlink	Southbound	2,100–2,800	2,400–3,200	2,200–2,900
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Northbound	1,900–2,500	2,100–2,800	2,000–2,500
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Southbound	1,300–1,600	1,400–1,800	1,100–1,400
Springvale Rd	Whitehorse Rd to Eastern Fwy	Northbound	4,100–5,300	4,300–5,600	4,500–5,900
Springvale Rd	Whitehorse Rd to Eastern Fwy	Southbound	3,300–4,200	3,600–4,600	4,300–5,500
St Georges Rd	Bell St to Normanby Ave	Northbound	2,600–3,400	2,700–3,500	2,600–3,400
St Georges Rd	Bell St to Normanby Ave	Southbound	2,400–3,100	2,700–3,500	2,600–3,400
St Georges Rd	Holden St to Alexandra Pde	Northbound	1,500–1,900	1,400–1,800	1,400–1,800
St Georges Rd	Holden St to Alexandra Pde	Southbound	800–1,100	1,000–1,300	1,000–1,300
St Georges Rd	Murray St to Bell St	Northbound	2,300–3,000	2,500–3,300	2,400–3,100
St Georges Rd	Murray St to Bell St	Southbound	1,600–2,100	2,000–2,600	1,900–2,500
St Georges Rd	Normanby Ave to Merri Pde	Northbound	2,700–3,500	2,700–3,500	2,600–3,300
St Georges Rd	Normanby Ave to Merri Pde	Southbound	2,300–2,900	2,600–3,300	2,500–3,300
Station St	Whitehorse Rd to Eastern Fwy	Northbound	2,400–3,100	2,500–3,300	2,500–3,300
Station St	Whitehorse Rd to Eastern Fwy	Southbound	1,500–1,900	1,800–2,300	1,800–2,300
Station St	Bell St to Darebin Rd	Northbound	2,400–3,100	2,600–3,400	2,400–3,100
Station St	Bell St to Darebin Rd	Southbound	2,100–2,700	2,500–3,200	2,400–3,100
Station St	Darebin Rd to Heidelberg Rd	Northbound	1,200–1,500	1,300–1,600	1,000–1,300
Station St	Darebin Rd to Heidelberg Rd	Southbound	1,100–1,400	1,500–1,900	1,300–1,700
Studley Park Road	At Yarra River	Eastbound	1,700–2,200	1,800–2,400	1,700–2,300
Studley Park Road	At Yarra River	Westbound	1,100–1,500	1,500–2,000	1,500–1,900
Surrey Rd	Whitehorse Rd to Eastern Fwy	Northbound	1,900–2,400	1,800–2,300	1,900–2,500
Surrey Rd	Whitehorse Rd to Eastern Fwy	Southbound	1,600–2,000	1,800–2,300	1,900–2,400
Templestowe Rd	Near Birrarrung Park	Eastbound	1,900–2,500	2,900–3,800	2,600–3,400
Templestowe Rd	Near Birrarrung Park	Westbound	800–1,000	1,500–1,900	1,100–1,400
Thompsons Rd	Manningham Rd to Foote St	Northbound	1,200–1,600	1,200–1,500	1,000–1,300
Thompsons Rd	Manningham Rd to Foote St	Southbound	600–800	600–800	600–800
Thompsons Rd	North-east of Eastern Fwy	Eastbound	2,200–2,800	2,100–2,700	1,700–2,100
Thompsons Rd	North-east of Eastern Fwy	Westbound	1,200–1,500	1,400–1,800	1,500–2,000
Tram Rd	North of Eastern Fwy	Northbound	2,400–3,100	2,900–3,700	2,800–3,700

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Tram Rd	North of Eastern Fwy	Southbound	2,500–3,300	2,900–3,800	2,700–3,400
Upper Heidelberg Rd	Banksia St to Studley Rd	Northbound	1,300–1,600	1,300–1,700	1,100–1,500
Upper Heidelberg Rd	Banksia St to Studley Rd	Southbound	1,000–1,300	1,100–1,400	1,000–1,300
Upper Heidelberg Rd	Burgundy St to Waiora Rd	Northbound	2,200–2,800	2,400–3,100	2,200–2,800
Upper Heidelberg Rd	Burgundy St to Waiora Rd	Southbound	1,800–2,400	2,200–2,900	2,000–2,600
Victoria Pde	Hoddle ST to Lansdown St	Eastbound	3,200–4,200	3,100–4,000	3,200–4,100
Victoria Pde	Hoddle ST to Lansdown St	Westbound	2,300–3,000	2,800–3,700	2,900–3,700
Waiora Rd	Southern Rd to Dougharty Rd	Northbound	1,500–2,000	1,900–2,500	1,500–2,000
Waiora Rd	Southern Rd to Dougharty Rd	Southbound	1,400–1,800	1,800–2,400	1,400–1,900
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Eastbound	600–800	900–1,100	600–800
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Westbound	800–1,000	1,000–1,300	800–1,000
Waterdale Rd	Southern Rd to Dougharty Rd	Northbound	1,300–1,700	1,400–1,800	1,300–1,700
Waterdale Rd	Southern Rd to Dougharty Rd	Southbound	1,300–1,700	1,500–1,900	1,400–1,800
Waterdale Rd	Southern Rd to Bell St	Northbound	1,400–1,800	1,500–1,900	1,400–1,800
Waterdale Rd	Southern Rd to Bell St	Southbound	1,300–1,700	1,400–1,900	1,300–1,700
Watsonia Rd	Princes St to Bungay St	Northbound	1,500–1,900	1,600–2,100	1,600–2,100
Watsonia Rd	Princes St to Bungay St	Southbound	800–1,000	900–1,100	1,000–1,300
Watsonia Rd	Greensborough Rd to rail line	Northbound	1,100–1,500	1,400–1,800	1,400–1,800
Watsonia Rd	Greensborough Rd to rail line	Southbound	1,000–1,300	1,100–1,400	1,100–1,400
Wattletree Rd	At Diamond Creek	Northbound	1,200–1,600	1,200–1,600	1,300–1,700
Wattletree Rd	At Diamond Creek	Southbound	1,400–1,800	1,400–1,800	1,400–1,900
Westgarth St	High St to Heidelberg Rd	Eastbound	500–600	600–700	600–800
Westgarth St	High St to Heidelberg Rd	Westbound	500–600	700–1,000	800–1,000
Whitehorse Rd	Station St to Middleborough Rd	Eastbound	2,900–3,800	3,100–4,000	3,000–3,900
Whitehorse Rd	Station St to Middleborough Rd	Westbound	1,500–1,900	2,100–2,700	2,100–2,700
Whitehorse Rd	Elgar Rd to Station St	Eastbound	2,200–2,800	2,400–3,000	2,200–2,800
Whitehorse Rd	Elgar Rd to Station St	Westbound	1,500–1,900	1,700–2,300	1,700–2,200
Whitehorse Rd	Middleborough Rd to Surrey Rd	Eastbound	2,400–3,100	2,700–3,500	2,600–3,300
Whitehorse Rd	Middleborough Rd to Surrey Rd	Westbound	1,700–2,200	2,100–2,800	2,100–2,700
Whitehorse Rd	Surrey Rd to Springvale Rd	Eastbound	3,200–4,100	3,700–4,800	3,600–4,600
Whitehorse Rd	Surrey Rd to Springvale Rd	Westbound	2,300–3,000	2,900–3,800	2,900–3,700

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Whitehorse Rd	Springvale Rd to Mitcham Rd	Eastbound	3,500–4,500	3,700–4,800	3,700–4,800
Whitehorse Rd	Springvale Rd to Mitcham Rd	Westbound	2,800–3,600	3,300–4,300	3,300–4,300
Whitehorse Rd	Burke Rd to Balwyn Rd	Eastbound	1,300–1,600	1,400–1,800	1,300–1,600
Whitehorse Rd	Burke Rd to Balwyn Rd	Westbound	700–900	1,000–1,300	900–1,200
Whitehorse Rd	Union Rd to Elgar Rd	Eastbound	1,500–2,000	1,800–2,400	1,600–2,100
Whitehorse Rd	Union Rd to Elgar Rd	Westbound	1,000–1,300	1,400–1,800	1,300–1,700
Williamsons Rd	Doncaster Rd to Manningham Rd	Northbound	3,900–5,100	4,200–5,400	4,000–5,200
Williamsons Rd	Doncaster Rd to Manningham Rd	Southbound	3,000–3,800	3,100–4,000	2,500–3,200
Williamsons Rd	Foote St to Warrandyte Rd	Northbound	3,100–4,000	3,200–4,200	3,100–4,000
Williamsons Rd	Foote St to Warrandyte Rd	Southbound	2,300–3,000	2,400–3,000	2,100–2,800
Williamsons Rd	King St to Foote St	Northbound	1,800–2,400	1,900–2,500	1,800–2,400
Williamsons Rd	King St to Foote St	Southbound	1,400–1,900	1,700–2,200	1,500–1,900
Williamsons Rd	Manningham Rd to King St	Northbound	2,200–2,900	2,300–2,900	2,200–2,900
Williamsons Rd	Manningham Rd to King St	Southbound	1,200–1,600	1,700–2,200	1,500–2,000
Wungan St	Skye St to Nicholls St	Northbound	1,100–1,500	1,300–1,600	900–1,100
Wungan St	Skye St to Nicholls St	Southbound	300–400	600–700	400–500
Yallambie Rd	Joules Ct to Fresham Rd	Eastbound	500–600	900–1,100	500–600
Yallambie Rd	Joules Ct to Fresham Rd	Westbound	300–400	250–350	400–500
Yan Yean Rd	North of Diamond Creek Rd	Northbound	2,500–3,300	3,400–4,400	3,400–4,400
Yan Yean Rd	North of Diamond Creek Rd	Southbound	1,100–1,500	1,800–2,400	1,900–2,500
Yarra St	Cape St to Hawden St	Eastbound	400–500	700–900	700–900
Yarra St	Cape St to Hawden St	Westbound	200–300	400–500	300–400

Daily traffic volumes (AWDT)

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Albert St	Murray St to Bell St	Northbound	15,000–20,000	18,000–24,000	17,000–22,000
Albert St	Murray St to Bell St	Southbound	15,000–20,000	18,000–24,000	17,000–23,000
Albert St	Plenty Rd to Murray Rd	Northbound	17,000–22,000	21,000–27,000	19,000–25,000
Albert St	Plenty Rd to Murray Rd	Southbound	17,000–21,000	21,000–27,000	19,000–25,000
Alexandra Pde	Rathdowne St to Nicholson St	Eastbound	30,000–39,000	32,000–42,000	32,000–42,000
Alexandra Pde	Rathdowne St to Nicholson St	Westbound	31,000–40,000	33,000–42,000	33,000–43,000
Alexandra Pde	Nicholson St to Brunswick St	Eastbound	37,000–48,000	40,000–52,000	40,000–52,000
Alexandra Pde	Nicholson St to Brunswick St	Westbound	36,000–47,000	39,000–51,000	39,000–51,000
Alexandra Pde	Queens Pde to Hoddle St	Eastbound	32,000–42,000	35,000–45,000	35,000–45,000
Alexandra Pde	Queens Pde to Hoddle St	Westbound	29,000–38,000	31,000–41,000	32,000–42,000
Anderson St	James St to Porter St	Northbound	6,000–8,000	8,000–11,000	6,000–8,000
Anderson St	James St to Porter St	Southbound	7,000–9,000	10,000–13,000	6,000–8,000
Andersons Creek Rd	Reynolds Rd to Warrandyte Rd	Northbound	4,000–5,000	5,000–7,000	4,000–5,000
Andersons Creek Rd	Reynolds Rd to Warrandyte Rd	Southbound	4,000–6,000	5,000–7,000	4,000–6,000
Andersons Creek Rd	Blackburn Rd to Reynolds Rd	Northbound	4,000–5,000	5,000–6,000	5,000–6,000
Andersons Creek Rd	Blackburn Rd to Reynolds Rd	Southbound	4,000–6,000	5,000–6,000	5,000–7,000
Balwyn Rd	Belmore Rd to Whitehorse Rd	Northbound	9,000–11,000	10,000–13,000	11,000–14,000
Balwyn Rd	Belmore Rd to Whitehorse Rd	Southbound	9,000–11,000	10,000–13,000	10,000–13,000
Balwyn Rd	Doncaster Rd to Belmore Rd	Northbound	7,000–9,000	8,000–10,000	8,000–11,000
Balwyn Rd	Doncaster Rd to Belmore Rd	Southbound	7,000–9,000	8,000–10,000	8,000–11,000
Banksia St	Mount St to Hawdon St	Eastbound	20,000–26,000	22,000–29,000	23,000–30,000
Banksia St	Mount St to Hawdon St	Westbound	23,000–29,000	26,000–33,000	26,000–34,000
Banksia St/Manningham Rd	At Yarra River	Eastbound	33,000–43,000	39,000–50,000	33,000–42,000
Banksia St/Manningham Rd	At Yarra River	Westbound	31,000–40,000	36,000–46,000	30,000–39,000
Bell St	Station St to Oriel Rd	Eastbound	21,000–27,000	25,000–33,000	25,000–32,000
Bell St	Station St to Oriel Rd	Westbound	22,000–29,000	26,000–34,000	26,000–34,000
Bell St	Studley Rd to rail line	Eastbound	19,000–25,000	22,000–29,000	23,000–29,000
Bell St	Studley Rd to rail line	Westbound	22,000–29,000	25,000–33,000	26,000–34,000
Bell St	Plenty Rd to Albert St	Eastbound	20,000–26,000	26,000–34,000	25,000–33,000
Bell St	Plenty Rd to Albert St	Westbound	19,000–25,000	24,000–32,000	24,000–31,000
Bell St	Oriel Rd to Waterdale Rd	Eastbound	20,000–26,000	23,000–29,000	23,000–29,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Bell St	Oriel Rd to Waterdale Rd	Westbound	20,000–26,000	23,000–30,000	23,000–30,000
Bell St	Waterdale Rd to Upper Heidelberg Rd	Eastbound	23,000–30,000	27,000–35,000	27,000–34,000
Bell St	Waterdale Rd to Upper Heidelberg Rd	Westbound	24,000–31,000	28,000–36,000	27,000–35,000
Bell St	High St to Plenty Rd	Eastbound	24,000–31,000	30,000–38,000	29,000–38,000
Bell St	High St to Plenty Rd	Westbound	23,000–30,000	28,000–37,000	28,000–36,000
Belmore Rd	Union Rd to Winfield Rd	Northbound	6,000–8,000	7,000–9,000	7,000–9,000
Belmore Rd	Union Rd to Winfield Rd	Southbound	5,000–7,000	6,000–8,000	6,000–8,000
Belmore Rd	Burke Rd to Balwyn Rd	Eastbound	8,000–11,000	10,000–14,000	9,000–12,000
Belmore Rd	Burke Rd to Balwyn Rd	Westbound	7,000–10,000	9,000–12,000	8,000–10,000
Blackburn Rd	Eastern Fwy to Doncaster Rd	Northbound	10,000–14,000	12,000–16,000	13,000–16,000
Blackburn Rd	Eastern Fwy to Doncaster Rd	Southbound	10,000–13,000	12,000–16,000	12,000–16,000
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Northbound	13,000–17,000	14,000–19,000	13,000–17,000
Blackburn Rd	Doncaster Rd to Andersons Creek Rd	Southbound	14,000–18,000	15,000–19,000	14,000–18,000
Blackburn Rd	Reynolds Rd to Andersons Creek Rd	Northbound	8,000–11,000	10,000–13,000	8,000–11,000
Blackburn Rd	Reynolds Rd to Andersons Creek Rd	Southbound	8,000–10,000	9,000–12,000	7,000–9,000
Bolton St	Bridge St to Main Rd	Northbound	9,000–12,000	11,000–15,000	8,000–11,000
Bolton St	Bridge St to Main Rd	Southbound	9,000–12,000	11,000–15,000	8,000–11,000
Bridge St	Bolton St to Main Rd	Eastbound	8,000–11,000	9,000–12,000	9,000–12,000
Bridge St	Bolton St to Main Rd	Westbound	8,000–10,000	9,000–11,000	9,000–12,000
Bridge St	Manningham St to Templestowe Rd	Eastbound	6,000–8,000	10,000–13,000	9,000–12,000
Bridge St	Manningham St to Templestowe Rd	Westbound	5,000–7,000	10,000–12,000	7,000–8,000
Broadway	High St to Boldrewood Pde	Eastbound	10,000–13,000	11,000–15,000	11,000–15,000
Broadway	High St to Boldrewood Pde	Westbound	15,000–20,000	17,000–23,000	18,000–23,000
Bulleen Rd	Eastern Fwy to Manningham Rd	Northbound	21,000–27,000	23,000–30,000	23,000–30,000
Bulleen Rd	Eastern Fwy to Manningham Rd	Southbound	18,000–23,000	20,000–26,000	21,000–28,000
Bulleen Rd	Doncaster Rd to Eastern Fwy	Northbound	7,000–8,000	7,000–9,000	9,000–12,000
Bulleen Rd	Doncaster Rd to Eastern Fwy	Southbound	6,000–8,000	6,000–8,000	9,000–11,000
Burgundy St	Rosanna Rd to Upper Heidelberg Rd	Eastbound	7,000–9,000	8,000–11,000	9,000–11,000
Burgundy St	Rosanna Rd to Upper Heidelberg Rd	Westbound	4,000–6,000	6,000–7,000	6,000–8,000
Burke Rd	Harp Rd to Cotham Rd	Northbound	14,000–18,000	16,000–21,000	17,000–22,000
Burke Rd	Harp Rd to Cotham Rd	Southbound	14,000–18,000	16,000–21,000	17,000–21,000
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Northbound	17,000–22,000	18,000–24,000	15,000–20,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Burke Rd	Eastern Fwy to Lower Heidelberg Rd	Southbound	18,000–23,000	20,000–25,000	16,000–21,000
Burke Rd	Doncaster Rd to Eastern Fwy	Northbound	12,000–16,000	15,000–19,000	13,000–17,000
Burke Rd	Doncaster Rd to Eastern Fwy	Southbound	14,000–17,000	16,000–21,000	15,000–19,000
Burke Rd	High St to Harp Rd	Northbound	13,000–17,000	15,000–19,000	15,000–20,000
Burke Rd	High St to Harp Rd	Southbound	13,000–17,000	15,000–19,000	15,000–19,000
Bush Blvd	McDonalds Rd to Plenty Rd	Northbound	6,000–8,000	10,000–14,000	11,000–14,000
Bush Blvd	McDonalds Rd to Plenty Rd	Southbound	5,000–7,000	9,000–11,000	9,000–12,000
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Northbound	20,000–26,000	34,000–43,000	32,000–42,000
Chandler Hwy	Eastern Fwy to Heidelberg Rd	Southbound	18,000–24,000	30,000–39,000	26,000–34,000
Chapman St	Ellesmere Pde to Thomson Dr	Eastbound	6,000–8,000	8,000–10,000	9,000–11,000
Chapman St	Ellesmere Pde to Thomson Dr	Westbound	7,000–9,000	8,000–11,000	9,000–12,000
Cherry St	Waiora Rd to Wungan St	Eastbound	4,000–5,000	5,000–6,000	5,000–7,000
Cherry St	Waiora Rd to Wungan St	Westbound	3,000–5,000	5,000–6,000	5,000–6,000
Childs Rd	Dalton Rd to Plenty Rd	Eastbound	13,000–17,000	21,000–27,000	22,000–29,000
Childs Rd	Dalton Rd to Plenty Rd	Westbound	13,000–16,000	20,000–26,000	22,000–28,000
Cooper St	Edgars Rd to High St	Eastbound	22,000–28,000	19,000–25,000	19,000–25,000
Cooper St	Edgars Rd to High St	Westbound	22,000–29,000	20,000–26,000	21,000–27,000
Cooper St	Hume Fwy to Edgars Rd	Eastbound	19,000–25,000	20,000–26,000	21,000–27,000
Cooper St	Hume Fwy to Edgars Rd	Westbound	21,000–27,000	22,000–29,000	22,000–29,000
Cotham Rd	Glenferrie Rd to Burke Rd	Eastbound	7,000–9,000	9,000–12,000	9,000–12,000
Cotham Rd	Glenferrie Rd to Burke Rd	Westbound	7,000–8,000	9,000–12,000	9,000–11,000
Cotham Rd	High St to Glenferrie Rd	Eastbound	6,000–7,000	8,000–10,000	7,000–10,000
Cotham Rd	High St to Glenferrie Rd	Westbound	6,000–8,000	9,000–11,000	8,000–11,000
Dalton Rd	North of M80 Ring Road	Northbound	20,000–26,000	27,000–35,000	27,000–36,000
Dalton Rd	North of M80 Ring Road	Southbound	22,000–28,000	29,000–38,000	29,000–38,000
Dalton Rd	Childs Rd to McKimmies Rd	Northbound	16,000–20,000	22,000–28,000	22,000–28,000
Dalton Rd	Childs Rd to McKimmies Rd	Southbound	16,000–20,000	21,000–28,000	21,000–28,000
Dalton Rd	Keon Pde to Settlement Rd	Northbound	16,000–21,000	20,000–26,000	18,000–23,000
Dalton Rd	Keon Pde to Settlement Rd	Southbound	19,000–25,000	24,000–30,000	22,000–28,000
Dalton Rd	Settlement Rd to M80 Ring Road	Northbound	26,000–34,000	33,000–43,000	32,000–42,000
Dalton Rd	Settlement Rd to M80 Ring Road	Southbound	23,000–29,000	28,000–36,000	28,000–36,000
Dalton Rd	South of Cooper St	Northbound	11,000–14,000	15,000–19,000	15,000–19,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Dalton Rd	South of Cooper St	Southbound	5,000–7,000	7,000–9,000	7,000–10,000
Darebin Rd	At Darebin Creek	Eastbound	9,000–12,000	11,000–15,000	11,000–14,000
Darebin Rd	At Darebin Creek	Westbound	8,000–10,000	10,000–13,000	9,000–12,000
Darebin Rd	High St to Station St	Eastbound	6,000–8,000	8,000–11,000	9,000–11,000
Darebin Rd	High St to Station St	Westbound	6,000–8,000	9,000–12,000	9,000–12,000
Darebin Rd	Station St to Grange Rd	Eastbound	12,000–16,000	15,000–19,000	15,000–19,000
Darebin Rd	Station St to Grange Rd	Westbound	12,000–15,000	14,000–19,000	14,000–18,000
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Eastbound	20,000–26,000	24,000–31,000	28,000–37,000
Diamond Creek Rd	Civic Drive to Yan Yean Rd	Westbound	20,000–26,000	24,000–32,000	28,000–36,000
Diamond Creek Rd	St Helena Rd to Greensborough Bypass	Northbound	12,000–15,000	16,000–21,000	15,000–19,000
Diamond Creek Rd	St Helena Rd to Greensborough Bypass	Southbound	11,000–15,000	13,000–17,000	12,000–16,000
Diamond Creek Rd	Yan Yean Rd to Ryans Rd	Eastbound	15,000–20,000	17,000–22,000	18,000–24,000
Diamond Creek Rd	Yan Yean Rd to Ryans Rd	Westbound	17,000–22,000	19,000–25,000	20,000–26,000
Doncaster Rd	East of Eastern Fwy	Eastbound	9,000–12,000	12,000–15,000	11,000–14,000
Doncaster Rd	East of Eastern Fwy	Westbound	10,000–13,000	13,000–16,000	13,000–17,000
Doncaster Rd	Middleborough Rd to Station St	Eastbound	14,000–18,000	17,000–22,000	15,000–19,000
Doncaster Rd	Middleborough Rd to Station St	Westbound	13,000–17,000	17,000–21,000	15,000–19,000
Doncaster Rd	Balwyn Rd to Eastern Fwy	Eastbound	10,000–13,000	12,000–15,000	12,000–15,000
Doncaster Rd	Balwyn Rd to Eastern Fwy	Westbound	14,000–19,000	17,000–22,000	16,000–20,000
Doncaster Rd	Blackburn Rd to Springvale Rd	Eastbound	13,000–16,000	16,000–21,000	14,000–18,000
Doncaster Rd	Blackburn Rd to Springvale Rd	Westbound	13,000–17,000	16,000–21,000	16,000–20,000
Doncaster Rd	Blackburn Rd to Wetherby Rd	Eastbound	12,000–16,000	15,000–20,000	13,000–17,000
Doncaster Rd	Blackburn Rd to Wetherby Rd	Westbound	12,000–15,000	15,000–19,000	15,000–19,000
Doncaster Rd	Balwyn Rd to Bulleen Rd	Eastbound	8,000–11,000	10,000–13,000	9,000–12,000
Doncaster Rd	Balwyn Rd to Bulleen Rd	Westbound	7,000–10,000	10,000–13,000	7,000–10,000
Drysdale St	Greensborough Rd to Borlase St	Eastbound	500–1,500	500–1,500	50–1,000
Drysdale St	Greensborough Rd to Borlase St	Westbound	50–1,000	50–1,000	50–1,000
Dunne St	At Darebin Creek	Eastbound	5,000–6,000	5,000–7,000	6,000–7,000
Dunne St	At Darebin Creek	Westbound	5,000–6,000	6,000–7,000	6,000–7,000
Earl St	Princess St to Willsmere Rd	Northbound	6,000–7,000	8,000–10,000	8,000–10,000
Earl St	Princess St to Willsmere Rd	Southbound	7,000–9,000	10,000–12,000	9,000–12,000
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Eastbound	63,000–73,000	72,000–84,000	93,000–109,000

