Prepared for:
Property Planning Partners on behalf of Astrodome Hire Pty Ltd

Prepared by:
Hilary Marshall

Traffic and Transport Expert Evidence for Amendment C223 to the Yarra Planning Scheme

81-95 Burnley Street and 26 Doonside Street, Richmond

8 May 2020

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traffic:evidence

ratio:consultants

8 Gwynne Street
Cremorne VIC 3121
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Prepared for:

Planning Property Partners behalf of
Astrodome Hire Pty Ltd.
Our reference 16958T-REP01-F01 81-95
Burnley St, Richmond

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1 Statement of Evidence

Reference

Amendment C223 to the Yarra Planning Scheme

Relating to land at 81-95 Burnley Street and 26 Doonside Street in Richmond.

Name and Address

Hilary Anne Marshall - Director

Ratio Consultants Pty Ltd

8 Gwynne Street, Cremorne, VIC 3121

Professional Qualifications

Bachelor of Engineering (Civil) Hons, 1998, RMIT University

Bachelor of Business Administration (Management), 1998, RMIT University

Professional Experience

Director – Ratio Consultants	Jan 2018 - present
Senior Associate – Ratio Consultants	Jan 2016 – Dec 2017
Associate – Cardno	Nov 2015 – Jan 2016
Senior Engineer – Cardno	Feb 2011 – Oct 2015
Associate – Urban Crossroads, Irvine, California USA	2004-2006
Senior Engineer – Grogan Richards	2002-2004
Engineer – Grogan Richards	1999 - 2001

Professional Expertise

1.1.1 I have worked in the area of Traffic and Transportation Engineering throughout my career. My area of expertise includes traffic advice and assessment of a wide range of land use and development proposals for planning authorities, government agencies, corporations and developers.

1.1.2 My training, qualifications and experience including involvement with a wide variety of developments over a number of years, qualifies me to comment on the traffic and transport implications of this proposal.

Instructions which define the scope of this report

1.1.3 I have been instructed by Planning Property Partners on behalf of Astrodome Hire Pty Ltd, to undertake a review of the traffic, transport and parking implications of the proposed Amendment C223 to the Yarra Planning Scheme and prepare an expert evidence statement for submission and presentation at the upcoming panel hearing.

Facts, Matters and Assumptions Relied Upon

1.1.4 In the course of preparing this report the facts, matters and assumptions I have relied upon are outlined as follows:

- Exhibited Development Plan Overlay – Schedule 15 (DPO15)
- Yarra Planning Scheme Clauses 21.06, 22.11, 52.06, 52.34, 56.06,
- City of Yarra Car Share Policy 2019-2024, formally adopted 16/7/2019.

- Victoria Street East Precinct, prepared by MGS, dated 16/11/2005
- Bridge Road – Victoria Street, Built Form Framework, prepared by David Lock Associates, dated June 2018
- Traffic Impact Assessment prepared by Ratio, dated December 2018
- Traffic Engineering Review by Traffix Group 18/1/2019
- Traffic surveys collected by Trans Traffic Solutions in November 2019.
- Amendment C223 documentation as exhibited
- Submissions to the exhibited Amendment C223
- Officers report, dated 3/3/2020
- Site visit Saturday 25/4/2020 and Thursday 7/5/2020.

Identity of Persons Undertaking the Work

1.1.5 Hilary Marshall of Ratio Consultants.

Declaration

1.1.6 I have read the Planning Panels Victoria Expert Witness guidelines (April 2019) and understand my obligations to the Panel.

1.1.7 I have no relationship with the client other than a business engagement to comment on this matter.

1.1.8 My involvement in this project commenced in March 2020 and I was not involved in the preparation of the Rezoning, Development Plan Overlay or any associated planning.

1.1.9 I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge, been withheld from the Panel.

Hilary Marshall
Director: Traffic
Ratio Consultants

2 Introduction

2.1 Overview

2.1.1 I have been instructed by Property Planning Partners on behalf of Astrodome Hire Pty Ltd, to provide my expert opinion with respect to the proposed Amendment C223 to the Yarra Planning Scheme, regarding traffic, transport and parking implications the Amendment may have on the subject site and surrounding area.

2.1.2 Amendment C223 seeks to rezone land at 81-95 Burnley Street and 26 Doonside Street, Richmond from Industrial 3 Zone to Mixed Use Zone and introduce a Development Plan Overlay – Schedule 15 (DPO15)

2.1.3 This report has been prepared in accordance with the Planning Panels Victoria Expert Witness guidelines.

2.1.4 In the course of preparing this assessment, I have undertaken a site visit to review existing conditions, examined the Amendment documentation and supporting background assessments, reviewed traffic and parking analysis and referred to the documents outlined in Section 1.