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Eastern Fwy Mid-block	Springvale Rd to Blackburn Rd	Westbound	63,000–74,000	73,000–85,000	89,000–104,000
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Eastbound	71,000–82,000	80,000–93,000	103,000–120,000
Eastern Fwy Mid-block	Blackburn Rd to Middleborough Rd	Westbound	72,000–85,000	83,000–96,000	102,000–119,000
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Eastbound	75,000–88,000	83,000–97,000	118,000–137,000
Eastern Fwy Mid-block	Middleborough Rd to Tram Rd	Westbound	77,000–90,000	86,000–100,000	117,000–137,000
Eastern Fwy Mid-block	Tram Rd to Elgar Rd	Eastbound	63,000–74,000	69,000–81,000	104,000–122,000
Eastern Fwy Mid-block	Tram Rd to Elgar Rd	Westbound	65,000–76,000	73,000–85,000	104,000–121,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Eastbound	72,000–83,000	78,000–91,000	119,000–138,000
Eastern Fwy Mid-block	Elgar Rd to Doncaster Rd	Westbound	74,000–87,000	82,000–96,000	117,000–136,000
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Eastbound	71,000–82,000	78,000–91,000	120,000–141,000
Eastern Fwy Mid-block	Doncaster Rd to Bulleen Rd	Westbound	72,000–84,000	80,000–93,000	123,000–143,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Eastbound	60,000–69,000	70,000–82,000	83,000–97,000
Eastern Fwy Mid-block	Bulleen Rd to Burke Rd	Westbound	62,000–72,000	73,000–85,000	85,000–99,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Eastbound	70,000–81,000	80,000–93,000	92,000–107,000
Eastern Fwy Mid-block	Burke Rd to Chandler Hwy	Westbound	69,000–81,000	80,000–94,000	90,000–105,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Eastbound	64,000–75,000	73,000–85,000	78,000–91,000
Eastern Fwy Mid-block	Chandler Hwy to Hoddle St	Westbound	59,000–68,000	66,000–76,000	69,000–81,000
Edgars Rd	South of Cooper St	Northbound	7,000–10,000	22,000–29,000	23,000–29,000
Edgars Rd	South of Cooper St	Southbound	8,000–10,000	21,000–27,000	22,000–28,000
Edgars Rd	North of M80 Ring Road	Northbound	16,000–20,000	24,000–31,000	24,000–31,000
Edgars Rd	North of M80 Ring Road	Southbound	16,000–20,000	22,000–28,000	22,000–28,000
Elder St	Papua St to Longmuir Rd	Eastbound	4,000–5,000	4,000–5,000	3,000–4,000
Elder St	Papua St to Longmuir Rd	Westbound	3,000–4,000	3,000–4,000	1,500–2,500
Elgar Rd	North of Eastern Fwy	Northbound	9,000–12,000	11,000–15,000	10,000–13,000
Elgar Rd	North of Eastern Fwy	Southbound	8,000–11,000	10,000–13,000	8,000–10,000
Elgar Rd	Belmore Rd to Eastern Fwy	Northbound	16,000–20,000	18,000–23,000	20,000–25,000
Elgar Rd	Belmore Rd to Eastern Fwy	Southbound	15,000–19,000	17,000–22,000	19,000–25,000
Elgar Rd	Belmore Rd to Whitehorse Rd	Northbound	13,000–17,000	15,000–19,000	16,000–21,000
Elgar Rd	Belmore Rd to Whitehorse Rd	Southbound	13,000–17,000	15,000–19,000	16,000–21,000
Eltham-Yarra Glen Rd	North of Donaldson Rd	Northbound	5,000–7,000	7,000–8,000	5,000–7,000
Eltham-Yarra Glen Rd	North of Donaldson Rd	Southbound	5,000–6,000	6,000–8,000	5,000–6,000
Eltham-Yarra Glen Rd	North of Henley Rd	Northbound	1,500–2,500	2,000–3,000	2,000–3,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Eltham-Yarra Glen Rd	North of Henley Rd	Southbound	1,500–2,500	2,000–3,000	2,000–3,000
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Eastbound	2,000–3,000	3,000–4,000	3,000–4,000
Eltham-Yarra Glen Rd	Kangaroo Ground-St Andrews Rd to Henley Rd	Westbound	2,000–3,000	3,000–4,000	2,500–3,500
Erskine Rd	Ferguson St to Argyle St	Eastbound	4,000–5,000	4,000–6,000	5,000–7,000
Erskine Rd	Ferguson St to Argyle St	Westbound	3,000–4,000	4,000–5,000	4,000–6,000
Fitzsimons Ln	At Yarra River	Northbound	27,000–35,000	33,000–43,000	26,000–33,000
Fitzsimons Ln	At Yarra River	Southbound	26,000–33,000	31,000–40,000	24,000–31,000
Foote St	West of Fitzsimons Ln	Eastbound	9,000–11,000	9,000–12,000	10,000–13,000
Foote St	West of Fitzsimons Ln	Westbound	8,000–10,000	8,000–11,000	9,000–12,000
Gorge Rd	At Plenty River	Eastbound	6,000–8,000	8,000–10,000	7,000–9,000
Gorge Rd	At Plenty River	Westbound	6,000–8,000	8,000–10,000	7,000–9,000
Grange Rd	Darebin Rd to Heidelberg Rd	Northbound	11,000–15,000	20,000–25,000	17,000–22,000
Grange Rd	Darebin Rd to Heidelberg Rd	Southbound	8,000–11,000	14,000–18,000	13,000–17,000
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Eastbound	22,000–28,000	26,000–33,000	31,000–40,000
Greensborough Bypass	M80 Ring Road interchange to Diamond Creek Rd	Westbound	22,000–28,000	29,000–38,000	33,000–43,000
Greensborough Bypass	Grimshaw St to M80 Ring Road	Northbound	31,000–41,000	38,000–50,000	33,000–43,000
Greensborough Bypass	Grimshaw St to M80 Ring Road	Southbound	30,000–39,000	41,000–53,000	32,000–42,000
Greensborough Rd	South of Watsonia Rd	Northbound	26,000–34,000	31,000–40,000	23,000–30,000
Greensborough Rd	South of Watsonia Rd	Southbound	26,000–34,000	32,000–41,000	23,000–30,000
Greenwood Dr	Gresswell Park Dr to Ladd St	Eastbound	2,000–3,000	2,500–3,500	2,500–3,500
Greenwood Dr	Gresswell Park Dr to Ladd St	Westbound	2,000–3,000	2,500–3,500	2,500–3,500
Grimshaw St	Plenty Rd to Watsonia Rd	Eastbound	11,000–15,000	13,000–17,000	12,000–16,000
Grimshaw St	Plenty Rd to Watsonia Rd	Westbound	10,000–14,000	12,000–16,000	11,000–14,000
Grimshaw St	Greensborough Hwy to The Circuit	Eastbound	15,000–20,000	21,000–27,000	20,000–25,000
Grimshaw St	Greensborough Hwy to The Circuit	Westbound	14,000–18,000	16,000–21,000	16,000–21,000
Grimshaw St	Watsonia Rd to Greensborough Hwy	Eastbound	11,000–14,000	12,000–16,000	14,000–18,000
Grimshaw St	Watsonia Rd to Greensborough Hwy	Westbound	9,000–12,000	11,000–14,000	12,000–15,000
Grimshaw St	Main St to Para Rd	Eastbound	500–1,500	2,000–3,000	500–1,500
Grimshaw St	Main St to Para Rd	Westbound	9,000–12,000	10,000–13,000	9,000–12,000
Heidelberg Rd	At Darebin Creek	Northbound	10,000–13,000	14,000–18,000	12,000–16,000
Heidelberg Rd	At Darebin Creek	Southbound	11,000–14,000	15,000–19,000	14,000–17,000
Heidelberg Rd	Hoddle St to Station St	Eastbound	15,000–19,000	19,000–24,000	18,000–23,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Heidelberg Rd	Hoddle St to Station St	Westbound	17,000–22,000	21,000–27,000	20,000–26,000
Heidelberg-Kinglake Rd	North of Cherry Tree Rd	Northbound	1,500–2,500	1,500–2,500	2,000–3,000
Heidelberg-Kinglake Rd	North of Cherry Tree Rd	Southbound	1,500–2,500	1,500–2,500	2,000–3,000
Heidelberg-Kinglake Rd	Kangaroo Ground-Wattle Glen Rd to Wilson Rd	Northbound	6,000–8,000	7,000–9,000	7,000–10,000
Heidelberg-Kinglake Rd	Kangaroo Ground-Wattle Glen Rd to Wilson Rd	Southbound	6,000–8,000	6,000–8,000	7,000–9,000
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Northbound	4,000–6,000	5,000–6,000	5,000–7,000
Heidelberg-Warrandyte Rd	At Mullum Mullum Creek	Southbound	5,000–6,000	5,000–7,000	5,000–7,000
High St	South of Cooper St	Northbound	16,000–21,000	25,000–32,000	25,000–32,000
High St	South of Cooper St	Southbound	17,000–21,000	26,000–34,000	27,000–35,000
High St	North of Settlement Rd	Northbound	13,000–17,000	20,000–26,000	21,000–27,000
High St	North of Settlement Rd	Southbound	13,000–17,000	20,000–26,000	21,000–27,000
High St	Doncaster Rd to Manningham Rd	Northbound	9,000–11,000	11,000–14,000	9,000–12,000
High St	Doncaster Rd to Manningham Rd	Southbound	8,000–11,000	10,000–13,000	10,000–13,000
High St	Keon Pde to Broadway	Northbound	18,000–23,000	23,000–30,000	22,000–29,000
High St	Keon Pde to Broadway	Southbound	16,000–20,000	21,000–27,000	20,000–26,000
High St	Mahoneys Rd to Settlement Rd	Northbound	13,000–17,000	20,000–25,000	19,000–25,000
High St	Mahoneys Rd to Settlement Rd	Southbound	13,000–17,000	19,000–25,000	19,000–25,000
High St	Westgarth St to Queens Pde	Northbound	15,000–20,000	17,000–22,000	16,000–21,000
High St	Westgarth St to Queens Pde	Southbound	14,000–18,000	18,000–23,000	16,000–21,000
High St	Cotham Rd to Parkhill Rd	Eastbound	9,000–12,000	12,000–15,000	11,000–14,000
High St	Cotham Rd to Parkhill Rd	Westbound	9,000–12,000	11,000–15,000	11,000–15,000
High St	Harp Rd to Burke Rd	Eastbound	6,000–7,000	7,000–10,000	7,000–10,000
High St	Harp Rd to Burke Rd	Westbound	6,000–8,000	9,000–11,000	8,000–11,000
Hoddle St	Heidelberg Rd to Eastern Fwy	Northbound	19,000–24,000	20,000–26,000	19,000–24,000
Hoddle St	Heidelberg Rd to Eastern Fwy	Southbound	16,000–20,000	18,000–23,000	18,000–23,000
Hoddle St	Eastern Fwy to Johnston St	Northbound	37,000–48,000	42,000–55,000	44,000–57,000
Hoddle St	Eastern Fwy to Johnston St	Southbound	36,000–47,000	42,000–55,000	43,000–55,000
Hoddle St	Johnston St to Victoria St	Northbound	35,000–46,000	41,000–53,000	42,000–54,000
Hoddle St	Johnston St to Victoria St	Southbound	36,000–47,000	43,000–55,000	43,000–56,000
Hoddle St	Victoria St to Bridge Rd	Northbound	28,000–37,000	31,000–41,000	32,000–42,000
Hoddle St	Victoria St to Bridge Rd	Southbound	29,000–38,000	32,000–42,000	33,000–43,000
Hume Fwy	M80 Ring Road to Cooper St	Northbound	41,000–48,000	59,000–69,000	60,000–70,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Hume Fwy	M80 Ring Road to Cooper St	Southbound	41,000–48,000	60,000–70,000	60,000–70,000
Hume Fwy	North of Cooper St	Northbound	29,000–34,000	55,000–64,000	55,000–64,000
Hume Fwy	North of Cooper St	Southbound	29,000–34,000	55,000–64,000	55,000–64,000
Jika St	Rosanna Rd to Banksia St	Northbound	7,000–9,000	8,000–10,000	8,000–10,000
Jika St	Rosanna Rd to Banksia St	Southbound	12,000–16,000	14,000–18,000	11,000–14,000
Johnston St	Wellington St to Hoddle St	Eastbound	7,000–8,000	8,000–11,000	8,000–11,000
Johnston St	Wellington St to Hoddle St	Westbound	7,000–9,000	9,000–11,000	9,000–11,000
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Northbound	1,500–2,500	2,500–3,500	2,000–3,000
Kangaroo Ground-St Andrews Rd	Kangaroo Ground-Wattle Glen Rd to Dawson Rd	Southbound	1,500–2,500	2,500–3,500	2,000–3,000
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Northbound	3,000–4,000	5,000–6,000	3,000–4,000
Kangaroo Ground-Warrandyte Rd	Near Pigeon Bank Rd	Southbound	3,000–4,000	5,000–6,000	3,000–4,000
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Northbound	8,000–11,000	11,000–14,000	8,000–11,000
Kangaroo Ground-Warrandyte Rd (Warrandyte Bridge)	At Yarra River	Southbound	8,000–10,000	10,000–13,000	8,000–10,000
Kangaroo Ground-Wattle Glen Rd	Heidelberg-Kinglake Rd to Kangaroo Ground-St Andrews Rd	Eastbound	4,000–5,000	5,000–6,000	4,000–5,000
Kangaroo Ground-Wattle Glen Rd	Heidelberg-Kinglake Rd to Kangaroo Ground-St Andrews Rd	Westbound	4,000–5,000	5,000–7,000	4,000–5,000
Karingal Drive	East of St Helena Rd	Northbound	10,000–13,000	13,000–16,000	10,000–13,000
Karingal Drive	East of St Helena Rd	Southbound	10,000–13,000	12,000–15,000	10,000–13,000
Keon Pde	High St to Dalton Rd	Eastbound	8,000–10,000	12,000–15,000	14,000–17,000
Keon Pde	High St to Dalton Rd	Westbound	7,000–9,000	10,000–13,000	13,000–16,000
King St	East of Williamsons Rd	Eastbound	6,000–8,000	8,000–10,000	7,000–9,000
King St	East of Williamsons Rd	Westbound	5,000–7,000	6,000–8,000	6,000–8,000
Kingsbury Drive	East of Waterdale Rd	Eastbound	7,000–9,000	9,000–12,000	10,000–12,000
Kingsbury Drive	East of Waterdale Rd	Westbound	6,000–8,000	8,000–10,000	8,000–10,000
Kingsbury Drive	West of Waterdale Rd	Eastbound	13,000–17,000	16,000–21,000	15,000–19,000
Kingsbury Drive	West of Waterdale Rd	Westbound	13,000–16,000	15,000–20,000	14,000–18,000
Livingstone St	Oriel Rd to Waterdale Rd	Eastbound	6,000–8,000	7,000–9,000	7,000–9,000
Livingstone St	Oriel Rd to Waterdale Rd	Westbound	5,000–7,000	6,000–8,000	6,000–8,000
Lower Heidelberg Rd	Maltravers Rd to The Eyrie	Northbound	16,000–20,000	17,000–22,000	16,000–20,000
Lower Heidelberg Rd	Maltravers Rd to The Eyrie	Southbound	15,000–19,000	16,000–21,000	14,000–18,000
Lower Heidelberg Rd	Near Ivanhoe Park	Eastbound	5,000–7,000	7,000–8,000	6,000–8,000
Lower Heidelberg Rd	Near Ivanhoe Park	Westbound	4,000–6,000	5,000–7,000	5,000–7,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Lower Plenty Rd	Greensborough Rd to Para Rd	Eastbound	13,000–17,000	15,000–20,000	16,000–21,000
Lower Plenty Rd	Greensborough Rd to Para Rd	Westbound	13,000–17,000	15,000–20,000	17,000–22,000
Lower Plenty Rd	Rosanna Rd to Greensborough Rd	Eastbound	28,000–37,000	32,000–42,000	27,000–34,000
Lower Plenty Rd	Rosanna Rd to Greensborough Rd	Westbound	28,000–37,000	32,000–42,000	26,000–34,000
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Eastbound	8,000–10,000	9,000–11,000	8,000–11,000
Lower Plenty Rd	Turnham Ave to Rosanna Rd	Westbound	8,000–11,000	10,000–13,000	9,000–12,000
M80 Ring Road	Dalton Rd to Plenty Rd	Eastbound	48,000–56,000	63,000–74,000	69,000–80,000
M80 Ring Road	Dalton Rd to Plenty Rd	Westbound	48,000–56,000	64,000–74,000	71,000–82,000
M80 Ring Road	Dalton Rd to Edgars Rd	Eastbound	57,000–67,000	76,000–88,000	82,000–96,000
M80 Ring Road	Dalton Rd to Edgars Rd	Westbound	55,000–64,000	73,000–85,000	79,000–92,000
M80 Ring Road	Edgars Rd to Hume Fwy	Eastbound	63,000–73,000	96,000–112,000	102,000–119,000
M80 Ring Road	Edgars Rd to Hume Fwy	Westbound	59,000–69,000	89,000–103,000	95,000–110,000
M80 Ring Road	Hume Fwy to Sydney Rd	Eastbound	70,000–82,000	103,000–120,000	103,000–120,000
M80 Ring Road	Hume Fwy to Sydney Rd	Westbound	68,000–79,000	98,000–115,000	99,000–115,000
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Eastbound	39,000–46,000	56,000–65,000	87,000–101,000
M80 Ring Road	M80 Ring Road interchange to Plenty Rd	Westbound	39,000–46,000	53,000–62,000	86,000–100,000
Main Hurstbridge Rd	At Diamond Creek	Eastbound	11,000–14,000	12,000–15,000	12,000–16,000
Main Hurstbridge Rd	At Diamond Creek	Westbound	11,000–14,000	12,000–15,000	12,000–16,000
Main Hurstbridge Rd	East of Diamond Creek town centre	Eastbound	7,000–9,000	8,000–10,000	8,000–10,000
Main Hurstbridge Rd	East of Diamond Creek town centre	Westbound	7,000–9,000	7,000–10,000	7,000–10,000
Main Rd	At Plenty River	Eastbound	12,000–15,000	14,000–18,000	14,000–18,000
Main Rd	At Plenty River	Westbound	12,000–16,000	14,000–18,000	14,000–18,000
Main Rd	East of Ingrams Rd	Eastbound	3,000–5,000	4,000–5,000	4,000–5,000
Main Rd	East of Ingrams Rd	Westbound	4,000–5,000	4,000–5,000	4,000–5,000
Main Rd	Para Rd to Bolton St	Eastbound	12,000–15,000	14,000–18,000	12,000–16,000
Main Rd	Para Rd to Bolton St	Westbound	13,000–17,000	15,000–20,000	13,000–17,000
Main Rd	Wattletree Rd to Bridge St	Northbound	10,000–14,000	12,000–15,000	11,000–14,000
Main Rd	Wattletree Rd to Bridge St	Southbound	11,000–14,000	12,000–16,000	11,000–14,000
Main Rd	East of Wattletree Rd	Eastbound	9,000–12,000	10,000–13,000	10,000–12,000
Main Rd	East of Wattletree Rd	Westbound	10,000–13,000	10,000–13,000	10,000–13,000
Main Rd	At Diamond Creek	Northbound	12,000–15,000	13,000–17,000	12,000–16,000
Main Rd	At Diamond Creek	Southbound	11,000–14,000	13,000–16,000	11,000–15,000

Name	Location	Direction	2017	2036 'no project'	2036 'with project'
Main Rd	Fitzsimons La to Bolton St	Eastbound	19,000–25,000	23,000–30,000	17,000–22,000
Main Rd	Fitzsimons La to Bolton St	Westbound	16,000–21,000	19,000–25,000	14,000–19,000
Main St	Para Rd to St Helena Rd	Northbound	13,000–17,000	16,000–21,000	16,000–20,000
Main St	Para Rd to St Helena Rd	Southbound	13,000–17,000	13,000–17,000	14,000–18,000
Manningham Rd	High St to Williamsons Rd	Eastbound	16,000–21,000	22,000–29,000	15,000–20,000
Manningham Rd	High St to Williamsons Rd	Westbound	14,000–19,000	18,000–24,000	16,000–21,000
Manningham Rd	Thompsons Rd to High St	Eastbound	15,000–20,000	19,000–25,000	15,000–19,000
Manningham Rd	Thompsons Rd to High St	Westbound	14,000–18,000	18,000–23,000	15,000–19,000
Manningham Rd	Bulleen Rd to Thompsons Rd	Eastbound	15,000–19,000	19,000–25,000	15,000–19,000
Manningham Rd	Bulleen Rd to Thompsons Rd	Westbound	11,000–15,000	15,000–19,000	13,000–16,000
Maroondah Hwy	East of Eastlink	Eastbound	15,000–19,000	21,000–27,000	21,000–28,000
Maroondah Hwy	East of Eastlink	Westbound	17,000–22,000	24,000–31,000	25,000–32,000
Maroondah Hwy	Ringwood St to Warrandyte Rd	Eastbound	12,000–16,000	16,000–20,000	16,000–20,000
Maroondah Hwy	Ringwood St to Warrandyte Rd	Westbound	13,000–17,000	17,000–22,000	17,000–22,000
Maroondah Hwy	Mitcham Rd to Eastlink	Eastbound	25,000–32,000	30,000–39,000	31,000–40,000
Maroondah Hwy	Mitcham Rd to Eastlink	Westbound	25,000–32,000	30,000–39,000	30,000–39,000
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Northbound	25,000–32,000	30,000–38,000	30,000–39,000
Maroondah Hwy	Mt Dandenong Rd to Dublin Rd	Southbound	26,000–33,000	31,000–40,000	31,000–40,000
McDonalds Rd	West of Pindari Ave	Eastbound	8,000–10,000	10,000–13,000	10,000–13,000
McDonalds Rd	West of Pindari Ave	Westbound	8,000–11,000	10,000–13,000	10,000–14,000
Merri Pde	St Georges Rd to Westgarth St	Eastbound	7,000–9,000	8,000–11,000	8,000–10,000
Merri Pde	St Georges Rd to Westgarth St	Westbound	9,000–12,000	10,000–13,000	10,000–13,000
Middleborough Rd	North of Eastern Fwy	Northbound	12,000–16,000	14,000–19,000	13,000–17,000
Middleborough Rd	North of Eastern Fwy	Southbound	12,000–15,000	14,000–19,000	14,000–18,000
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Northbound	14,000–19,000	16,000–20,000	17,000–22,000
Middleborough Rd	Whitehorse Rd to Eastern Fwy	Southbound	14,000–18,000	15,000–20,000	16,000–21,000
Mitcham Rd	At Eastern Fwy	Northbound	11,000–14,000	13,000–17,000	13,000–17,000
Mitcham Rd	At Eastern Fwy	Southbound	12,000–15,000	14,000–18,000	15,000–19,000
Mt Dandenong Rd	Maroondah Hwy to Dublin Rd	Eastbound	17,000–22,000	20,000–26,000	20,000–26,000
Mt Dandenong Rd	Maroondah Hwy to Dublin Rd	Westbound	16,000–21,000	19,000–25,000	20,000–25,000
Murray Rd	High St to Plenty Rd	Eastbound	6,000–7,000	7,000–9,000	7,000–9,000
Murray Rd	High St to Plenty Rd	Westbound	6,000–8,000	8,000–10,000	7,000–10,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Murray Rd	Plenty Rd to Albert St	Eastbound	5,000–7,000	7,000–8,000	6,000–8,000
Murray Rd	Plenty Rd to Albert St	Westbound	6,000–7,000	7,000–9,000	7,000–9,000
Murray Rd	At Darebin Creek	Eastbound	11,000–15,000	16,000–21,000	15,000–20,000
Murray Rd	At Darebin Creek	Westbound	10,000–13,000	14,000–19,000	14,000–18,000
Nell Street	Longmuir Rd to Greta Street	Eastbound	500–1,500	500–1,500	500–1,500
Nell Street	Longmuir Rd to Greta Street	Westbound	500–1,500	500–1,500	500–1,500
Oriel Rd	Bell St to Livingston St	Northbound	7,000–8,000	11,000–14,000	9,000–12,000
Oriel Rd	Bell St to Livingston St	Southbound	6,000–8,000	10,000–13,000	8,000–10,000
Para Rd	Rattray Rd to Main Rd	Northbound	9,000–11,000	10,000–13,000	8,000–10,000
Para Rd	Rattray Rd to Main Rd	Southbound	7,000–10,000	9,000–11,000	7,000–9,000
Parker St	Reynolds Rd to Swilk St	Eastbound	6,000–8,000	9,000–11,000	7,000–9,000
Parker St	Reynolds Rd to Swilk St	Westbound	7,000–9,000	9,000–12,000	7,000–9,000
Plenty Rd	At Darebin Creek	Eastbound	16,000–21,000	20,000–26,000	19,000–25,000
Plenty Rd	At Darebin Creek	Westbound	16,000–20,000	20,000–26,000	19,000–24,000
Plenty Rd	Main Dr to Greenwood Dr	Northbound	26,000–34,000	32,000–42,000	28,000–36,000
Plenty Rd	Main Dr to Greenwood Dr	Southbound	25,000–32,000	31,000–41,000	27,000–35,000
Plenty Rd	McDonalds Rd to Bush Blvd	Northbound	17,000–22,000	29,000–38,000	29,000–37,000
Plenty Rd	McDonalds Rd to Bush Blvd	Southbound	19,000–25,000	33,000–43,000	33,000–43,000
Plenty Rd	North of Mckimmies Rd	Northbound	25,000–32,000	38,000–49,000	40,000–52,000
Plenty Rd	North of Mckimmies Rd	Southbound	25,000–32,000	39,000–50,000	41,000–53,000
Plenty Rd	Albert St to Murray Rd	Northbound	9,000–11,000	10,000–13,000	10,000–13,000
Plenty Rd	Albert St to Murray Rd	Southbound	10,000–12,000	12,000–15,000	11,000–15,000
Plenty Rd	Murray St to Bell St	Northbound	9,000–12,000	12,000–15,000	11,000–14,000
Plenty Rd	Murray St to Bell St	Southbound	9,000–12,000	12,000–15,000	11,000–14,000
Princess St	Duke St to Wills St	Northbound	13,000–16,000	15,000–20,000	17,000–21,000
Princess St	Duke St to Wills St	Southbound	15,000–19,000	18,000–23,000	19,000–24,000
Queens Pde	Hoddle St to Alexandra Pde	Northbound	6,000–8,000	8,000–10,000	7,000–10,000
Queens Pde	Hoddle St to Alexandra Pde	Southbound	6,000–8,000	9,000–11,000	8,000–10,000
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Northbound	4,000–5,000	5,000–7,000	4,000–5,000
Research-Warrandyte Rd	Main Rd to Kangaroo Ground-Warrandyte Rd	Southbound	3,000–4,000	4,000–6,000	3,000–4,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Reynolds Rd	Blackburn Rd to Williamsons Rd	Eastbound	13,000–17,000	17,000–22,000	14,000–18,000
Reynolds Rd	Blackburn Rd to Williamsons Rd	Westbound	13,000–17,000	17,000–22,000	15,000–19,000
Reynolds Rd	Blackburn Rd to Andersons Creek Rd	Eastbound	13,000–16,000	15,000–20,000	13,000–17,000
Reynolds Rd	Blackburn Rd to Andersons Creek Rd	Westbound	13,000–17,000	15,000–19,000	14,000–18,000
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Northbound	6,000–8,000	8,000–10,000	7,000–9,000
Ringwood-Warrandyte Rd	South of Jumping Creek Rd	Southbound	6,000–8,000	8,000–10,000	6,000–8,000
Ringwood-Warrandyte Rd	Milne Rd to Tortice Dr	Northbound	9,000–11,000	10,000–14,000	10,000–13,000
Ringwood-Warrandyte Rd	Milne Rd to Tortice Dr	Southbound	9,000–11,000	11,000–14,000	10,000–13,000
Rosanna Rd	Brown St to Reid St	Northbound	20,000–26,000	21,000–28,000	16,000–21,000
Rosanna Rd	Brown St to Reid St	Southbound	19,000–24,000	20,000–26,000	15,000–20,000
Ryans Rd	Diamond Creek Rd to Allendale Rd	Northbound	6,000–8,000	8,000–10,000	6,000–8,000
Ryans Rd	Diamond Creek Rd to Allendale Rd	Southbound	6,000–8,000	8,000–10,000	6,000–8,000
Settlement Rd	At Darebin Creek	Eastbound	8,000–10,000	10,000–13,000	12,000–15,000
Settlement Rd	At Darebin Creek	Westbound	7,000–10,000	10,000–12,000	11,000–14,000
Settlement Rd	Dalton Rd to High St	Eastbound	5,000–6,000	6,000–8,000	6,000–8,000
Settlement Rd	Dalton Rd to High St	Westbound	5,000–6,000	6,000–8,000	7,000–8,000
Southern Rd	Waterdale Rd to Waiora Rd	Eastbound	5,000–7,000	7,000–9,000	6,000–8,000
Southern Rd	Waterdale Rd to Waiora Rd	Westbound	5,000–7,000	7,000–9,000	6,000–8,000
Spring St	Broadway to Murray Rd	Northbound	11,000–14,000	15,000–20,000	14,000–18,000
Spring St	Broadway to Murray Rd	Southbound	11,000–14,000	15,000–20,000	14,000–18,000
Springvale Rd	North of Eastlink	Northbound	18,000–23,000	20,000–26,000	23,000–29,000
Springvale Rd	North of Eastlink	Southbound	16,000–21,000	19,000–25,000	18,000–23,000
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Northbound	10,000–12,000	12,000–15,000	10,000–13,000
Springvale Rd	Reynolds Rd to Old Warrandyte Rd	Southbound	9,000–12,000	11,000–14,000	9,000–11,000
Springvale Rd	Whitehorse Rd to Eastern Fwy	Northbound	25,000–33,000	27,000–36,000	30,000–38,000
Springvale Rd	Whitehorse Rd to Eastern Fwy	Southbound	25,000–33,000	28,000–36,000	30,000–39,000
St Georges Rd	Bell St to Normanby Ave	Northbound	19,000–24,000	21,000–27,000	20,000–26,000
St Georges Rd	Bell St to Normanby Ave	Southbound	19,000–25,000	22,000–29,000	22,000–28,000
St Georges Rd	Holden St to Alexandra Pde	Northbound	8,000–11,000	9,000–11,000	8,000–11,000
St Georges Rd	Holden St to Alexandra Pde	Southbound	9,000–12,000	10,000–13,000	10,000–13,000
St Georges Rd	Murray St to Bell St	Northbound	15,000–19,000	19,000–25,000	18,000–24,000
St Georges Rd	Murray St to Bell St	Southbound	13,000–17,000	17,000–22,000	16,000–21,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
St Georges Rd	Normanby Ave to Merri Pde	Northbound	19,000–25,000	21,000–27,000	20,000–26,000
St Georges Rd	Normanby Ave to Merri Pde	Southbound	19,000–24,000	21,000–27,000	20,000–26,000
Station St	Whitehorse Rd to Eastern Fwy	Northbound	11,000–15,000	14,000–18,000	14,000–18,000
Station St	Whitehorse Rd to Eastern Fwy	Southbound	11,000–15,000	14,000–18,000	15,000–19,000
Station St	Bell St to Darebin Rd	Northbound	15,000–20,000	19,000–25,000	18,000–23,000
Station St	Bell St to Darebin Rd	Southbound	16,000–20,000	20,000–26,000	19,000–24,000
Station St	Darebin Rd to Heidelberg Rd	Northbound	8,000–10,000	9,000–12,000	9,000–11,000
Station St	Darebin Rd to Heidelberg Rd	Southbound	8,000–11,000	9,000–12,000	9,000–11,000
Studley Park Rd	At Yarra River	Eastbound	8,000–10,000	10,000–13,000	9,000–12,000
Studley Park Rd	At Yarra River	Westbound	9,000–11,000	11,000–15,000	11,000–15,000
Surrey Rd	Whitehorse Rd to Eastern Fwy	Northbound	10,000–13,000	11,000–14,000	12,000–16,000
Surrey Rd	Whitehorse Rd to Eastern Fwy	Southbound	10,000–13,000	11,000–15,000	13,000–16,000
Templestowe Rd	Near Birrarrung Park	Eastbound	8,000–11,000	14,000–18,000	14,000–18,000
Templestowe Rd	Near Birrarrung Park	Westbound	7,000–10,000	13,000–17,000	11,000–14,000
Thompsons Rd	Manningham Rd to Foote St	Northbound	6,000–7,000	6,000–8,000	5,000–6,000
Thompsons Rd	Manningham Rd to Foote St	Southbound	6,000–8,000	6,000–8,000	6,000–8,000
Thompsons Rd	North-east of Eastern Fwy	Eastbound	10,000–12,000	11,000–14,000	10,000–13,000
Thompsons Rd	North-east of Eastern Fwy	Westbound	11,000–15,000	13,000–16,000	12,000–16,000
Tram Rd	North of Eastern Fwy	Northbound	14,000–18,000	17,000–22,000	16,000–21,000
Tram Rd	North of Eastern Fwy	Southbound	16,000–21,000	19,000–25,000	18,000–23,000
Upper Heidelberg Rd	Banksia St to Studley Rd	Northbound	7,000–9,000	9,000–11,000	7,000–9,000
Upper Heidelberg Rd	Banksia St to Studley Rd	Southbound	7,000–9,000	10,000–13,000	8,000–11,000
Upper Heidelberg Rd	Burgundy St to Waiora Rd	Northbound	12,000–15,000	15,000–19,000	13,000–17,000
Upper Heidelberg Rd	Burgundy St to Waiora Rd	Southbound	13,000–17,000	17,000–22,000	15,000–19,000
Victoria Pde	Hoddle ST to Lansdown St	Eastbound	23,000–29,000	26,000–34,000	26,000–34,000
Victoria Pde	Hoddle St to Lansdown St	Westbound	20,000–26,000	24,000–31,000	24,000–31,000
Waiora Rd	Southern Rd to Dougharty Rd	Northbound	8,000–11,000	12,000–16,000	9,000–12,000
Waiora Rd	Southern Rd to Dougharty Rd	Southbound	9,000–12,000	14,000–18,000	11,000–14,000
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Eastbound	5,000–6,000	6,000–8,000	5,000–6,000
Warrandyte Rd	Fitzsimons Ln to Blackburn Rd	Westbound	5,000–6,000	7,000–9,000	5,000–6,000
Waterdale Rd	Southern Rd to Dougharty Rd	Northbound	9,000–12,000	11,000–14,000	10,000–12,000
Waterdale Rd	Southern Rd to Dougharty Rd	Southbound	9,000–11,000	11,000–14,000	9,000–12,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Waterdale Rd	Southern Rd to Bell St	Northbound	9,000–11,000	10,000–14,000	9,000–12,000
Waterdale Rd	Southern Rd to Bell St	Southbound	10,000–13,000	11,000–15,000	10,000–13,000
Watsonia Rd	Princes St to Bungay St	Northbound	7,000–9,000	8,000–11,000	10,000–13,000
Watsonia Rd	Princes St to Bungay St	Southbound	5,000–7,000	6,000–8,000	8,000–10,000
Watsonia Rd	Greensborough Rd to rail line	Northbound	7,000–9,000	9,000–12,000	10,000–12,000
Watsonia Rd	Greensborough Rd to rail line	Southbound	5,000–7,000	7,000–9,000	8,000–10,000
Wattletree Rd	At Diamond Creek	Northbound	8,000–10,000	8,000–11,000	8,000–11,000
Wattletree Rd	At Diamond Creek	Southbound	9,000–12,000	9,000–12,000	9,000–12,000
Westgarth St	High St to Heidelberg Rd	Eastbound	3,000–4,000	5,000–6,000	5,000–7,000
Westgarth St	High St to Heidelberg Rd	Westbound	4,000–5,000	6,000–7,000	6,000–7,000
Whitehorse Rd	Station St to Middleborough Rd	Eastbound	14,000–18,000	18,000–24,000	17,000–22,000
Whitehorse Rd	Station Str to Middleborough Rd	Westbound	13,000–17,000	17,000–23,000	17,000–22,000
Whitehorse Rd	Elgar Rd to Station St	Eastbound	12,000–16,000	15,000–19,000	15,000–19,000
Whitehorse Rd	Elgar Rd to Station St	Westbound	11,000–14,000	13,000–16,000	13,000–17,000
Whitehorse Rd	Middleborough Rd to Surrey Rd	Eastbound	12,000–16,000	16,000–20,000	15,000–19,000
Whitehorse Rd	Middleborough Rd to Surrey Rd	Westbound	13,000–17,000	17,000–21,000	16,000–21,000
Whitehorse Rd	Surrey Rd to Springvale Rd	Eastbound	16,000–21,000	21,000–27,000	20,000–26,000
Whitehorse Rd	Surrey Rd to Springvale Rd	Westbound	17,000–22,000	22,000–28,000	21,000–27,000
Whitehorse Rd	Springvale Rd to Mitcham Rd	Eastbound	21,000–27,000	25,000–33,000	25,000–32,000
Whitehorse Rd	Springvale Rd to Mitcham Rd	Westbound	22,000–29,000	27,000–34,000	27,000–35,000
Whitehorse Rd	Burke Rd to Balwyn Rd	Eastbound	6,000–8,000	8,000–11,000	8,000–10,000
Whitehorse Rd	Burke Rd to Balwyn Rd	Westbound	7,000–9,000	9,000–12,000	9,000–11,000
Whitehorse Rd	Union Rd to Elgar Rd	Eastbound	8,000–11,000	11,000–14,000	10,000–13,000
Whitehorse Rd	Union Rd to Elgar Rd	Westbound	8,000–10,000	11,000–14,000	10,000–13,000
Williamsons Rd	Doncaster Rd to Manningham Rd	Northbound	21,000–27,000	25,000–32,000	22,000–28,000
Williamsons Rd	Doncaster Rd to Manningham Rd	Southbound	21,000–27,000	26,000–33,000	21,000–27,000
Williamsons Rd	Foote St to Warrandyte Rd	Northbound	18,000–24,000	19,000–25,000	18,000–23,000
Williamsons Rd	Foote St to Warrandyte Rd	Southbound	17,000–23,000	19,000–25,000	17,000–22,000
Williamsons Rd	King St to Foote St	Northbound	12,000–15,000	13,000–17,000	12,000–15,000
Williamsons Rd	King St to Foote St	Southbound	13,000–17,000	15,000–19,000	13,000–17,000
Williamsons Rd	Manningham Rd to King St	Northbound	12,000–15,000	13,000–17,000	12,000–15,000
Williamsons Rd	Manningham Rd to King St	Southbound	11,000–15,000	12,000–16,000	11,000–15,000