2.1.5 My opinions with respect to the traffic and transport issues relating to the proposed development are set out in the following report.

2.2 Acronyms

2.2.1 For convenient reference, a summary of commonly used acronyms in this report are outlined as follows:

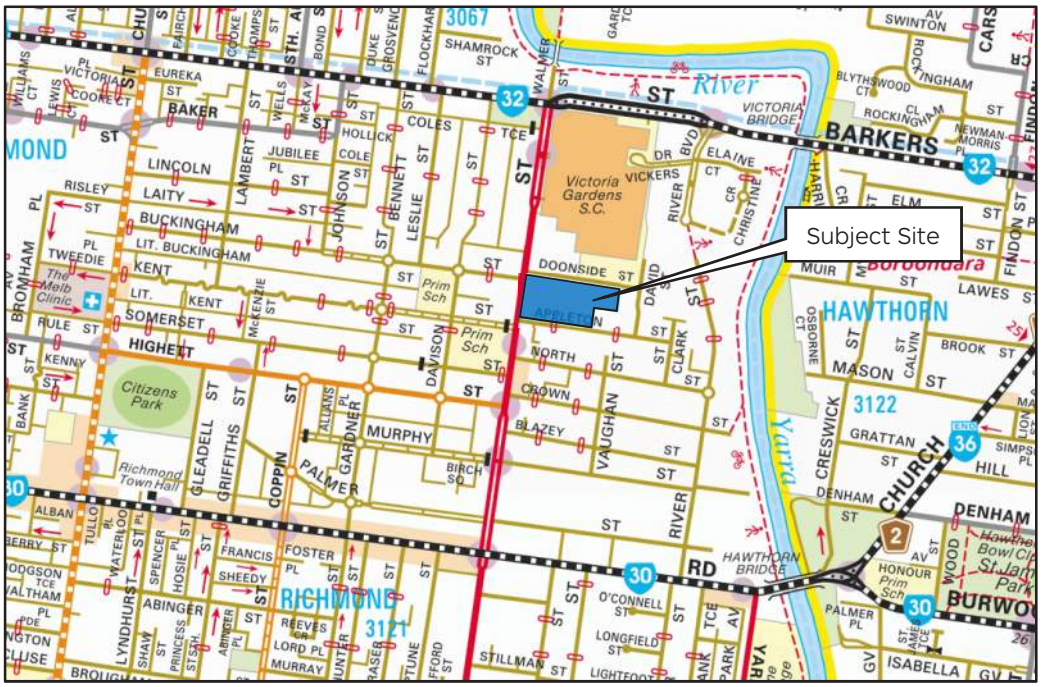
INZ	Industrial Use Zone
MUZ	Mixed Use Zone
DPO	Development Plan Overlay
DPO15	Development Plan Overlay – Schedule 15
EAO	Environmental Audit Overlay
vph	Vehicles per hour
vpd	Vehicles per day

3 Existing Conditions and Background

3.1 Location

3.1.1 The subject site is located on the eastern side of Burnley Street, in between Doonside Street and Appleton Street in Richmond. The location of the site relative to the surrounding road network is shown in Figure 3-1.

Figure 3-1: Site Location



Source: www.melway.com.au

3.1.2 As shown in the preceding figure, the site is irregular in shape and bordered by Doonside Street to the north, residential development to the east, Appleton Street to the south and Burnley Street to the west.

3.1.3 The site has a frontage of approximately 80 metres to Burnley Street, 170 metres to Doonside Street and 130 metres to Appleton Street, resulting in an area of approximately 1.3 hectares.

3.1.4 The subject site is currently occupied by the 'Harry the Hirer' party and marquee hire company. 'Harry the Hirer' used to operate Monday to Saturday and was typically staffed by up to 115 employees at any one time. I am instructed that the hiring portion of the development has been relocated and that the site is now used primarily as office and showroom by the Harry the Hirer company.

3.1.5 There are a variety of land uses within the vicinity of the subject site. To the north of the site is Victoria Gardens Shopping Centre which comprises a wide variety of retail uses, including a full line Coles supermarket and an Ikea store.

3.1.6 To the east of the site, land uses are typically a mix of residential and industrial, whilst to the south and west, land use is primarily residential, with two primary schools located to the south west of the subject site.