Name	Location	Direction	2017	2036 ‘no project’	2036 ‘with project’
Wungan St	Skye St to Nicholls St	Northbound	4,000–5,000	5,000–7,000	4,000–5,000
Wungan St	Skye St to Nicholls St	Southbound	3,000–4,000	5,000–6,000	4,000–5,000
Yallambie Rd	Joules Ct to Fresham Rd	Eastbound	1,500–2,500	2,500–3,500	1,000–2,000
Yallambie Rd	Joules Ct to Fresham Rd	Westbound	2,000–3,000	3,000–4,000	3,000–4,000
Yan Yean Rd	North of Diamond Creek Rd	Northbound	12,000–15,000	18,000–23,000	20,000–26,000
Yan Yean Rd	North of Diamond Creek Rd	Southbound	10,000–13,000	17,000–21,000	18,000–24,000
Yarra St	Cape St to Hawden St	Eastbound	1,500–2,500	3,000–4,000	3,000–4,000
Yarra St	Cape St to Hawden St	Westbound	1,500–2,500	2,000–3,000	2,000–3,000

Appendix E – Microsimulation results

Eastern Freeway–Freeway modelling results

2036 AM peak: West of Chandler Highway–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
City to Chandler Highway	Mid-block	3,970	99	8.7	B	4,100	99	9.0	B	5,220	99	11.4	C	5,510	99	12.0	C
Chandler Highway	Diverge	3,910	99	8.6	B	4,070	99	9.0	B	5,160	99	11.3	C	5,480	97	12.1	C

2036 PM peak: West of Chandler Highway–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
City to Chandler Highway	Mid-block	6,350	98	13.8	C	7,310	98	15.8	C	6,290	99	13.4	C	7,060	98	15.0	C
Chandler Highway	Diverge	6,300	98	13.8	C	7,290	97	15.9	C	6,220	98	13.3	C	7,030	97	15.0	C

2036 AM peak: West of Chandler Highway–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Chandler Highway	Merge	5,430	97	12.2	C	6,180	98	13.4	C	4,790	96	10.9	B	6,000	97	13.1	C
Chandler Highway towards City	Mid-block	5,550	98	12.0	C	6,210	99	13.4	C	4,880	98	10.8	B	6,030	99	13.1	C

2036 PM peak: West of Chandler Highway–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Chandler Highway	Merge	4,180	97	9.8	B	4,970	98	11.0	B	4,590	96	10.6	B	5,510	98	11.9	C
Chandler Highway towards City	Mid-block	4,430	98	9.7	B	4,990	99	10.9	B	4,860	98	10.5	B	5,540	99	11.9	C

2036 AM peak: Chandler Highway to Burke Road–Eastbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Chandler Highway	Merge	4,380	97	11.2	C	4,690	96	9.8	B	5,560	96	14.3	C	6,080	95	12.8	C
Chandler Highway to Burke Road	Mid-block	4,370	98	12.1	C	4,800	98	10.5	B	5,570	97	15.5	C	6,220	98	13.8	C
Burke Road	Diverge	4,340	98	12.0	C	4,710	98	10.4	B	5,550	84	18.3	D	6,180	98	13.8	C

2036 PM peak: Chandler Highway to Burke Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Chandler Highway	Merge	6,560	25	65.0	F	8,710	92	18.7	D	6,790	29	58.5	F	8,000	95	16.3	D
Chandler Highway to Burke Road	Mid-block	6,470	30	57.4	F	8,930	96	19.8	D	6,920	35	52.3	F	8,180	97	17.5	D
Burke Road	Diverge	6,420	29	59.2	F	8,870	95	20.0	D	6,950	34	54.3	F	8,120	97	17.5	D

2036 AM peak: Burke Road to Chandler Highway–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Burke Road	Merge	7,040	79	24.0	E	8,340	95	17.4	D	6,310	59	33.9	F	8,170	95	17.0	D
Burke Road to Chandler Highway	Mid-block	7,060	85	23.3	E	8,350	96	18.3	D	6,360	66	34.2	F	8,170	96	17.9	D
Chandler Highway	Diverge	7,010	79	26.8	E	8,340	95	18.5	D	6,360	62	34.9	F	8,180	95	18.0	D

2036 PM peak: Burke Road to Chandler Highway–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Burke Road	Merge	5,240	72	23.9	E	6,170	97	13.0	C	5,720	47	47.9	F	6,800	96	14.1	C
Burke Road to Chandler Highway	Mid-block	5,240	74	30.9	F	6,170	98	13.6	C	5,720	51	45.5	F	6,800	97	14.7	C
Chandler Highway	Diverge	5,170	73	35.0	F	6,160	97	13.7	C	5,610	45	46.9	F	6,790	97	14.8	C

2036 AM peak: Burke Road to Bulleen Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Burke Road to Bulleen Road	Mid-block	3,790	98	10.5	B	4,230	98	9.4	B	5,000	97	14.1	C	5,530	98	12.3	C
Bulleen Road and North East Link	Diverge	3,740	98	10.4	B	4,220	99	9.3	B	4,970	97	13.9	C	5,540	98	12.3	C
Collector Distributor	Diverge	-	-	-	-	3,370	99	9.2	B	-	-	-	-	4,450	98	12.2	C
Bulleen Road (NEL)	Diverge	-	-	-	-	830	82	5.8	A	-	-	-	-	1,080	81	7.5	B

2036 PM peak: Burke Road to Bulleen Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Burke Road to Bulleen Road	Mid-block	5,820	29	56.5	F	8,290	95	18.7	D	6,360	35	49.9	F	7,570	97	16.4	D
Bulleen Road and North East Link	Diverge	5,780	27	59.4	F	8,330	96	18.5	D	6,300	31	54.7	F	7,600	98	16.2	D
Collector Distributor	Diverge	-	-	-	-	5,520	97	15.3	C	-	-	-	-	5,030	98	13.4	C
Bulleen Road (NEL)	Diverge	-	-	-	-	2,770	77	19.2	D	-	-	-	-	2,540	77	17.1	D

2036 AM peak: Bulleen Road to Burke Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Collector Distributor	Merge	-	-	-	-	5,180	95	17.0	D	-	-	-	-	5,160	93	17.2	D
Bulleen Road	Merge	6,660	86	19.8	D	6,550	95	18.0	D	5,990	61	27.0	E	6,510	95	17.9	D
North East Link	Merge	-	-	-	-	7,800	95	16.3	D	-	-	-	-	7,790	95	16.2	D
Bulleen Road to Burke Road	Mid-block	6,680	91	20.2	D	7,830	98	16.8	D	5,990	59	31.4	F	7,820	98	16.8	D

2036 PM peak: Bulleen Road to Burke Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Collector Distributor	Merge	-	-	-	-	4,310	96	14.3	C	-	-	-	-	4,760	95	15.5	C
Bulleen Road	Merge	4,740	93	13.3	C	5,020	96	13.9	C	5,380	64	27.3	E	5,610	96	15.2	C
North East Link	Merge	-	-	-	-	5,570	96	12.0	C	-	-	-	-	6,120	96	12.9	C
Bulleen Road to Burke Road	Mid-block	4,740	88	15.4	C	5,590	98	12.3	C	5,310	47	47.5	F	6,150	98	13.2	C

2036 AM peak: Bulleen Road to Doncaster Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Bulleen Road	Merge	4,550	89	16.3	D	1,410	91	8.2	B	5,910	48	43.4	F	1,720	90	10.0	B
North East Link	Merge	-	-	-	-	4,450	90	13.4	C	-	-	-	-	4,690	90	13.8	C
Bulleen Road to Doncaster Road	Mid-block	4,530	88	19.1	D	3,020	93	11.6	C	5,890	80	26.7	E	4,030	92	15.6	C
Bulleen Road to Doncaster Road (CD)	Mid-block	-	-	-	-	4,570	89	15.2	C	-	-	-	-	4,830	89	15.6	C
Doncaster Road	Diverge	4,510	94	17.7	D	4,610	95	14.2	C	5,880	80	26.5	E	4,880	96	14.6	C

2036 PM peak: Bulleen Road to Doncaster Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Bulleen Road	Merge	5,460	32	57.9	F	1,860	89	10.9	B	5,730	36	52.6	F	1,740	88	10.1	B
North East Link	Merge	-	-	-	-	4,660	89	14.2	C	-	-	-	-	4,440	91	12.6	C
Bulleen Road to Doncaster Road	Mid-block	5,480	42	47.8	F	4,850	91	18.9	D	5,760	48	42.6	F	4,410	92	16.7	D
Bulleen Road to Doncaster Road (CD)	Mid-block	-	-	-	-	4,800	88	16.0	C	-	-	-	-	4,570	89	14.2	C
Doncaster Road	Diverge	5,460	38	52.7	F	4,840	95	15.1	C	5,750	44	46.5	F	4,620	97	13.2	C

2036 AM peak: Doncaster Road to Bulleen Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Doncaster Road	Merge	6,380	52	34.1	F	4,270	96	13.2	C	5,800	50	32.2	F	4,860	95	14.8	C
Doncaster Road to Bulleen Road	Mid-block	6,340	68	33.7	F	4,470	94	16.8	D	5,860	66	32.4	F	4,370	94	16.4	D
Doncaster Road to North East Link Offramp (CD)	Mid-Block	-	-	-	-	4,270	97	13.2	C	-	-	-	-	4,860	95	14.8	C
North East Link	Diverge	-	-	-	-	4,270	89	14.3	C	-	-	-	-	4,850	88	16.0	C
Bulleen Road	Diverge	6,330	77	29.4	F	1,970	95	10.9	B	5,890	70	30.9	F	2,110	94	11.8	C

2036 PM peak: Doncaster Road to Bulleen Road–Westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Doncaster Road	Merge	5,490	88	16.4	D	4,920	95	14.5	C	5,950	89	17.2	D	5,040	96	14.3	C
Doncaster Road to Bulleen Road	Mid-block	5,490	80	25.0	E	3,620	94	13.8	C	5,950	79	26.6	E	3,990	94	15.0	C
Doncaster Road to North East Link Offramp (CD)	Mid-Block	-	-	-	-	4,920	96	14.5	C	-	-	-	-	5,040	96	14.3	C
North East Link	Diverge	-	-	-	-	4,920	88	15.7	C	-	-	-	-	5,050	88	15.6	C
Bulleen Road	Diverge	5,480	67	29.9	F	1,880	95	10.1	B	5,960	74	28.5	F	2,090	96	11.1	B

2036 AM peak: Doncaster Road to Elgar Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Doncaster Road	Merge	4,510	93	15.8	C	-	-	-	-	5,970	53	38.3	F	-	-	-	-
Elgar Road	Diverge	4,500	94	17.6	D	-	-	-	-	5,960	81	26.6	E	-	-	-	-
Doncaster Road to Elgar Road (CD)	Weave	-	-	-	-	4,400	94	13.5	C	-	-	-	-	5,050	94	15.1	C
Doncaster Road to Elgar Road	Mid-block	-	-	-	-	2,980	98	10.9	B	-	-	-	-	4,030	97	14.9	C

2036 PM peak: Doncaster Road to Elgar Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Doncaster Road	Merge	5,960	46	49.8	F	-	-	-	-	6,090	48	47.1	F	-	-	-	-
Elgar Road	Diverge	5,960	81	26.7	E	-	-	-	-	6,100	83	26.0	E	-	-	-	-
Doncaster Road to Elgar Road (CD)	Weave	-	-	-	-	5,020	92	15.7	C	-	-	-	-	4,880	94	14.2	C
Doncaster Road to Elgar Road	Mid-block	-	-	-	-	4,850	95	18.2	D	-	-	-	-	4,410	97	15.9	C

2036 AM peak: Elgar Road to Doncaster Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Elgar Road	Merge	6,440	54	38.3	F	-	-	-	-	6,000	55	34.9	F	-	-	-	-
Doncaster Road	Diverge	6,430	79	29.1	F	-	-	-	-	6,000	75	28.8	F	-	-	-	-
Elgar Road to Doncaster Road (CD)	Weave	-	-	-	-	4,100	93	15.0	C	-	-	-	-	4,390	92	15.9	C
Elgar Road to Doncaster Road	Mid-block	-	-	-	-	4,480	97	16.3	D	-	-	-	-	4,360	97	15.8	C

2036 PM peak: Elgar Road to Doncaster Road–Westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Elgar Road	Merge	5,780	76	23.7	E	-	-	-	-	6,260	49	46.1	F	-	-	-	-
Doncaster Road	Diverge	5,770	89	23.2	E	-	-	-	-	6,240	89	24.5	E	-	-	-	-
Elgar Road to Doncaster Road (CD)	Weave	-	-	-	-	4,610	92	16.2	D	-	-	-	-	4,770	92	16.2	D
Elgar Road to Doncaster Road	Mid-block	-	-	-	-	3,630	98	13.4	C	-	-	-	-	3,980	97	14.5	C

2036 AM peak: Elgar Road to Middleborough Road–Eastbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Elgar Road to Tram Road	Mid-block	3,880	98	14.7	C	2,970	98	10.9	B	5,090	95	19.5	D	4,040	97	14.9	C
Tram Road to Middleborough Road	Weave	3,860	98	12.0	C	-	-	-	-	5,070	96	16.4	D	-	-	-	-
Elgar Road to Tram Road (CD)	Mid-block	-	-	-	-	3,330	96	13.3	C	-	-	-	-	3,830	96	14.9	C
Middleborough Road	Diverge	-	-	-	-	2,910	97	10.8	B	-	-	-	-	3,970	96	14.9	C
Middleborough Road (CD)	Diverge	-	-	-	-	3,300	96	13.3	C	-	-	-	-	3,810	95	15.0	C
Tram Road (CD)	Merge	-	-	-	-	3,430	95	11.5	C	-	-	-	-	4,200	94	13.9	C
Tram Road to Collector Distributor	Mid-block	-	-	-	-	2,530	98	9.3	B	-	-	-	-	3,460	98	12.7	C
Collector Distributor	Merge	-	-	-	-	5,940	97	11.4	C	-	-	-	-	7,650	97	14.4	C

2036 PM peak: Elgar Road to Middleborough Road–Eastbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Elgar Road to Tram Road	Mid-block	5,410	94	20.8	D	4,860	95	18.3	D	5,500	95	20.4	D	4,410	97	15.9	C
Tram Road to Middleborough Road	Weave	5,410	96	18.5	D	-	-	-	-	5,490	96	18.8	D	-	-	-	-
Elgar Road to Tram Road (CD)	Mid-block	-	-	-	-	3,830	95	15.5	C	-	-	-	-	3,750	96	14.2	C
Middleborough Road	Diverge	-	-	-	-	4,780	94	18.4	D	-	-	-	-	4,340	96	16.0	C
Middleborough Road (CD)	Diverge	-	-	-	-	3,810	94	15.7	C	-	-	-	-	3,720	96	14.3	C
Tram Road (CD)	Merge	-	-	-	-	4,480	92	15.4	C	-	-	-	-	4,490	95	14.3	C
Tram Road to Collector Distributor	Mid-block	-	-	-	-	4,050	97	14.9	C	-	-	-	-	3,670	98	13.1	C
Collector Distributor	Merge	-	-	-	-	8,540	96	16.4	D	-	-	-	-	8,160	97	14.9	C

2036 AM peak: Middleborough Road to Elgar Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Middleborough Road to Tram Road	Weave	6,900	55	32.0	F	-	-	-	-	6,600	46	35.3	F	-	-	-	-
Tram Road	Diverge	-	-	-	-	7,200	97	16.7	D	-	-	-	-	6,960	97	15.9	C
Middleborough Road to Collector Distributor	Weave	-	-	-	-	7,760	94	16.8	D	-	-	-	-	7,860	94	16.8	D
Tram Road to Elgar Road	Mid-block	6,010	51	41.1	F	4,510	97	16.3	D	5,320	54	34.0	F	4,400	98	15.8	C
Tram Road to Elgar Road (CD)	Mid-block	-	-	-	-	3,260	97	13.2	C	-	-	-	-	3,450	97	13.6	C

2036 PM peak: Middleborough Road to Elgar Road–Westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Middleborough Road to Tram Road	Weave	5,980	95	14.2	C	-	-	-	-	6,520	49	32.4	F	-	-	-	-
Tram Road	Diverge	-	-	-	-	6,570	97	15.1	C	-	-	-	-	7,050	97	15.7	C
Middleborough Road to Collector Distributor	Weave	-	-	-	-	7,080	95	15.0	C	-	-	-	-	7,570	95	15.6	C
Tram Road to Elgar Road	Mid-block	5,000	92	18.6	D	3,660	98	13.4	C	5,450	42	43.3	F	4,020	98	14.4	C
Tram Road to Elgar Road (CD)	Mid-block	-	-	-	-	3,420	97	13.3	C	-	-	-	-	3,560	98	13.2	C

2036 AM peak: Middleborough Road to Springvale Road–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Middleborough Road	Merge	4,460	98	11.3	C	-	-	-	-	6,110	96	15.6	C	-	-	-	-
Blackburn Road	Diverge	4,460	98	12.6	C	-	-	-	-	6,120	96	17.4	D	-	-	-	-
Middleborough Road to Blackburn Road	Weave	-	-	-	-	6,220	96	11.6	C	-	-	-	-	8,200	95	15.2	C
Blackburn Road to Springvale Road	Mid-block	4,130	96	12.8	C	5,550	97	12.8	C	5,610	91	18.1	D	7,310	96	16.7	D
Springvale Road	Diverge	4,050	98	11.4	C	5,520	97	12.7	C	5,510	97	15.5	C	7,280	96	16.6	D

2036 PM peak: Middleborough Road to Springvale Road–Eastbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Middleborough Road	Merge	6,710	95	17.3	D	-	-	-	-	6,800	96	16.6	D	-	-	-	-
Blackburn Road	Diverge	6,720	94	19.3	D	-	-	-	-	6,810	96	18.5	D	-	-	-	-
Middleborough Road to Blackburn Road	Weave	-	-	-	-	8,930	93	16.8	D	-	-	-	-	8,560	95	15.2	C
Blackburn Road to Springvale Road	Mid-block	5,810	88	19.7	D	7,540	95	17.7	D	5,780	91	18.2	D	7,220	97	16.0	C
Springvale Road	Diverge	5,720	97	16.2	C	7,530	94	17.7	D	5,710	97	15.4	C	7,200	96	16.0	C

2036 AM peak: Springvale Road to Middleborough Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Springvale Road	Merge	5,670	45	45.8	F	5,590	94	17.0	D	5,370	72	23.5	E	5,340	94	15.8	C
Springvale Road to Blackburn Road	Mid-block	5,690	93	22.3	E	6,450	96	18.7	D	5,390	95	20.3	D	6,140	97	17.5	D
Blackburn Road to Middleborough Road	Weave	5,690	96	17.8	D	7,740	96	17.8	D	5,390	91	18.2	D	7,500	96	17.0	D

2036 PM peak: Springvale Road to Middleborough Road–Westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Springvale Road	Merge	5,170	80	20.8	D	5,240	93	15.7	C	5,810	49	40.7	F	5,640	94	16.1	C
Springvale Road to Blackburn Road	Mid-block	5,170	93	20.0	D	6,060	97	17.2	D	5,790	93	21.7	D	6,490	97	17.9	D
Blackburn Road to Middleborough Road	Weave	5,150	94	16.2	D	7,190	96	16.3	D	5,780	95	17.4	D	7,730	96	17.0	D