3.1.7 An aerial view of the site in context with its surrounds is presented in Figure 3-2.

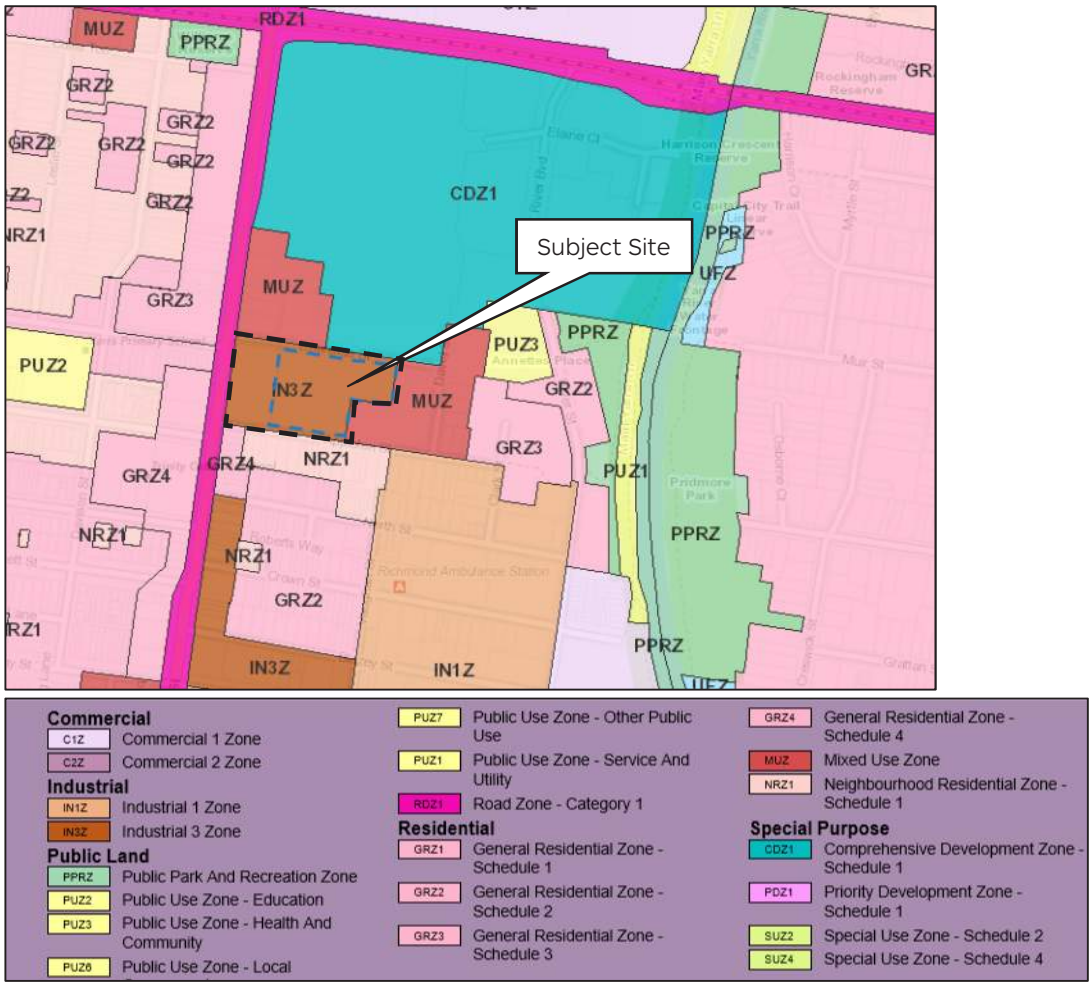
Figure 3-2: Aerial View of the Subject Site

Source: www.nearmap.com

3.2 Zoning

3.2.1 The subject site is currently zoned for Industrial 3 Zone (IN3Z), shown in Figure 3-3, and subject to Development Plan Overlay (DD02) and a Heritage Overlay – Schedule 375 (HO375).

Figure 3-3: Existing Zoning



3.2.2 As shown in the preceding figure, there are a variety of zones abutting the subject site and on the surrounding land, including Mixed Use Zone to the north and east, as well as a Comprehensive Development Zone (Schedule 1) applicable to the Victoria Gardens Shopping Centre.

3.2.3 Land use to the south along Appleton Street is a mix of Neighbourhood Residential Zone (Schedule 1), General Residential Zone (Schedule 4) and Industrial 1 Zone to the east. Burnley Street along the western side of the site is Road Zone Category 1 (RDZ1).

3.3 Road Network

Burnley Street

3.3.1 Burnley Street is an arterial road managed by VicRoads and zoned Road Zone category 1 (RDZ1). Burnley Street is aligned in a north south direction between Victoria Street and Barkly Avenue.

3.3.2 Burnley Street has a road reserve width of 19.3 metres allowing parallel parking on both sides, as well as a bike lane and one traffic lane in each direction. Footpaths of 2.7m are provided on both sides of the road, noting that the western side footpath is reduced to 2.5m opposite the site due to construction works.

3.3.3 Along the site frontage, a posted speed limit of 40 kilometres per hour applies between 8:00am-9:30am and 2:30pm-4:00pm on school days. Outside of these times, a posted speed limit of 60 kilometres per hour applies.

3.3.4 A view of Burnley Street, adjacent to Doonside Street, is provided in Figure 3-4 and Figure 3-5.

Figure 3-4: Burnley Street looking north from Doonside Street

Figure 3-5: Burnley Street looking south from Doonside Street

Doonside Street

3.3.5 Doonside Street is a local road aligned east west between Burnley Street and David Street.

3.3.6 Adjacent to the site, Doonside Street has a road reserve width of 15.2m, comprising a 2.9m wide footpath abutting the subject site and a 2.4m wide footpath on the northern side. The central carriageway is 9.9m in width, allowing parallel parking on both sides with sufficient room remaining for a traffic lane in each direction.

3.3.7 On-street parking is unrestricted on both sides of Doonside Street adjacent the subject site. A posted speed limit of 40 kilometres per hour applies along the length of Doonside Street.

3.3.8 A view of Doonside Street in the vicinity of the site is provided in Figure 3-6 and Figure 3-7.

Figure 3-6: Doonside Street looking east adjacent the subject site

Figure 3-7: Doonside Street looking west adjacent the subject site

Appleton Street

3.3.9 Appleton Street is a local road aligned east west between Clark Street to Burnley Street.

3.3.10 Adjacent the site, Appleton Street has a road reserve width comprising 2.2m wide footpaths on both sides and a central carriageway of 7.9m width. The carriageway allows parallel parking on both sides and a shared two-way traffic lane through the centre.

3.3.11 Parking along Appleton Street has varying restrictions, with unrestricted parking along the frontage of the site and permit zone along the southern edge. A posted speed limit of 40 kilometres per hour applies along the length of Appleton Street.

3.3.12 A view of Appleton Street in the vicinity of the site is provided in Figure 3-8Figure 3-9.

Figure 3-8: Appleton Street looking east adjacent to the subject site

Figure 3-9: Appleton Street looking west adjacent to the subject site

David Street

3.3.13 David Street is a local road aligned north south between Appleton Street in the south and its termination in the north adjacent to Victoria Gardens Shopping Centre.

3.3.14 Just north of Appleton Street, David Street has a clear carriageway width of 7.5m plus indented parallel parking on both sides. A narrow footpath is provided on the eastern side (1.3m) with a wide (2.1m) footpath on the western side.

3.3.15 Parking along David Street has varying restrictions, including unrestricted, 1P and 2P. A speed limit of 40 kilometres per hour applies along the length of David Street.

3.3.16 A view of David Street in the vicinity of the site is provided in Figure 3-10.

Figure 3-10: David Street looking north from Appleton Street

Buckingham Street

3.3.17 Buckingham Street is a local road aligned east west between Church Street and Burnley Street.

3.3.18 Buckingham Street has a road reserve width of approximately 20.9 metres, noting that the footpath on the northern side is temporarily reduced due to construction hoarding.

3.3.19 Buckingham Street contains one traffic lane in each direction, 90 degree parkgin on the southern side and parallel parking on the northern side, with footpaths on both sides of the road.

3.3.20 Parking along Buckingham Street has varying restrictions including permit parking, 2P and 8P. A posted speed limit of 40 kilometres per hour applies along the length of Buckingham Street.