2036 AM peak: Springvale Road to Mullum Mullum Tunnel–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Springvale Road	Merge	3,000	94	9.0	B	3,680	93	11.3	C	4,450	93	13.2	C	4,940	92	14.9	C
Springvale Road to Mullum Mullum Tunnel	Mid-block	3,000	79	-	NA	3,670	78	-	NA	4,450	78	-	NA	4,930	77	-	NA
Mullum Mullum Tunnel	Mid-block	2,970	78	-	NA	3,660	77	-	NA	4,440	77	-	NA	4,940	75	-	NA

2036 PM peak: Springvale Road to Mullum Mullum Tunnel–Eastbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Springvale Road	Merge	4,540	92	13.7	C	4,690	92	14.4	C	4,390	94	12.5	C	4,400	94	12.7	C
Springvale Road to Mullum Mullum Tunnel	Mid-block	4,550	78	-	NA	4,690	77	-	NA	4,390	78	-	NA	4,390	78	-	NA
Mullum Mullum Tunnel	Mid-block	4,550	76	-	NA	4,700	73	-	NA	4,400	76	-	NA	4,390	76	-	NA

2036 AM peak: Melba Tunnel to Springvale Road–Westbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Melba Tunnel	Mid-block	4,470	76	-	NA	4,510	76	-	NA	4,520	76	-	NA	4,440	76	-	NA
Melba Tunnel to Springvale Road	Mid-block	4,450	80	-	NA	4,480	78	-	NA	4,510	83	-	NA	4,410	81	-	NA
Springvale Road	Diverge	4,450	93	13.4	C	4,510	91	14.2	C	4,490	95	12.8	C	4,450	94	13.3	C

2036 PM peak: Melba Tunnel to Springvale Road–Westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Melba Tunnel	Mid-block	4,120	76	-	NA	4,190	76	-	NA	4,830	76	-	NA	4,810	76	-	NA
Melba Tunnel to Springvale Road	Mid-block	4,100	84	-	NA	4,150	84	-	NA	4,810	84	-	NA	4,780	85	-	NA
Springvale Road	Diverge	4,080	94	11.8	C	4,170	95	12.1	C	4,820	94	13.5	C	4,810	94	13.7	C

2036 AM peak: Mullum Mullum Tunnel to EastLink–Southbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Ringwood Bypass	Diverge	2,960	75	-	NA	3,630	73	-	NA	4,420	72	-	NA	4,930	70	-	NA
Maroondah Highway	Diverge	2,270	77	-	NA	2,710	77	-	NA	3,370	76	-	NA	3,680	76	-	NA
Ringwood Bypass	Merge	3,080	94	10.4	B	3,350	93	11.6	C	3,960	92	13.3	C	4,140	92	14.1	C
Maroondah Highway	Merge	3,480	98	9.8	B	3,720	97	10.7	B	4,450	97	12.5	C	4,600	97	13.1	C

2036 PM peak: Mullum Mullum Tunnel to EastLink–Southbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Ringwood Bypass	Diverge	4,550	69	-	NA	4,710	69	-	NA	4,400	73	-	NA	4,410	73	-	NA
Maroondah Highway	Diverge	3,320	76	-	NA	3,360	76	-	NA	3,180	77	-	NA	3,130	77	-	NA
Ringwood Bypass	Merge	4,650	91	15.9	C	4,570	91	15.7	C	4,330	93	13.8	C	4,180	93	13.6	C
Maroondah Highway	Merge	5,180	97	14.5	C	5,070	96	14.4	C	4,930	98	13.1	C	4,750	97	12.9	C

2036 AM peak: EastLink to Melba Tunnel–Northbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Maroondah Highway	Diverge	3,440	98	10.1	B	3,450	98	10.5	B	4,400	96	12.3	C	4,150	97	11.8	C
Ringwood Bypass	Merge	2,570	79	-	NA	4,490	78	-	NA	2,860	78	-	NA	4,420	77	-	NA
Maroondah Highway	Merge	4,450	78	-	NA	2,730	78	-	NA	4,490	77	-	NA	2,810	78	-	NA

2036 PM peak: EastLink to Melba Tunnel–Northbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Maroondah Highway	Diverge	5,160	90	15.4	C	4,940	94	14.2	C	5,870	67	23.2	E	5,660	92	16.3	D
Ringwood Bypass	Merge	3,220	77	-	NA	4,170	77	-	NA	4,020	76	-	NA	4,780	75	-	NA
Maroondah Highway	Merge	4,100	77	-	NA	3,220	77	-	NA	4,800	75	-	NA	3,980	76	-	NA

M80 Ring Road/North East Link–Freeway modelling results

2036 AM peak: Eastern Freeway to Manningham Road–Northbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Eastern Freeway westbound ramp	Mid-block	-	-	-	-	2,640	79	-	NA	-	-	-	-	2,950	79	-	NA
Eastern Freeway eastbound ramp	Mid-block	-	-	-	-	570	82	-	NA	-	-	-	-	570	82	-	NA
Eastern Freeway to Manningham Road	Weave	-	-	-	-	3,240	78	-	NA	-	-	-	-	3,570	78	-	NA

2036 PM peak: Eastern Freeway to Manningham Road–Northbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Eastern Freeway westbound ramp	Mid-block	-	-	-	-	3,200	79	-	NA	-	-	-	-	3,140	79	-	NA
Eastern Freeway eastbound ramp	Mid-block	-	-	-	-	1,660	80	-	NA	-	-	-	-	1,500	80	-	NA
Eastern Freeway to Manningham Road	Weave	-	-	-	-	4,950	76	-	NA	-	-	-	-	4,730	77	-	NA

2036 AM peak: Manningham Road to Eastern Freeway–Southbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Manningham Road to Eastern Freeway	Weave	-	-	-	-	4,580	75	-	NA	-	-	-	-	4,540	76	-	NA
Eastern Freeway eastbound ramp	Mid-block	-	-	-	-	3,260	77	-	NA	-	-	-	-	3,250	77	-	NA
Eastern Freeway westbound ramp	Mid-block	-	-	-	-	1,310	79	-	NA	-	-	-	-	1,250	79	-	NA

2036 PM peak: Manningham Road to Eastern Freeway–Southbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Manningham Road to Eastern Freeway	Weave	-	-	-	-	3,840	78	-	NA	-	-	-	-	3,610	78	-	NA
Eastern Freeway eastbound ramp	Mid-block	-	-	-	-	3,290	77	-	NA	-	-	-	-	3,090	78	-	NA
Eastern Freeway westbound ramp	Mid-block	-	-	-	-	560	79	-	NA	-	-	-	-	510	79	-	NA

2036 AM peak: Manningham Road to Lower Plenty Road–Northbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Manningham Road	Merge	-	-	-	-	3,530	78	-	NA	-	-	-	-	3,930	78	-	NA
Manningham Road to Lower Plenty Road	Mid-block	-	-	-	-	3,540	78	-	NA	-	-	-	-	3,930	78	-	NA
Lower Plenty Road	Diverge	-	-	-	-	3,330	77	-	NA	-	-	-	-	3,740	77	-	NA

2036 PM peak: Manningham Road to Lower Plenty Road–Northbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Manningham Road	Merge	-	-	-	-	5,040	77	-	NA	-	-	-	-	4,850	77	-	NA
Manningham Road to Lower Plenty Road	Mid-block	-	-	-	-	5,050	77	-	NA	-	-	-	-	4,860	77	-	NA
Lower Plenty Road	Diverge	-	-	-	-	4,850	77	-	NA	-	-	-	-	4,680	77	-	NA

2036 AM peak: Lower Plenty Road to Manningham Road–Southbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Lower Plenty Road	Merge	-	-	-	-	4,920	77	-	NA	-	-	-	-	4,970	77	-	NA
Lower Plenty Road to Manningham Road	Mid-block	-	-	-	-	4,920	77	-	NA	-	-	-	-	4,970	77	-	NA
Manningham Road	Diverge	-	-	-	-	4,920	74	-	NA	-	-	-	-	4,970	73	-	NA

2036 PM peak: Lower Plenty Road to Manningham Road–Southbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Lower Plenty Road	Merge	-	-	-	-	4,180	77	-	NA	-	-	-	-	3,920	78	-	NA
Lower Plenty Road to Manningham Road	Mid-block	-	-	-	-	4,190	78	-	NA	-	-	-	-	3,920	78	-	NA
Manningham Road	Diverge	-	-	-	-	4,220	75	-	NA	-	-	-	-	3,900	77	-	NA

2036 AM peak: Lower Plenty Road to Grimshaw Street–Northbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Lower Plenty Road	Merge	-	-	-	-	3,310	81	-	NA	-	-	-	-	3,630	81	-	NA
Lower Plenty Road to Grimshaw Street	Mid-block	-	-	-	-	3,310	91	11.4	C	-	-	-	-	3,630	91	12.4	C
Grimshaw Street	Diverge	-	-	-	-	3,290	94	10.0	B	-	-	-	-	3,620	94	11.9	C

2036 PM peak: Lower Plenty Road to Grimshaw Street–Northbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Lower Plenty Road	Merge	-	-	-	-	5,340	80	-	NA	-	-	-	-	5,070	83	-	NA
Lower Plenty Road to Grimshaw Street	Mid-block	-	-	-	-	5,350	89	17.2	D	-	-	-	-	5,080	93	15.0	C
Grimshaw Street	Diverge	-	-	-	-	5,330	92	16.6	D	-	-	-	-	5,060	95	14.6	C

2036 AM peak: Grimshaw Street to Lower Plenty Road–Southbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Grimshaw Street	Merge	-	-	-	-	4,830	88	18.3	D	-	-	-	-	4,910	87	18.8	D
Grimshaw Street to Lower Plenty Road	Mid-block	-	-	-	-	4,830	96	19.2	D	-	-	-	-	4,900	96	19.7	D
Lower Plenty Road	Diverge	-	-	-	-	4,780	97	18.8	D	-	-	-	-	4,860	97	19.2	D

2036 PM peak: Grimshaw Street to Lower Plenty Road–Southbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Grimshaw Street	Merge	-	-	-	-	4,210	87	17.2	D	-	-	-	-	3,960	91	14.2	C
Grimshaw Street to Lower Plenty Road	Mid-block	-	-	-	-	4,220	96	18.1	D	-	-	-	-	3,950	97	15.3	C
Lower Plenty Road	Diverge	-	-	-	-	4,180	98	17.6	D	-	-	-	-	3,900	98	15.0	C

2036 AM peak: Grimshaw Street to Plenty Road–Northbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
M80 Ring Road diverge to G'borough Bypass	Diverge	-	-	-	-	2,720	98	12.1	C	-	-	-	-	3,000	98	13.1	C
M80 Ring Road diverge to Plenty Road	Diverge	-	-	-	-	2,370	98	10.5	B	-	-	-	-	2,620	98	11.4	C
M80 Ring Road north of Plenty Road diverge	Mid-block	-	-	-	-	1,610	95	7.4	B	-	-	-	-	1,770	95	8.0	B
M80 Ring Road merge with G'borough Bypass	Merge	-	-	-	-	3,350	95	9.4	B	-	-	-	-	3,540	95	10.0	B
M80 Ring Road west of merge	Mid-block	-	-	-	-	3,490	98	10.3	B	-	-	-	-	3,700	98	10.9	B
M80 Ring Road merge with CD Road	Merge	-	-	-	-	4,880	94	13.3	C	-	-	-	-	5,180	94	14.2	C

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
CD Road weave to G'borough Bypass/Plenty Road	Weave	-	-	-	-	2,540	78	-	NA	-	-	-	-	2,670	78	-	NA
CD Road north of diverge	Mid-block	-	-	-	-	2,120	78	-	NA	-	-	-	-	2,220	78	-	NA
CD Road merge with G'borough Bypass	Merge	-	-	-	-	2,070	79	-	NA	-	-	-	-	2,180	79	-	NA
CD Road diverge to Plenty Road/M80 Ring Road	Diverge	-	-	-	-	2,150	77	-	NA	-	-	-	-	2,250	77	-	NA
G'borough Bypass	Mid-block	-	-	-	-	4,240	78	-	NA	-	-	-	-	3,930	78	-	NA
G'borough Bypass diverge to M80 Ring Road/NEL	Diverge	-	-	-	-	4,220	78	-	NA	-	-	-	-	3,920	79	-	NA
G'borough Bypass diverge to M80 Ring Road/Plenty Road	Diverge	-	-	-	-	2,290	79	-	NA	-	-	-	-	2,290	79	-	NA

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
G'borough Bypass west of diverge	Mid-block	-	-	-	-	1,940	78	-	NA	-	-	-	-	1,950	78	-	NA
G'borough Bypass merge with M80 Ring Road (to Plenty Road)	Merge	-	-	-	-	1,270	71	10.6	B	-	-	-	-	1,360	70	11.5	C
CD Road merge with northbound M80 Ring Road ramp (to G'borough Bypass)	Merge	-	-	-	-	700	79	5.0	A	-	-	-	-	770	79	5.5	A
Greensborough Bypass to Plenty Road	Mid-block	3,520	84	15.2	C	-	-	-	-	3,500	84	15.0	C	-	-	-	-
Plenty Road	Diverge	3,430	85	14.6	C	-	-	-	-	3,430	85	14.5	C	-	-	-	-

2036 PM peak: Grimshaw Street to Plenty Road–Northbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
M80 Ring Road diverge to G'borough Bypass	Diverge	-	-	-	-	4,240	92	18.4	D	-	-	-	-	4,000	95	15.9	C
M80 Ring Road diverge to Plenty Road	Diverge	-	-	-	-	3,100	97	12.8	C	-	-	-	-	2,920	98	11.3	C
M80 Ring Road north of Plenty Road diverge	Mid-block	-	-	-	-	2,280	95	9.7	B	-	-	-	-	2,130	97	8.4	B
M80 Ring Road merge with G'borough Bypass	Merge	-	-	-	-	2,860	96	8.4	B	-	-	-	-	2,750	97	7.6	B
M80 Ring Road west of merge	Mid-block	-	-	-	-	2,980	98	8.9	B	-	-	-	-	2,870	99	8.1	B
M80 Ring Road merge with CD Road	Merge	-	-	-	-	4,340	95	11.8	C	-	-	-	-	4,240	96	11.0	B

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
CD Road weave to G'borough Bypass/Plenty Road	Weave	-	-	-	-	2,890	77	-	NA	-	-	-	-	2,850	78	-	NA
CD Road north of diverge	Mid-block	-	-	-	-	1,920	78	-	NA	-	-	-	-	1,920	78	-	NA
CD Road merge with G'borough Bypass	Merge	-	-	-	-	1,780	79	-	NA	-	-	-	-	1,770	79	-	NA
CD Road diverge to Plenty Road/M80 Ring Road	Diverge	-	-	-	-	1,950	77	-	NA	-	-	-	-	1,950	78	-	NA
G'borough Bypass	Mid-block	-	-	-	-	1,780	80	-	NA	-	-	-	-	1,960	79	-	NA
G'borough Bypass diverge to M80 Ring Road/NEL	Diverge	-	-	-	-	1,780	80	-	NA	-	-	-	-	1,950	79	-	NA
G'borough Bypass diverge to M80 Ring Road/Plenty Road	Diverge	-	-	-	-	960	79	-	NA	-	-	-	-	1,020	79	-	NA

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
G'borough Bypass west of diverge	Mid-block	-	-	-	-	730	79	-	NA	-	-	-	-	770	79	-	NA
G'borough Bypass merge with M80 Ring Road (to Plenty Road)	Merge	-	-	-	-	1,170	76	8.7	B	-	-	-	-	1,160	77	8.2	B
CD Road merge with northbound M80 Ring Road ramp (to G'borough Bypass)	Merge	-	-	-	-	2,050	78	13.9	C	-	-	-	-	1,970	78	13.1	C
Greensborough Bypass to Plenty Road	Mid-block	3,010	85	13.2	C	-	-	-	-	3,040	86	12.7	C	-	-	-	-
Plenty Road	Diverge	2,920	86	12.7	C	-	-	-	-	2,960	86	12.4	C	-	-	-	-

2036 AM peak: Plenty Road to Grimshaw Street–Southbound

		First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
	Segment Type	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
M80 Ring Road weave with Plenty Road	Weave	-	-	-	-	5,230	98	11.9	C	-	-	-	-	5,790	97	13.3	C
M80 Ring Road east of weave	Mid-block	-	-	-	-	2,930	99	11.8	C	-	-	-	-	3,240	99	13.1	C
M80 Ring Road merge with G'borough Bypass	Merge	-	-	-	-	3,950	95	14.3	C	-	-	-	-	4,120	94	15.0	C
CD Road diverge to G'borough Bypass/Grimshaw Street	Diverge	-	-	-	-	2,270	89	8.9	B	-	-	-	-	2,530	88	9.9	B
M80 Ring Road off-ramp mid-block to G'borough Bypass	Mid-block	-	-	-	-	660	79	-	NA	-	-	-	-	740	79	-	NA
M80 Ring Road off-ramp merge with	Merge	-	-	-	-	1,300	79	-	NA	-	-	-	-	1,430	79	-	NA

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
G'borough Bypass eastbound																	
G'borough Bypass east of merge	Mid-block	-	-	-	-	1,380	80	-	NA	-	-	-	-	1,530	80	-	NA
CD Road south of M80 Ring Road diverge	Mid-block	-	-	-	-	1,640	79	-	NA	-	-	-	-	1,820	79	-	NA
CD Road weave (southbound) with G'borough Bypass	Weave	-	-	-	-	2,380	76	-	NA	-	-	-	-	2,420	76	-	NA
G'borough Bypass southbound diverge to NEL and Grimshaw Street	Diverge	-	-	-	-	1,800	79	-	NA	-	-	-	-	1,520	79	-	NA
G'borough Bypass southbound mid-block towards NEL	Mid-block	-	-	-	-	1,040	79	-	NA	-	-	-	-	890	80	-	NA
G'borough Bypass southbound mid-	Mid-block	-	-	-	-	770	79	-	NA	-	-	-	-	640	79	-	NA

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
block towards Grimshaw Street																	
Plenty Road	Merge	3,070	87	11.7	C	-	-	-	-	2,970	12	84.8	F	-	-	-	-
Plenty Road to Greensborough Bypass	Mid-block	3,000	26	47.5	F	-	-	-	-	2,880	12	90.8	F	-	-	-	-

2036 PM peak: Plenty Road to Grimshaw Street–Southbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
M80 Ring Road weave with Plenty Road	Weave	-	-	-	-	7,350	95	17.1	D	-	-	-	-	7,240	96	15.9	C
M80 Ring Road east of weave	Mid-block	-	-	-	-	3,040	99	12.8	C	-	-	-	-	2,850	99	11.0	B
M80 Ring Road merge with G'borough Bypass	Merge	-	-	-	-	3,510	95	13.5	C	-	-	-	-	3,330	96	11.6	C
CD Road diverge to G'borough Bypass/Grimshaw Street	Diverge	-	-	-	-	4,270	83	17.6	D	-	-	-	-	4,340	82	17.9	D
M80 Ring Road off-ramp mid-block to G'borough Bypass	Mid-block	-	-	-	-	2,000	78	-	NA	-	-	-	-	1,990	78	-	NA
M80 Ring Road off-ramp merge with	Merge	-	-	-	-	3,840	78	-	NA	-	-	-	-	3,750	78	-	NA

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
G'borough Bypass eastbound																	
G'borough Bypass east of merge	Mid-block	-	-	-	-	4,090	78	-	NA	-	-	-	-	4,000	78	-	NA
CD Road south of M80 Ring Road diverge	Mid-block	-	-	-	-	2,330	79	-	NA	-	-	-	-	2,410	79	-	NA
CD Road weave (southbound) with G'borough Bypass	Weave	-	-	-	-	2,590	76	-	NA	-	-	-	-	2,730	76	-	NA
G'borough Bypass southbound diverge to NEL and Grimshaw Street	Diverge	-	-	-	-	750	79	-	NA	-	-	-	-	850	79	-	NA
G'borough Bypass southbound mid-block towards NEL	Mid-block	-	-	-	-	460	80	-	NA	-	-	-	-	500	80	-	NA
G'borough Bypass southbound mid-	Mid-block	-	-	-	-	290	80	-	NA	-	-	-	-	350	80	-	NA

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
block towards Grimshaw Street																	
Plenty Road	Merge	3,770	14	92.5	F	-	-	-	-	3,920	14	89.1	F	-	-	-	-
Plenty Road to Greensborough Bypass	Mid-block	3,780	18	78.8	F	-	-	-	-	3,920	19	76.2	F	-	-	-	-

2036 AM peak: M80 Ring Road corridor west of Plenty Road–westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Plenty Road	Merge	3,900	95	10.1	B	5,120	96	13.5	C	3,900	95	10.1	B	5,430	96	14.3	C
West of Plenty Road	Mid-block	3,880	98	10.4	B	5,020	99	14.3	C	3,880	98	10.4	B	5,330	98	15.2	C

2036 PM peak: M80 Ring Road corridor west of Plenty Road–westbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Plenty Road	Merge	3,620	95	9.7	B	4,930	96	12.9	C	3,620	95	9.3	B	4,820	97	12.1	C
West of Plenty Road	Mid-Block	3,600	99	9.9	B	4,830	99	13.7	C	3,590	99	9.6	B	4,730	99	12.9	C

2036 AM peak: M80 Ring Road corridor west of Plenty Road–eastbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Plenty Road	Merge	3,640	99	9.9	B	4,070	99	11.6	C	4,040	99	11.1	B	4,530	99	13.0	C
West of Plenty Road	Mid-block	3,600	99	9.9	B	4,160	99	11.9	C	4,000	99	11.0	B	4,630	98	13.4	C

2036 PM peak: M80 Ring Road corridor west of Plenty Road–eastbound

	Segment Type	First hour								Second hour							
		No Project Case				Project Case				No Project Case				Project Case			
		Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service	Arrived Volume	Average Speed (km/hr)	Density (pcu/lane/km/hr)	Level of Service
Plenty Road	Merge	3,930	13	88.1	F	5,580	98	16.0	C	3,890	11	95.3	F	5,270	98	14.4	C
West of Plenty Road	Mid-block	3,800	13	91.4	F	5,700	98	16.3	D	3,840	13	91.3	F	5,390	98	14.8	C

Eastern Freeway–Intersection modelling results

2036 AM peak: Chandler Highway/Yarra Boulevard

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Chandler Highway S	2,230	12.8	B	145	2,140	15.2	B	155	2,500	23.9	C	175	2,400	22.0	C	180
Chandler Highway N	2,890	10.6	B	205	2,510	14.9	B	250	2,950	28.5	C	480	2,820	14.5	B	220
Yarra Boulevard	60	32.4	C	20	210	30.4	C	40	370	26.9	C	85	250	26.6	C	50
Intersection	**5,180**	**11.8**	**B**		**4,860**	**15.7**	**B**		**5,820**	**26.4**	**C**		**5,470**	**18.4**	**B**	

2036 PM peak: Chandler Highway/Yarra Boulevard

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Chandler Highway S	2,470	19.3	B	185	2,110	22.4	C	130	2,460	17.2	B	180	2,200	21.4	C	135
Chandler Highway N	2,110	241.9	F	500+	2,560	9.7	A	205	2,520	209.2	F	500+	2,330	7.4	A	105
Yarra Boulevard	590	53.6	D	225	690	66.4	E	390	540	46.3	D	160	660	50.0	D	220
Intersection	**5,170**	**114.1**	**F**		**5,360**	**22.0**	**C**		**5,520**	**107.7**	**F**		**5,190**	**18.7**	**B**	

2036 AM peak: Chandler Highway/Eastbound Offramp

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Eastbound Offramp	230	23.4	C	30	210	42.8	D	35	320	24.5	C	35	300	40.3	D	40
Chandler Highway E	1,900	22.6	C	300	1,810	8.0	A	130	2,020	34.4	C	365	1,950	13.0	B	180
Chandler Highway W	2,530	19.7	B	220	2,080	3.6	A	80	2,350	19.5	B	215	2,320	4.3	A	95
Intersection	**4,660**	**21.1**	**C**		**4,100**	**7.5**	**A**		**4,690**	**26.3**	**C**		**4,570**	**10.3**	**B**	

2036 PM peak: Chandler Highway/Eastbound Offramp

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Eastbound Offramp	270	27.2	C	35	210	41.9	D	35	340	34.4	C	45	210	43.0	D	40
Chandler Highway E	2,000	16.1	B	220	1,690	2.3	A	30	1,880	11.9	B	125	1,790	2.6	A	35
Chandler Highway W	2,020	61.1	E	230	2,510	3.6	A	105	2,410	60.6	E	230	2,270	2.8	A	50
Intersection	**4,290**	**38.0**	**D**		**4,410**	**5.0**	**A**		**4,630**	**38.9**	**D**		**4,270**	**4.7**	**A**	

2036 AM peak: Chandler Highway/Eastbound Onramp

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Chandler Highway E	170	24.3	C	45	390	22.8	C	55	200	57.3	E	150	440	23.4	C	60
Chandler Highway W	2,750	8.0	A	135	1,380	4.6	A	55	2,670	4.2	A	70	1,580	5.9	A	65
Intersection	**2,920**	**8.9**	**A**		**1,770**	**8.6**	**A**		**2,870**	**7.8**	**A**		**2,020**	**9.7**	**A**	

2036 PM peak: Chandler Highway/Eastbound Onramp

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Chandler Highway E	170	47.8	D	60	820	32.2	C	110	160	45.5	D	60	670	28.4	C	85
Chandler Highway W	2,290	28.5	C	170	1,390	10.5	B	85	2,750	25.7	C	170	1,400	6.8	A	60
Intersection	**2,460**	**29.8**	**C**		**2,210**	**18.6**	**B**		**2,910**	**26.8**	**C**		**2,070**	**13.7**	**B**	

2036 AM peak: Chandler Highway/Westbound Ramps

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Chandler Highway E	1,330	15.5	B	100	1,280	22.6	C	70	1,470	27.0	C	150	1,480	24.0	C	85
Westbound Offramp	1,570	122.7	F	500+	2,290	24.6	C	105	1,660	117.3	F	500+	2,300	28.0	C	110
Chandler Highway W	1,880	13.5	B	205	1,370	15.7	B	130	1,740	9.6	A	80	1,580	14.0	B	160
Intersection	**4,780**	**50.0**	**D**		**4,940**	**21.6**	**C**		**4,870**	**51.5**	**D**		**5,360**	**22.8**	**C**	

2036 PM peak: Chandler Highway/Westbound Ramps

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Chandler Highway E	1,840	17.9	B	135	2,100	17.6	B	110	1,720	18.0	B	125	1,990	18.5	B	110
Westbound Offramp	1,100	193.1	F	500+	1,580	22.4	C	85	1,110	195.0	F	500+	1,740	23.7	C	95
Chandler Highway W	1,240	8.6	A	50	1,390	12.0	B	55	1,700	11.3	B	75	1,410	11.9	B	45
Intersection	**4,180**	**61.1**	**E**		**5,070**	**17.6**	**B**		**4,530**	**58.9**	**E**		**5,140**	**18.4**	**B**	

2036 AM peak: Chandler Highway/Earl Street/Princess Street

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Princess Street	690	9.9	A	45	680	7.4	A	50	630	10.0	A	45	780	9.0	A	75
Earl Street	660	31.0	C	70	610	39.2	D	90	880	52.3	D	410	720	38.6	D	100
Chandler Highway	2,380	22.0	C	190	2,530	4.1	A	65	2,430	16.8	B	170	2,780	4.7	A	75
Intersection	**3,730**	**21.4**	**C**		**3,820**	**10.3**	**B**		**3,940**	**23.7**	**C**		**4,280**	**11.2**	**B**	

2036 PM peak: Chandler Highway/Earl Street/Princess Street

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Princess Street	1,180	7.0	A	60	1,300	13.0	B	100	1,060	7.1	A	55	1,190	12.2	B	100
Earl Street	670	128.6	F	415	810	43.2	D	120	680	136.5	F	415	800	43.7	D	140
Chandler Highway	1,580	5.4	A	75	2,110	7.8	A	80	2,030	7.5	A	100	2,190	8.0	A	95
Intersection	**3,430**	**30.1**	**C**		**4,220**	**16.2**	**B**		**3,770**	**30.5**	**C**		**4,180**	**16.0**	**B**	

2036 AM peak: Burke Road/MacArthur Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Burke Road S	980	19.8	B	440	840	10.0	A	135	1,210	160.4	F	500+	1,250	79.8	E	500+
MacArthur Road E	20	31.1	C	15	30	35.8	D	20	40	29.9	C	20	40	33.0	C	20
Burke Road N	1,080	14.1	B	300	860	6.0	A	75	910	18.0	B	295	1,130	12.6	B	205
MacArthur Road W	350	37.3	D	45	310	41.8	D	45	740	68.9	E	360	450	39.6	D	55
Intersection	**2,430**	**19.9**	**B**		**2,040**	**13.6**	**B**		**2,900**	**90.5**	**F**		**2,870**	**46.3**	**D**	

2036 PM peak: Burke Road/MacArthur Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Burke Road S	1,150	15.3	B	170	1,060	15.2	B	165	1,160	14.7	B	165	1,100	16.7	B	195
MacArthur Road E	30	40.7	D	15	30	39.3	D	20	30	38.4	D	15	30	37.4	D	15
Burke Road N	950	5.1	A	60	950	4.7	A	60	1,050	6.3	A	85	1,040	5.1	A	65
MacArthur Road W	400	55.1	E	65	300	46.1	D	45	500	82.0	F	160	320	43.2	D	45
Intersection	**2,530**	**18.1**	**B**		**2,340**	**15.2**	**B**		**2,740**	**24.0**	**C**		**2,490**	**15.5**	**B**	

2036 AM peak: Burke Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Burke Road S	1,050	11.0	B	65	950	9.1	A	50	1,660	32.2	C	125	1,420	15.2	B	85
Burke Road N	1,380	10.0	B	70	1,130	8.4	A	65	1,600	10.9	B	80	1,530	9.3	A	75
Eastbound Offramp	550	17.7	B	30	500	17.7	B	30	470	152.9	F	500+	700	19.7	B	45
Intersection	**2,980**	**11.8**	**B**		**2,580**	**10.4**	**B**		**3,730**	**38.3**	**D**		**3,650**	**13.6**	**B**	

2036 PM peak: Burke Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Burke Road S	1,500	17.5	B	115	1,360	16.0	B	105	1,520	21.4	C	115	1,470	18.3	B	110
Burke Road N	1,270	12.0	B	65	1,170	11.4	B	55	1,440	13.0	B	65	1,250	10.9	B	55
Eastbound Offramp	600	23.1	C	45	620	21.8	C	45	590	20.6	C	35	600	22.3	C	40
Intersection	**3,370**	**16.4**	**B**		**3,150**	**15.4**	**B**		**3,550**	**17.9**	**B**		**3,320**	**16.2**	**B**	

2036 AM peak: Burke Road/The Boulevard/Old Burke Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Burke Road S	880	7.1	A	45	750	5.5	A	35	1,280	8.7	A	65	1,140	7.4	A	50
The Boulevard	210	29.2	C	40	240	32.9	C	40	500	114.7	F	205	370	34.3	C	60
Burke Road N	1,390	8.1	A	80	1,230	6.2	A	60	1,790	7.1	A	70	1,860	6.8	A	75
Old Burke Road	30	26.1	C	0	50	27.1	C	10	70	24.3	C	15	70	25.1	C	15
Intersection	**2,510**	**9.7**	**A**		**2,270**	**9.3**	**A**		**3,640**	**22.9**	**C**		**3,440**	**10.3**	**B**	

2036 PM peak: Burke Road/The Boulevard/Old Burke Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Burke Road S	1,270	7.9	A	60	1,130	7.1	A	55	1,200	8.3	A	55	1,210	8.2	A	60
The Boulevard	200	41.3	D	50	160	35.2	D	35	220	68.4	E	75	180	33.7	C	35
Burke Road N	1,390	8.1	A	80	1,380	9.9	A	85	1,480	8.1	A	80	1,420	9.9	A	85
Old Burke Road	140	24.9	C	20	190	25.9	C	30	250	26.1	C	35	200	24.8	C	30
Intersection	**3,000**	**11.0**	**B**		**2,860**	**11.3**	**B**		**3,150**	**13.8**	**B**		**3,010**	**11.7**	**B**	

2036 AM peak: Bulleen Road/Veneto Club

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	-	-	-	-	1,380	0.5	A	35	-	-	-	-	1,500	0.6	A	40
Bulleen Road N	-	-	-	-	1,770	2.7	A	65	-	-	-	-	1,970	3.2	A	70
Veneto Club Access	-	-	-	-	10	37.2	D	10	-	-	-	-	10	30.2	C	10
Intersection	**-**	**-**	**-**		**3,160**	**1.8**	**A**		**-**	**-**	**-**		**3,480**	**2.2**	**A**	

2036 PM peak: Bulleen Road/Veneto Club

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	-	-	-	-	1,860	0.4	A	20	-	-	-	-	2,290	0.5	A	30
Bulleen Road N	-	-	-	-	1,420	9.2	A	95	-	-	-	-	1,670	11.3	B	130
Veneto Club Access	-	-	-	-	110	26.2	C	20	-	-	-	-	160	27.1	C	20
Intersection	**-**	**-**	**-**		**3,390**	**4.9**	**A**		**-**	**-**	**-**		**4,120**	**5.9**	**A**	

2036 AM peak: Bulleen Road/Manningham Club access

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	1,440	2.7	A	0	1,370	3.3	A	85	1,570	2.9	A	0	1,500	5.8	A	130
Bulleen Road N	20	16.3	B	0	1,750	2.2	A	60	20	25.7	C	0	1,950	3.1	A	75
Manningham Club access	1,960	1.0	A	0	20	51.7	D	10	1,810	17.9	B	0	40	54.7	D	15
Carey Oval	10	5.2	A	0	-	-	-	-	10	7.7	A	0	-	-	-	-
Intersection	**3,420**	**1.8**	**A**		**3,140**	**3.1**	**A**		**3,400**	**11.0**	**B**		**3,490**	**4.8**	**A**	

2036 PM peak: Bulleen Road/Manningham Club access

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	2,340	4.9	A	0	1,850	6.7	A	50	2,400	4.9	A	0	2,280	7.3	A	115
Bulleen Road N	80	9.2	A	0	1,390	4.0	A	70	60	300.1	F	110	1,650	4.5	A	65
Manningham Club access	1,220	0.4	A	0	70	57.2	E	35	1,230	141.2	F	0	110	52.3	D	45
Carey Oval	70	6.7	A	0	-	-	-	-	190	94.8	F	70	-	-	-	-
Intersection	**3,640**	**3.5**	**A**		**3,310**	**6.7**	**A**		**3,690**	**56.9**	**E**		**4,040**	**7.3**	**A**	

2036 AM peak: Thompsons Road/Eastbound Onramp

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Busway E	-	-	-	-	20	22.2	C	30	-	-	-	-	30	20.3	C	40
Thompsons Road E	1,440	26.9	C	225	1,470	14.9	B	85	1,480	135.4	F	420	1,570	22.2	C	120
MCC access	-	-	-	-	40	1.3	A	0	-	-	-	-	50	1.7	A	0
Busway W	-	-	-	-	90	18.3	B	30	-	-	-	-	100	16.9	B	30
Thompsons Road W	1,410	22.3	C	115	1,290	17.3	B	60	1,630	37.2	D	335	1,610	23.0	C	70
Intersection	**2,850**	**24.6**	**C**		**2,890**	**15.9**	**B**		**3,110**	**83.9**	**F**		**3,330**	**22.1**	**C**	

2036 PM peak: Thompsons Road/Eastbound Onramp

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Busway E	-	-	-	-	90	19.8	B	25	-	-	-	-	100	20.0	C	15
Thompsons Road E	840	20.0	C	60	900	13.0	B	35	880	11.4	B	50	990	13.1	B	45
MCC access	-	-	-	-	40	3.0	A	0	-	-	-	-	50	4.4	A	0
Busway W	-	-	-	-	30	17.6	B	40	-	-	-	-	30	19.3	B	40
Thompsons Road W	1,880	45.4	D	330	1,870	23.9	C	105	1,950	31.1	C	290	1,950	23.6	C	120
Intersection	**2,720**	**37.6**	**D**		**2,930**	**20.1**	**C**		**2,830**	**25.0**	**C**		**3,120**	**19.8**	**B**	

2036 AM peak: Bulleen Road Interchange (northern intersection)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	1,420	6.0	A	55	2,170	3.2	A	35	1,900	11.0	B	125	2,550	2.9	A	30
Thompsons Road E	1,160	77.4	E	315	970	64.2	E	270	1,080	146.8	F	315	1,090	125.8	F	345
Bulleen Road N	1,940	53.7	D	310	1,730	38.2	D	130	1,810	87.5	F	500+	1,900	42.3	D	150
Eastbound offramp	500	45.8	D	80	320	53.3	D	45	590	49.7	D	75	440	58.5	E	60
Intersection	**5,020**	**44.9**	**D**		**5,190**	**29.4**	**C**		**5,380**	**68.2**	**E**		**5,980**	**41.9**	**D**	

2036 PM peak: Bulleen Road Interchange (northern intersection)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	2,400	20.0	B	125	2,610	3.7	A	30	2,410	18.6	B	125	3,230	3.1	A	35
Thompsons Road E	630	32.0	C	75	530	36.7	D	65	720	44.0	D	125	640	33.1	C	70
Bulleen Road N	1,220	45.4	D	145	1,380	34.5	C	230	1,170	237.4	F	500+	1,620	70.7	E	375
Eastbound offramp	1,240	49.1	D	200	1,050	50.4	D	110	1,490	50.9	D	215	990	66.0	E	130
Intersection	**5,490**	**33.6**	**C**		**5,570**	**23.3**	**C**		**5,790**	**74.4**	**E**		**6,480**	**32.6**	**C**	

2036 AM peak: Bulleen Road Interchange (southern intersection)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	480	41.8	D	40	730	52.3	D	65	950	64.9	E	175	910	60.8	E	90
Westbound offramp	1,230	44.4	D	115	1,290	51.7	D	130	1,290	81.6	F	500+	1,370	56.0	E	150
Bulleen Road N	2,150	21.5	C	135	2,120	8.4	A	125	2,130	21.4	C	135	2,270	8.7	A	125
Intersection	**3,860**	**31.3**	**C**		**4,140**	**29.7**	**C**		**4,370**	**48.6**	**D**		**4,550**	**33.4**	**C**	

2036 PM peak: Bulleen Road Interchange (southern intersection)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	1,100	42.7	D	110	1,120	58.5	E	95	1,220	44.9	D	155	1,470	79.4	E	370
Westbound offramp	1,490	76.7	E	500+	1,190	47.4	D	105	1,470	66.6	E	500+	1,360	59.8	E	185
Bulleen Road N	1,210	31.0	C	120	1,290	8.8	A	100	1,440	29.3	C	125	1,640	9.2	A	125
Intersection	**3,800**	**52.3**	**D**		**3,600**	**37.0**	**D**		**4,130**	**47.2**	**D**		**4,470**	**47.7**	**D**	

2036 AM peak: Bulleen Road/Hillview Road/Dorado Avenue

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	300	4.2	A	15	580	3.9	A	25	740	5.4	A	30	700	4.2	A	30
Hillview Road	160	31.1	C	35	140	33.9	C	35	250	35.5	D	60	180	35.9	D	50
Bulleen Road N	850	5.5	A	50	970	5.7	A	75	1,100	7.0	A	80	1,280	7.6	A	110
Dorado Avenue	40	1.2	A	0	40	1.4	A	5	50	2.1	A	0	60	1.7	A	5
Intersection	**1,350**	**8.1**	**A**		**1,730**	**7.3**	**A**		**2,140**	**9.6**	**A**		**2,220**	**8.7**	**A**	

2036 PM peak: Bulleen Road/Hillview Road/Dorado Avenue

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	940	5.4	A	35	890	4.5	A	35	1,000	5.7	A	40	1,210	6.7	A	55
Hillview Road	210	32.5	C	50	180	32.5	C	45	210	29.1	C	45	250	36.9	D	60
Bulleen Road N	640	5.9	A	50	800	6.8	A	70	790	6.8	A	60	1,000	8.1	A	100
Dorado Avenue	70	2.3	A	0	100	2.2	A	5	90	2.5	A	0	120	7.5	A	15
Intersection	**1,860**	**8.4**	**A**		**1,970**	**7.8**	**A**		**2,090**	**8.4**	**A**		**2,580**	**10.3**	**B**	

2036 AM peak: Doncaster Road/High Street

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
High Street	880	50.7	D	230	850	30.0	C	100	1,100	184.4	F	460	1,420	39.3	D	210
Doncaster Road West	740	10.7	B	120	670	31.9	C	55	1,470	14.4	B	140	920	34.9	C	75
Park and Ride	40	30.2	C	30	80	22.9	C	60	90	38.3	D	60	100	31.1	C	60
Doncaster Road East	940	42.6	D	45	880	38.2	D	70	1,450	51.7	D	110	1,310	53.0	D	125
Intersection	**2,600**	**36.1**	**D**		**2,480**	**33.2**	**C**		**4,110**	**73.7**	**E**		**3,750**	**42.8**	**D**	

2036 PM peak: Doncaster Road/High Street

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
High Street	790	101.6	F	265	760	27.7	C	60	800	237.1	F	395	870	27.4	C	70
Doncaster Road West	2,090	10.4	B	115	1,620	27.5	C	120	2,270	11.5	B	145	1,840	29.8	C	135
Park and Ride	90	35.8	D	50	200	31.1	C	180	170	36.6	D	60	220	34.4	C	335
Doncaster Road East	980	37.0	D	115	1,000	49.7	D	75	1,130	40.1	D	110	1,150	55.1	E	95
Intersection	**3,950**	**35.7**	**D**		**3,580**	**34.0**	**C**		**4,370**	**61.1**	**E**		**4,080**	**36.7**	**D**	

2036 AM peak: Doncaster Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southbound Offramp	380	30.6	C	35	620	49.5	D	60	510	36.6	D	55	670	55.3	E	65
Doncaster Road West	580	28.7	C	35	870	16.8	B	35	1,290	53.3	D	105	1,450	25.1	C	55
Northbound Offramp	560	34.7	C	50	630	39.3	D	65	880	35.5	D	85	620	41.4	D	55
Doncaster Road East	1,380	25.1	C	120	1,430	26.0	C	60	1,860	34.1	C	120	2,280	28.6	C	105
Intersection	**2,900**	**28.4**	**C**		**3,550**	**30.2**	**C**		**4,540**	**40.1**	**D**		**5,020**	**32.8**	**C**	

2036 PM peak: Doncaster Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southbound Offramp	520	46.2	D	65	740	48.8	D	55	600	44.8	D	70	690	46.5	D	50
Doncaster Road West	2,120	47.8	D	270	2,120	31.2	C	90	2,240	59.8	E	275	2,390	35.2	D	100
Northbound Offramp	820	39.6	D	95	740	42.8	D	50	910	40.0	D	90	840	43.2	D	55
Doncaster Road East	1,150	52.2	D	80	1,460	22.3	C	65	1,360	51.4	D	95	1,660	22.4	C	70
Intersection	**4,610**	**47.2**	**D**		**5,060**	**32.9**	**C**		**5,110**	**52.3**	**D**		**5,580**	**34.0**	**C**	

2036 AM peak: Doncaster Road/Greythorn Road/Gardenia Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Greythorn Road	190	36.6	D	40	320	50.8	D	95	390	35.6	D	50	510	70.4	E	200
Doncaster Road E	1,330	11.7	B	90	1,630	15.8	B	200	2,150	24.5	C	290	2,120	22.0	C	265
Gardenia Road	80	38.2	D	30	90	69.1	E	45	120	33.5	C	70	130	173.6	F	110
Doncaster Road W	400	8.3	A	5	530	12.6	B	50	950	13.8	B	15	930	20.7	C	90
Intersection	**2,000**	**14.5**	**B**		**2,570**	**21.3**	**C**		**3,610**	**23.1**	**C**		**3,690**	**33.8**	**C**	

2036 PM peak: Doncaster Road/Greythorn Road/Gardenia Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Greythorn Road	610	46.9	D	150	620	52.0	D	190	680	48.1	D	185	660	50.5	D	195
Doncaster Road E	1,290	18.8	B	80	1,500	21.9	C	165	1,520	28.0	C	130	1,690	33.5	C	210
Gardenia Road	80	31.2	C	250	80	70.8	E	35	100	32.8	C	215	90	78.9	E	40
Doncaster Road W	1,510	24.1	C	5	1,520	23.2	C	160	1,600	26.9	C	20	1,740	41.1	D	355
Intersection	**3,490**	**26.3**	**C**		**3,720**	**28.5**	**C**		**3,900**	**31.2**	**C**		**4,180**	**40.3**	**D**	

2036 AM peak: Elgar Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Elgar Road S	590	6.3	A	20	960	9.0	A	15	1,140	12.2	B	65	1,310	12.9	B	35
Sargent Street	10	40.9	D	0	10	37.7	D	0	10	58.4	E	10	20	49.1	D	10
Elgar Road N	730	15.1	B	60	580	15.1	B	35	1,120	19.5	B	135	1,260	22.9	C	110
Eastbound Offramp	600	21.3	C	55	1,060	39.6	D	145	860	27.3	C	75	1,220	50.7	D	200
Intersection	**1,930**	**14.5**	**B**		**2,610**	**22.9**	**C**		**3,130**	**19.2**	**B**		**3,810**	**28.5**	**C**	

2036 PM peak: Elgar Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Elgar Road S	1,880	16.6	B	90	2,170	21.7	C	170	1,950	13.7	B	75	2,160	20.4	C	110
Sargent Street	10	57.2	E	10	20	50.7	D	10	10	54.8	D	0	10	54.4	D	10
Elgar Road N	620	12.6	B	55	510	20.9	C	45	700	11.8	B	60	510	20.2	C	40
Eastbound Offramp	550	30.8	C	55	1,220	45.7	D	190	610	30.6	C	60	1,140	33.7	C	125
Intersection	**3,060**	**18.5**	**B**		**3,920**	**29.2**	**C**		**3,270**	**16.6**	**B**		**3,820**	**24.4**	**C**	

2036 AM peak: Elgar Road/Belmore Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Elgar Road S	560	15.8	B	50	850	37.3	D	110	1,110	36.9	D	190	1,110	42.2	D	150
Church Access	10	53.6	D	10	0	40.1	D	5	10	44.8	D	10	10	38.9	D	10
Elgar Road N	1,340	8.5	A	70	1,470	10.7	B	60	1,970	14.2	B	190	2,220	45.9	D	360
Belmore Road	180	21.9	C	30	200	12.0	B	15	340	20.3	C	40	390	21.5	C	40
Intersection	**2,090**	**11.7**	**B**		**2,520**	**19.8**	**B**		**3,430**	**22.2**	**C**		**3,730**	**42.2**	**D**	

2036 PM peak: Elgar Road/Belmore Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Elgar Road S	1,410	113.7	F	295	1,480	41.9	D	245	1,340	134.9	F	295	1,480	40.1	D	215
Church Access	10	60.8	E	10	10	35.7	D	10	10	52.9	D	10	10	55.9	E	10
Elgar Road N	1,150	12.5	B	60	1,510	40.1	D	225	1,270	15.3	B	90	1,430	28.5	C	160
Belmore Road	780	23.2	C	110	990	48.2	D	285	930	24.5	C	140	970	49.9	D	275
Intersection	**3,350**	**57.7**	**E**		**3,990**	**42.7**	**D**		**3,550**	**62.8**	**E**		**3,890**	**38.3**	**D**	

2036 AM peak: Tram Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Station Street S	530	12.5	B	25	570	15.7	B	25	930	25.7	C	65	940	26.1	C	85
Westbound Offramp	870	28.1	C	75	1,040	20.4	C	110	1,370	29.3	C	200	1,040	26.4	C	115
Tram Road N	1,280	11.1	B	60	1,230	14.7	B	65	1,890	50.4	D	500+	2,000	26.7	C	225
Intersection	**2,680**	**16.9**	**B**		**2,840**	**17.0**	**B**		**4,190**	**38.0**	**D**		**3,980**	**26.5**	**C**	

2036 PM peak: Tram Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Station Street S	1,520	11.2	B	45	1,680	16.1	B	70	1,840	17.2	B	125	1,860	18.6	B	135
Westbound Offramp	970	29.9	C	70	900	35.6	D	125	940	33.6	C	100	1,020	45.5	D	160
Tram Road N	1,650	10.3	B	50	1,500	17.3	B	155	1,780	16.0	B	85	1,640	30.3	C	250
Intersection	**4,140**	**15.2**	**B**		**4,080**	**20.8**	**C**		**4,560**	**20.1**	**C**		**4,520**	**28.9**	**C**	

2036 AM peak: Station Street/Woodhouse Grove

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Station Street S	490	3.8	A	20	520	6.3	A	30	900	8.9	A	50	860	12.1	B	55
Woodhouse Grove E	90	36.8	D	30	80	44.8	D	30	160	31.3	C	40	130	36.6	D	30
Station Street N	1,080	7.6	A	70	1,290	4.8	A	45	1,800	12.9	B	130	1,800	13.5	B	130
Woodhouse Grove W	30	49.8	D	20	40	55.2	E	25	90	33.0	C	25	70	36.7	D	25
Intersection	**1,690**	**8.9**	**A**		**1,930**	**8.0**	**A**		**2,950**	**13.3**	**B**		**2,860**	**14.7**	**B**	

2036 PM peak: Station Street/Woodhouse Grove

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Station Street S	1,300	8.5	A	65	1,410	25.2	C	130	1,650	9.7	A	95	1,560	36.8	D	230
Woodhouse Grove E	210	107.3	F	110	210	49.6	D	70	180	241.5	F	130	240	74.5	E	95
Station Street N	1,020	12.0	B	60	1,080	19.6	B	65	1,130	17.5	B	90	1,240	17.7	B	95
Woodhouse Grove W	330	35.3	D	75	300	25.4	C	60	290	38.2	D	75	340	27.2	C	80
Intersection	**2,860**	**20.1**	**C**		**3,000**	**24.9**	**C**		**3,250**	**28.1**	**C**		**3,380**	**31.5**	**C**	

2036 AM peak: Middleborough Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Middleborough Road S	340	25.2	C	30	950	20.6	C	65	620	39.2	D	50	1,300	28.3	C	115
Westbound Offramp	330	30.8	C	30	350	26.5	C	40	660	47.2	D	90	350	30.4	C	50
Wetherby Road N	760	27.7	C	45	870	43.7	D	90	980	75.5	E	275	1,110	48.7	D	130
Eastbound Offramp	380	31.6	C	35	930	33.2	C	85	570	98.4	F	225	1,220	28.0	C	95
Intersection	**1,810**	**28.6**	**C**		**3,100**	**31.5**	**C**		**2,830**	**65.6**	**E**		**3,980**	**34.1**	**C**	

2036 PM peak: Middleborough Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Middleborough Road S	750	31.7	C	50	1,330	27.7	C	80	950	35.1	D	75	1,470	28.4	C	75
Westbound Offramp	570	35.8	D	45	420	38.7	D	45	630	40.8	D	50	490	45.2	D	55
Wetherby Road N	670	29.1	C	40	680	46.8	D	70	680	32.1	C	45	750	52.8	D	85
Eastbound Offramp	720	32.1	C	50	1,580	26.8	C	115	880	36.0	D	65	1,510	24.4	C	100
Intersection	**2,710**	**32.0**	**C**		**4,010**	**31.7**	**C**		**3,140**	**35.9**	**D**		**4,220**	**33.3**	**C**	

2036 AM peak: Middleborough Road/Katrina Street/Heathfield Rise

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Middleborough Road S	770	0.5	A	0	860	1.8	A	0	1,050	1.5	A	0	1,180	4.3	A	60
Katrina Street	70	11.1	B	10	80	25.1	C	20	130	42.7	D	40	120	58.9	E	50
Middleborough Road N	930	9.0	A	0	1,120	7.0	A	15	1,390	18.7	B	0	1,410	9.3	A	55
Heathfield Rise	40	9.8	A	0	50	10.4	B	0	50	16.2	B	0	80	26.2	C	20
Intersection	**1,810**	**5.5**	**A**		**2,110**	**5.7**	**A**		**2,620**	**13.0**	**B**		**2,790**	**9.7**	**A**	

2036 PM peak: Middleborough Road/Katrina Street/Heathfield Rise

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Middleborough Road S	1,110	1.0	A	0	1,100	3.8	A	35	1,300	5.2	A	0	1,210	6.0	A	120
Katrina Street	120	41.7	D	35	160	57.7	E	65	170	72.8	E	75	190	87.1	F	95
Middleborough Road N	1,160	8.8	A	0	1,260	6.8	A	10	1,290	17.8	B	0	1,300	10.2	B	10
Heathfield Rise	110	17.4	B	15	130	15.8	B	20	100	32.6	C	30	140	24.1	C	30
Intersection	**2,500**	**7.3**	**A**		**2,650**	**9.1**	**A**		**2,860**	**16.0**	**B**		**2,840**	**14.2**	**B**	

2036 AM peak: Blackburn Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Surrey Road S	630	7.3	A	20	690	5.9	A	20	830	16.1	B	45	900	8.8	A	30
Blackburn Road N	960	8.0	A	45	1,110	12.1	B	95	1,680	13.7	B	155	1,550	17.5	B	240
Eastbound Offramp	320	22.2	C	35	660	14.5	B	40	520	19.3	B	40	890	16.4	B	50
Intersection	**1,910**	**10.2**	**B**		**2,460**	**11.0**	**B**		**3,030**	**15.3**	**B**		**3,340**	**14.9**	**B**	

2036 PM peak: Blackburn Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Surrey Road S	1,200	43.2	D	265	1,280	13.1	B	55	1,280	81.1	F	270	1,450	14.2	B	65
Blackburn Road N	920	16.7	B	50	930	17.7	B	95	1,030	19.6	B	60	1,070	19.8	B	120
Eastbound Offramp	910	16.4	B	95	1,390	14.9	B	70	1,040	16.4	B	110	1,340	15.3	B	60
Intersection	**3,030**	**27.1**	**C**		**3,600**	**15.0**	**B**		**3,350**	**42.0**	**D**		**3,860**	**16.1**	**B**	

2036 AM peak: Springvale Road/Mitcham Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Springvale Road S	1,120	17.0	B	75	1,290	16.7	B	60	1,410	25.8	C	100	1,690	20.2	C	75
Mitcham Road E	990	44.8	D	80	1,090	31.2	C	80	1,210	74.4	E	260	1,320	52.4	D	170
Springvale Road N	1,190	24.4	C	85	1,050	26.6	C	65	1,200	34.5	C	165	1,350	34.9	C	230
Mitcham Road W	590	40.1	D	45	590	37.0	D	40	1,230	59.4	E	175	840	38.6	D	55
Intersection	**3,890**	**29.8**	**C**		**4,020**	**26.2**	**C**		**5,050**	**47.7**	**D**		**5,200**	**35.2**	**D**	

2036 PM peak: Springvale Road/Mitcham Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Springvale Road S	1,710	26.4	C	115	1,990	22.2	C	95	1,910	25.5	C	135	2,070	23.7	C	115
Mitcham Road E	1,020	39.6	D	75	1,210	43.3	D	100	1,150	43.8	D	95	1,260	45.6	D	110
Springvale Road N	1,110	36.2	D	100	920	34.4	C	65	1,040	34.6	C	80	940	35.5	D	65
Mitcham Road W	1,310	114.1	F	350	1,070	53.3	D	110	1,210	203.9	F	365	1,110	63.9	E	160
Intersection	**5,150**	**53.4**	**D**		**5,190**	**35.7**	**D**		**5,310**	**72.0**	**E**		**5,380**	**39.2**	**D**	

2036 AM peak: Springvale Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Springvale Road S	1,780	219.6	F	500+	2,110	8.4	A	35	1,800	56.9	E	500+	2,110	12.8	B	45
Westbound Offramp	480	17.1	B	30	420	19.3	B	30	540	18.2	B	30	410	16.0	B	25
Springvale Road N	1,490	25.3	C	60	1,560	22.3	C	75	1,820	24.5	C	65	1,830	22.6	C	60
Eastbound Offramp	1,410	21.7	C	75	2,130	20.8	C	100	1,740	23.0	C	85	2,910	23.5	C	140
Intersection	**5,160**	**90.5**	**F**		**6,220**	**16.9**	**B**		**5,900**	**33.3**	**C**		**7,260**	**19.8**	**B**	

2036 PM peak: Springvale Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Springvale Road S	2,250	19.4	B	85	2,610	14.4	B	130	2,390	70.3	E	500+	2,540	12.4	B	50
Westbound Offramp	540	17.4	B	30	420	13.8	B	20	590	20.8	C	30	510	16.6	B	30
Springvale Road N	1,540	23.8	C	60	1,320	34.1	C	75	1,300	26.0	C	50	1,280	52.0	D	225
Eastbound Offramp	1,830	18.6	B	75	3,350	25.3	C	195	1,860	21.4	C	85	3,180	25.4	C	165
Intersection	**6,160**	**20.1**	**C**		**7,700**	**22.5**	**C**		**6,140**	**41.4**	**D**		**7,510**	**24.9**	**C**	

2036 AM peak: Springvale Road/Ashwood Drive

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Springvale Road S	1,800	240.0	F	0	2,090	0.6	A	0	1,770	35.5	D	0	2,090	0.7	A	0
Ashwood Drive	30	97.9	F	0	30	7.1	A	0	40	17.1	B	0	40	10.2	B	0
Springvale Road N	2,110	1.0	A	0	2,120	1.0	A	0	2,470	0.8	A	0	2,890	1.0	A	0
Intersection	**3,940**	**110.9**	**F**		**4,240**	**0.9**	**A**		**4,280**	**15.3**	**B**		**5,020**	**1.0**	**A**	

2036 PM peak: Springvale Road/Ashwood Drive

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Springvale Road S	2,260	1.1	A	0	2,610	2.7	A	0	2,440	50.9	D	0	2,550	1.1	A	0
Ashwood Drive	20	3.8	A	0	20	13.4	B	0	20	48.3	D	0	20	10.0	B	0
Springvale Road N	2,090	0.8	A	0	2,780	1.4	A	0	2,090	0.8	A	0	2,720	1.0	A	0
Intersection	**4,370**	**1.0**	**A**		**5,410**	**2.1**	**A**		**4,550**	**27.9**	**C**		**5,290**	**1.0**	**A**	

2036 AM peak: Ringwood Bypass/Ringwood Street

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Ringwood Street N	1,230	68.8	E	200	1,190	51.5	D	105	1,200	71.3	E	210	1,170	69.5	E	210
Ringwood Bypass E	2,410	73.3	E	435	2,220	84.8	F	435	2,380	42.5	D	195	2,270	49.2	D	250
Ringwood Street S	340	45.5	D	45	380	45.6	D	50	460	45.6	D	55	510	47.3	D	70
Ringwood Bypass W	1,780	25.2	C	65	1,890	27.1	C	70	2,740	33.0	C	105	2,800	33.3	C	110
Intersection	**5,760**	**55.8**	**E**		**5,680**	**56.1**	**E**		**6,780**	**44.0**	**D**		**6,750**	**46.0**	**D**	

2036 PM peak: Ringwood Bypass/Ringwood Street

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Ringwood Street N	640	51.9	D	65	640	57.5	E	65	650	50.9	D	60	650	55.6	E	60
Ringwood Bypass E	2,440	54.5	D	245	2,420	43.4	D	195	2,150	49.6	D	280	2,060	38.9	D	145
Ringwood Street S	1,390	63.3	E	235	1,430	66.0	E	245	1,250	53.1	D	200	1,270	58.2	E	235
Ringwood Bypass W	3,790	73.4	E	460	3,840	39.5	D	220	4,020	147.8	F	500+	4,000	45.5	D	280
Intersection	**8,260**	**64.5**	**E**		**8,330**	**46.6**	**D**		**8,070**	**99.2**	**F**		**7,980**	**46.7**	**D**	

2036 AM peak: Maroondah Highway Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southbound Offramps	420	40.1	D	45	470	40.4	D	55	440	42.3	D	60	490	44.6	D	60
Maroondah Highway E	1,880	30.8	C	120	1,950	31.1	C	120	1,870	31.9	C	120	1,970	32.6	C	120
Northbound Offramp	360	47.5	D	55	350	48.5	D	65	600	66.4	E	125	580	60.2	E	105
Maroondah Highway W	1,190	19.0	B	50	1,220	19.3	B	55	1,900	23.3	C	100	1,920	23.6	C	105
Intersection	**3,850**	**29.7**	**C**		**3,990**	**30.1**	**C**		**4,810**	**33.8**	**C**		**4,960**	**33.6**	**C**	

2036 PM peak: Maroondah Highway Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southbound Offramps	680	53.8	D	75	700	59.6	E	100	660	51.3	D	70	640	50.8	D	70
Maroondah Highway E	1,530	22.9	C	85	1,680	26.8	C	80	1,650	23.4	C	90	1,830	26.6	C	95
Northbound Offramp	450	75.6	E	95	420	55.5	E	65	410	62.7	E	80	390	50.5	D	55
Maroondah Highway W	2,420	21.0	C	110	2,520	20.7	C	105	2,590	20.5	C	90	2,650	19.9	B	105
Intersection	**5,080**	**30.8**	**C**		**5,320**	**30.5**	**C**		**5,310**	**28.5**	**C**		**5,510**	**27.9**	**C**	

M80 Ring Road/North East Link corridor–Intersection modelling results

2036 AM peak: Plenty Road/Enterprise Drive

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Plenty Road N	3,490	72.0	E	500+	3,490	27.1	C	500	3,120	81.7	F	500+	2,950	23.1	C	455
Enterprise Drive	390	73.6	E	165	390	71.7	E	165	250	125.3	F	170	340	43.1	D	130
Plenty Road S	2,630	10.5	B	70	2,960	9.7	A	70	3,410	9.5	A	80	3,740	9.4	A	85
Intersection	**6,510**	**47.2**	**D**		**6,840**	**22.1**	**C**		**6,780**	**47.0**	**D**		**7,030**	**16.8**	**B**	

2036 PM peak: Plenty Road/Enterprise Drive

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Plenty Road N	2,430	161.8	F	500+	3,110	20.5	C	290	2,650	139.3	F	500+	3,480	26.3	C	500
Enterprise Drive	150	525.6	F	170	490	87.4	F	165	160	473.7	F	170	480	74.4	E	165
Plenty Road S	3,350	8.1	A	75	3,560	8.6	A	80	3,320	7.3	A	60	3,620	7.8	A	65
Intersection	**5,930**	**84.0**	**F**		**7,160**	**19.2**	**B**		**6,130**	**76.4**	**E**		**7,580**	**20.6**	**C**	

2036 AM peak: Plenty Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Eastbound Offramp	1,500	65.6	E	100	560	55.6	E	65	1,660	74.6	E	120	620	59.4	E	70
Plenty Road S	1,590	22.5	C	90	1,150	28.6	C	60	2,280	37.9	D	190	1,770	36.7	D	130
Westbound Offramp	820	39.3	D	85	2,050	47.6	D	270	800	38.2	D	80	2,200	45.8	D	260
Plenty Road N	3,810	34.6	C	200	3,810	21.4	C	195	3,310	48.3	D	205	3,270	20.0	B	195
Intersection	**7,720**	**38.6**	**D**		**7,570**	**32.1**	**C**		**8,050**	**49.8**	**D**		**7,860**	**34.1**	**C**	

2036 PM peak: Plenty Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Eastbound Offramp	1,000	61.4	E	105	500	51.9	D	70	990	58.5	E	120	490	52.7	D	60
Plenty Road S	3,000	17.0	B	185	2,390	21.6	C	155	2,910	19.6	B	185	2,510	22.1	C	155
Westbound Offramp	830	38.2	D	75	1,790	44.1	D	130	860	43.7	D	75	1,770	43.0	D	120
Plenty Road N	2,550	77.1	E	210	3,540	17.5	B	100	2,780	72.5	E	205	3,920	18.1	B	130
Intersection	**7,380**	**46.2**	**D**		**8,220**	**26.6**	**C**		**7,540**	**46.9**	**D**		**8,690**	**26.3**	**C**	

2036 AM peak: Plenty Road/Taunton Drive/Ambrose Treacy Drive

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Plenty Road S	1,500	16.6	B	100	990	18.6	B	70	2,170	29.1	C	225	1,600	20.8	C	100
Ambrose Drive	160	34.7	C	30	160	33.4	C	35	230	31.2	C	35	240	28.3	C	50
Plenty Road N	2,940	5.0	A	65	2,710	4.5	A	60	2,510	5.6	A	55	2,100	6.2	A	70
Taunton Drive	170	43.0	D	40	230	39.4	D	40	260	45.3	D	55	320	40.1	D	60
Intersection	**4,770**	**11.0**	**B**		**4,090**	**11.0**	**B**		**5,170**	**18.6**	**B**		**4,260**	**15.4**	**B**	

2036 PM peak: Plenty Road/Taunton Drive/Ambrose Treacy Drive

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Plenty Road S	2,880	55.2	E	485	2,180	32.7	C	205	2,810	38.1	D	400	2,310	33.1	C	210
Ambrose Drive	110	42.3	D	30	120	39.4	D	30	120	35.5	D	30	130	35.9	D	35
Plenty Road N	1,640	18.6	B	100	1,930	22.4	C	115	1,760	18.2	B	100	2,080	23.8	C	120
Taunton Drive	190	46.6	D	65	260	38.1	D	75	180	40.7	D	50	280	33.4	C	70
Intersection	**4,820**	**42.1**	**D**		**4,490**	**28.8**	**C**		**4,870**	**31.0**	**C**		**4,800**	**29.2**	**C**	

2036 AM peak: M80 Ring Road/Greensborough Bypass

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
M80 Ring Road	2,880	199.1	F	500+	-	-	-	-	2,870	304.6	F	500+	-	-	-	-
Greensborough Bypass	2,220	228.7	F	500+	-	-	-	-	2,190	230.4	F	500+	-	-	-	-
Greensborough Hwy	330	61.5	E	50	-	-	-	-	340	55.0	E	50	-	-	-	-
Intersection	**5,430**	**203.0**	**F**		**-**	**-**	**-**		**5,400**	**258.8**	**F**		**-**	**-**	**-**	

2036 PM peak: M80 Ring Road/Greensborough Bypass

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
M80 Ring Road	3,770	198.3	F	500+	-	-	-	-	3,920	187.4	F	500+	-	-	-	-
Greensborough Bypass	1,670	62.2	E	245	-	-	-	-	1,780	97.1	F	385	-	-	-	-
Greensborough Hwy	780	107.3	F	255	-	-	-	-	820	290.0	F	500+	-	-	-	-
Intersection	**6,220**	**150.4**	**F**		**-**	**-**	**-**		**6,520**	**175.7**	**F**		**-**	**-**	**-**	

2036 AM peak: Grimshaw Street Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southern Approach	1,550	429.8	F	500+	770	38.6	D	100	1,630	403.2	F	500+	900	39.8	D	120
Grimshaw Street E	1,550	194.5	F	500+	2,160	38.9	D	235	1,820	166.2	F	500+	2,270	40.4	D	240
Northern Approach	2,660	44.8	D	200	1,520	34.7	C	105	2,620	48.8	D	190	1,560	33.7	C	95
Grimshaw Street W	680	42.2	D	55	1,220	34.8	C	70	900	96.8	F	195	1,350	34.6	C	75
Intersection	**6,440**	**173.1**	**F**		**5,670**	**36.9**	**D**		**6,970**	**168.4**	**F**		**6,080**	**37.3**	**D**	

2036 PM peak: Grimshaw Street Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southern Approach	1,930	313.9	F	500+	1,480	54.7	D	180	1,930	326.7	F	500+	1,440	69.8	E	205
Grimshaw Street E	1,040	426.7	F	500+	1,690	30.5	C	110	1,040	435.5	F	500+	1,720	27.8	C	110
Northern Approach	2,470	39.5	D	150	1,770	34.0	C	140	2,620	37.9	D	155	1,830	30.4	C	130
Grimshaw Street W	1,480	204.7	F	475	1,770	25.8	C	150	1,490	202.4	F	470	1,650	31.4	C	165
Intersection	**6,920**	**209.4**	**F**		**6,710**	**35.5**	**D**		**7,080**	**209.6**	**F**		**6,640**	**38.5**	**D**	

2036 AM peak: Watsonia Road Intersection

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Northern Approach	1,940	22.2	C	190	-	-	-	-	1,980	25.2	C	180	-	-	-	-
Watsonia Road	410	48.2	D	50	490	47.9	D	70	460	50.2	D	55	560	46.3	D	75
Southern Approach	1,570	116.3	F	495	1,570	14.5	B	145	1,490	241.5	F	500	1,560	16.3	B	150
CD Road East	-	-	-	-	1,380	12.1	B	80	-	-	-	-	1,500	13.5	B	85
Intersection	**3,920**	**62.6**	**E**		**3,440**	**18.3**	**B**		**3,930**	**110.2**	**F**		**3,620**	**19.8**	**B**	

2036 PM peak: Watsonia Road Intersection

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Northern Approach	1,760	11.2	B	60	-	-	-	-	1,800	12.1	B	70	-	-	-	-
Watsonia Road	520	53.0	D	85	710	42.2	D	80	550	72.1	E	180	750	42.9	D	80
Southern Approach	1,810	175.7	F	500	1,850	18.8	B	185	1,780	187.9	F	500	1,990	20.9	C	220
CD Road E	-	-	-	-	1,210	14.9	B	70	-	-	-	-	1,300	14.1	B	70
Intersection	**4,090**	**89.4**	**F**		**3,770**	**21.9**	**C**		**4,130**	**95.9**	**F**		**4,040**	**22.8**	**C**	

2036 AM peak: Elder Street Intersection

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Elder Street	310	200.8	F	225	250	32.2	C	60	330	315.9	F	225	300	35.5	D	70
Northern approach	2,040	44.5	D	175	1,170	6.6	A	55	2,070	45.1	D	180	1,230	7.5	A	60
Southern approach	1,380	181.8	F	450	70	24.2	C	20	1,430	253.9	F	450	80	21.4	C	25
Station Access	50	64.2	E	10	-	-	-	-	50	66.0	E	10	-	-	-	-
Intersection	**3,780**	**107.6**	**F**		**1,490**	**11.8**	**B**		**3,880**	**145.3**	**F**		**1,610**	**13.3**	**B**	

2036 PM peak: Elder Street Intersection

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Elder Street	270	65.7	E	95	140	24.6	C	35	280	58.5	E	80	160	24.5	C	30
Northern approach	1,890	41.8	D	165	1,210	7.6	A	60	1,920	42.3	D	155	1,280	8.1	A	65
Southern approach	1,820	180.4	F	445	340	38.6	D	90	1,830	188.5	F	445	370	37.6	D	90
Station Access	50	63.1	E	10	-	-	-	-	50	61.8	E	10	-	-	-	-
Intersection	**4,030**	**106.3**	**F**		**1,690**	**15.2**	**B**		**4,080**	**109.4**	**F**		**1,810**	**15.5**	**B**	

2036 AM peak: Greensborough Road Interchange (Lower Plenty Road interchange)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Northbound Offramp	-	-	-	-	1,040	40.1	D	80	-	-	-	-	1,180	42.3	D	100
Greensborough Rd N	-	-	-	-	2,250	22.9	C	285	-	-	-	-	2,050	20.1	C	150
Greensborough Rd S	-	-	-	-	1,040	20.9	C	55	-	-	-	-	1,210	18.4	B	55
Intersection	**-**	**-**	**-**		**4,330**	**26.5**	**C**		**-**	**-**	**-**		**4,440**	**25.5**	**C**	

2036 PM peak: Greensborough Road Interchange (Lower Plenty Road interchange)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Northbound Offramp	-	-	-	-	1,160	41.1	D	105	-	-	-	-	1,140	41.8	D	100
Greensborough Rd N	-	-	-	-	1,550	18.1	B	90	-	-	-	-	1,640	18.3	B	95
Greensborough Rd S	-	-	-	-	1,770	16.2	B	70	-	-	-	-	1,920	15.3	B	70
Intersection	**-**	**-**	**-**		**4,480**	**23.3**	**C**		**-**	**-**	**-**		**4,700**	**22.8**	**C**	

2036 AM peak: Erskine Road/Greensborough Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Greensborough Rd S	1,480	33.4	C	280	1,140	23.0	C	135	1,760	101.0	F	500+	1,410	35.3	D	175
Greensborough Rd N	2,260	86.5	F	500+	1,690	20.6	C	220	2,220	87.1	F	500+	1,590	25.5	C	255
Erskine Road	340	48.4	D	95	390	24.4	C	60	310	42.3	D	70	370	25.5	C	60
Intersection	**4,080**	**64.1**	**E**		**3,220**	**21.9**	**C**		**4,290**	**89.5**	**F**		**3,370**	**29.6**	**C**	

2036 PM peak: Erskine Road/Greensborough Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Greensborough Rd S	1,930	105.9	F	500+	1,400	14.4	B	100	1,990	105.5	F	500+	1,550	18.5	B	150
Greensborough Rd N	2,000	21.7	C	155	1,200	19.8	B	85	1,970	21.2	C	130	1,220	20.5	C	85
Erskine Road	750	58.0	E	215	820	29.8	C	145	770	46.4	D	135	860	31.5	C	170
Intersection	**4,680**	**62.3**	**E**		**3,420**	**20.0**	**C**		**4,730**	**60.7**	**E**		**3,630**	**22.3**	**C**	

2036 AM peak: Drysdale Street/Greensborough Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Greensborough Rd S	1,500	4.9	A	115	530	17.3	B	65	1,760	58.6	E	390	650	22.8	C	70
Drysdale Street	100	97.6	F	65	620	4.0	A	20	40	437.9	F	245	750	5.8	A	25
Greensborough Rd N	2,070	4.0	A	0	1,490	3.9	A	45	2,020	3.8	A	0	1,370	5.0	A	50
Intersection	**3,670**	**6.8**	**A**		**2,640**	**6.6**	**A**		**3,820**	**41.0**	**D**		**2,770**	**9.4**	**A**	

2036 PM peak: Drysdale Street/Greensborough Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Greensborough Rd S	1,930	67.9	E	500+	980	24.3	C	100	1,990	68.1	E	500+	1,090	23.7	C	110
Drysdale Street	10	77.2	E	0	420	1.1	A	0	0	98.3	F	0	470	1.2	A	0
Greensborough Rd N	2,160	0.8	A	0	1,450	5.8	A	70	2,130	0.8	A	0	1,480	5.0	A	65
Intersection	**4,100**	**32.5**	**C**		**2,850**	**11.4**	**B**		**4,120**	**33.4**	**C**		**3,040**	**11.1**	**B**	

2036 AM peak: Lower Plenty Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southbound Offramp	-	-	-	-	1,500	40.1	D	85	-	-	-	-	1,520	41.0	D	75
Greensborough Rd N	2,050	53.7	D	495	1,040	40.0	D	55	2,000	62.6	E	470	950	40.6	D	60
Lower Plenty Road W	1,480	19.5	B	75	1,260	36.7	D	95	1,830	40.1	D	265	1,520	43.0	D	130
Lower Plenty Road E	2,080	36.9	D	380	2,150	33.3	C	130	2,340	74.8	E	500+	2,630	33.4	C	195
Intersection	**5,610**	**38.4**	**D**		**5,950**	**36.9**	**D**		**6,170**	**60.6**	**E**		**6,620**	**38.4**	**D**	

2036 PM peak: Lower Plenty Road Interchange

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Southbound Offramp	-	-	-	-	1,870	38.3	D	170	-	-	-	-	1,880	38.7	D	175
Greensborough Rd N	2,090	26.4	C	500+	810	43.3	D	45	2,080	24.9	C	500+	800	41.9	D	45
Lower Plenty Road W	2,830	78.8	E	430	2,860	28.5	C	285	2,860	84.0	F	430	3,070	32.2	C	305
Lower Plenty Road E	1,150	32.1	C	65	1,330	35.5	D	75	1,290	31.8	C	70	1,470	36.8	D	90
Intersection	**6,070**	**51.9**	**D**		**6,870**	**34.3**	**C**		**6,230**	**53.5**	**D**		**7,220**	**35.9**	**D**	

2036 AM peak: Lower Plenty Road/Rosanna Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Lower Plenty Road W	490	21.9	C	35	500	24.6	C	40	630	23.4	C	45	600	23.9	C	45
Rosanna Road	910	29.0	C	105	690	28.3	C	80	1,150	41.3	D	185	830	31.3	C	105
Lower Plenty Road E	2,740	13.6	B	135	2,710	5.9	A	55	2,880	14.2	B	145	2,940	6.5	A	60
Intersection	**4,140**	**18.0**	**B**		**3,900**	**12.2**	**B**		**4,660**	**22.1**	**C**		**4,370**	**13.6**	**B**	

2036 PM peak: Lower Plenty Road/Rosanna Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Lower Plenty Road W	1,230	129.7	F	345	1,240	40.5	D	140	1,240	214.4	F	455	1,320	41.8	D	155
Rosanna Road	1,400	213.0	F	500+	1,530	27.8	C	205	1,430	210.0	F	500+	1,660	30.8	C	235
Lower Plenty Road E	2,140	28.4	C	290	1,680	17.3	B	95	2,160	33.1	C	250	1,750	16.2	B	85
Intersection	**4,770**	**108.7**	**F**		**4,450**	**27.4**	**C**		**4,830**	**132.0**	**F**		**4,730**	**28.5**	**C**	

2036 AM peak: Manningham Road Interchange (at Bridge Street)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Manningham Road W	2,400	21.6	C	280	1,140	10.3	B	55	2,060	14.3	B	160	970	9.6	A	50
Northbound Offramp	-	-	-	-	900	39.0	D	110	-	-	-	-	1,010	49.9	D	225
Manningham Road E	2,450	12.4	B	105	1,490	21.2	C	115	2,150	9.5	A	90	1,310	24.1	C	100
Bridge Street NE	1,090	60.0	E	225	990	32.9	C	80	980	53.3	D	225	850	33.8	C	70
Intersection	**5,940**	**24.8**	**C**		**4,520**	**24.6**	**C**		**5,190**	**19.6**	**B**		**4,140**	**29.0**	**C**	

2036 PM peak: Manningham Road Interchange (at Bridge Street)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Manningham Road W	2,390	16.1	B	360	1,340	18.9	B	110	2,430	18.2	B	375	1,380	19.0	B	135
Northbound Offramp	-	-	-	-	1,240	49.0	D	250	-	-	-	-	1,180	41.7	D	165
Manningham Road E	2,260	11.2	B	100	1,230	17.3	B	55	2,360	10.8	B	100	1,260	17.1	B	55
Bridge Street NE	590	36.7	D	85	490	31.1	C	45	620	36.0	D	85	500	32.3	C	45
Intersection	**5,240**	**16.3**	**B**		**4,300**	**28.5**	**C**		**5,410**	**17.0**	**B**		**4,320**	**26.2**	**C**	

2036 AM peak: Manningham Road/Bulleen Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Manningham Road W	2,380	43.3	D	230	1,310	30.0	C	75	2,090	37.2	D	145	1,160	28.9	C	75
Bulleen Road	1,340	28.9	C	145	1,140	50.5	D	140	1,170	27.8	C	105	1,070	52.4	D	115
Manningham Road E	1,670	56.3	E	190	1,290	38.0	D	145	1,450	41.6	D	125	1,190	35.6	D	155
Templestowe Road	800	109.6	F	160	700	43.4	D	55	720	89.7	F	130	670	43.2	D	55
Intersection	**6,190**	**52.3**	**D**		**4,440**	**39.7**	**D**		**5,430**	**43.3**	**D**		**4,090**	**39.3**	**D**	

2036 PM peak: Manningham Road/Bulleen Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Manningham Road W	2,380	40.6	D	170	1,860	32.5	C	155	2,410	45.5	D	205	1,860	31.3	C	150
Bulleen Road	1,850	32.1	C	315	1,300	38.6	D	95	1,870	34.4	C	325	1,300	37.5	D	100
Manningham Road E	1,330	197.0	F	410	1,100	39.5	D	140	1,440	151.5	F	400	1,110	38.1	D	120
Templestowe Road	300	30.6	C	30	180	45.6	D	25	310	33.7	C	35	170	46.9	D	20
Intersection	**5,860**	**73.0**	**E**		**4,440**	**36.5**	**D**		**6,030**	**66.7**	**E**		**4,440**	**35.4**	**D**	

2036 AM peak: Bulleen Road Interchange (south of Manningham Road)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	-	-	-	-	1,350	14.3	B	80	-	-	-	-	1,330	13.6	B	70
Southbound Offramp	-	-	-	-	1,230	38.9	D	90	-	-	-	-	1,250	39.9	D	95
Bulleen Road N	-	-	-	-	1,410	27.8	C	90	-	-	-	-	1,370	29.3	C	95
Intersection	**-**	**-**	**-**		**3,990**	**26.7**	**C**		**-**	**-**	**-**		**3,950**	**27.3**	**C**	

2036 PM peak: Bulleen Road Interchange (south of Manningham Road)

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Bulleen Road S	-	-	-	-	1,570	11.7	B	70	-	-	-	-	1,570	11.7	B	70
Southbound Offramp	-	-	-	-	1,390	44.4	D	155	-	-	-	-	1,360	40.9	D	105
Bulleen Road N	-	-	-	-	1,060	18.7	B	70	-	-	-	-	1,070	17.1	B	65
Intersection	**-**	**-**	**-**		**4,020**	**24.9**	**C**		**-**	**-**	**-**		**4,000**	**23.1**	**C**	

2036 AM peak: Bridge Street/Templestowe Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Templestowe Road S	340	0.7	A	0	260	49.8	D	40	290	0.4	A	0	270	52.5	D	40
Bridge Street	480	2.4	A	15	330	3.8	A	20	410	1.9	A	10	290	3.6	A	20
Templestowe Road N	1,100	21.4	C	350	990	8.5	A	120	960	11.0	B	255	840	6.7	A	90
Intersection	**1,920**	**13.0**	**B**		**1,580**	**14.4**	**B**		**1,660**	**6.9**	**A**		**1,400**	**14.8**	**B**	

2036 PM peak: Bridge Street/Templestowe Road

	First hour								Second hour							
	No Project Case				Project Case				No Project Case				Project Case			
	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (sec)	Level of Service	95th Percentile Queue (m)	Arrived Volume	Average Delay (secs)	Level of Service	95th Percentile Queue (m)
Templestowe Road S	720	0.3	A	0	810	42.2	D	120	750	0.2	A	0	770	40.7	D	110
Bridge Street	980	6.8	A	95	760	8.1	A	45	1,000	7.0	A	110	790	7.7	A	45
Templestowe Road N	590	12.7	B	100	480	8.4	A	65	610	14.7	B	105	500	7.8	A	65
Intersection	**2,290**	**6.2**	**A**		**2,050**	**21.6**	**C**		**2,360**	**6.8**	**A**		**2,060**	**20.0**	**C**	