3.3.21 A view of Buckingham Street in the vicinity of the site is provided in Figure 3-11 and Figure 3-12.

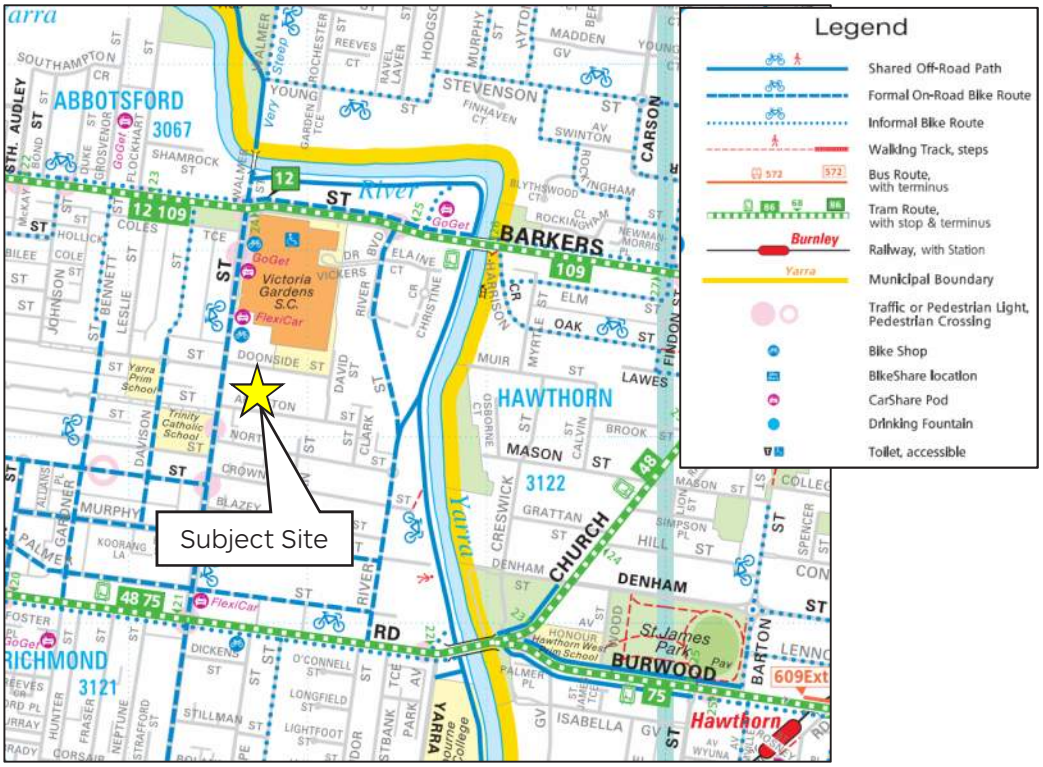
Figure 3-11: Buckingham Street looking west

Figure 3-12: Buckingham Street looking east

3.4 Pedestrian and Bicycle Network:

3.4.1 The site is well served by existing bicycle and pedestrian infrastructure, including on-road and off-road paths. The existing bicycle network in the vicinity of the site is shown in Figure 3-13.

Figure 3-13: Existing Bicycle Network in the vicinity of the Site



3.4.2 As shown in the preceding figure, on road bike lanes are currently provided on Burnley Street, providing connection to Victoria Street and the Yarra River Trail to the north and Swan Street and the Monash Freeway Trail to the south.

3.4.3 The site has good pedestrian access, with the vast majority of roads in the vicinity of the site having footpaths on both sides of the road. A shared path is located alongside the western edge of the Yarra providing recreational opportunities as well.

3.4.4 Pedestrian crossing of Burnley Street is well catered for with a signalised pedestrian crossing located immediately south of Appleton Street, and a traffic signal approximately 200m north of Doonside Street.

3.5 Victoria Street East Urban Design Framework

3.5.1 Clause 22.11 of the Yarra Planning Scheme outlines the Victoria Street East Precent Policy and refers to the Victoria Street East Precinct, Richmond, Urban Design Framework (UDF). The UDF was prepared in 2005, as a guide for change in the area after the State Government identified the precinct as a new activity centre.

3.5.2 As shown in Figure 3.14, the subject site is located within the Victoria Street East Precinct and identified as an opportunity for a mixed-use rezoning to enable a mix of commercial and higher density residential uses.

Figure 3-14: Victoria Street East Precinct

Major Objectives

3.5.3 The UDF identifies several major objectives, with the following aimed at reducing the use of private motor vehicles, stating the following:

- "*Encourage the use of public transport, cycling and walking for access between the precinct and other parts of Melbourne, in preference to use of private motor vehicles.*"

Primary Pedestrian Routes

3.5.4 The UDF identifies objectives for Primary, Secondary and Tertiary pedestrian routes through the study area.

3.5.5 Victoria Street, Burnley Street and the Yarra River path are identified as the Primary pedestrian routes.

3.5.6 Three objectives were identified under the heading Primary Pedestrian Routes, with the following one relevant to this assessment:

1. *"Remove or reduce slip lanes at Victoria Street / Burnley Street intersection to improve pedestrian access, especially at tram stops."*

Secondary Pedestrian Routes

3.5.7 Four Secondary Pedestrian Route objectives were identified in the UDF, with the following two relevant to this discussion:

3. *"Extension and linking of River Street as a pedestrian priority boulevard. This should be a generous, integrated public space linking Victoria Gardens with the area to the south although its traffic role will vary along its length. Traffic calming, part closures or barriers may be appropriate in various locations to prevent undesirable though traffic."*
4. *"Enhanced link from Appleton Street to the river and new footbridge to Mason Street, Hawthorn."*

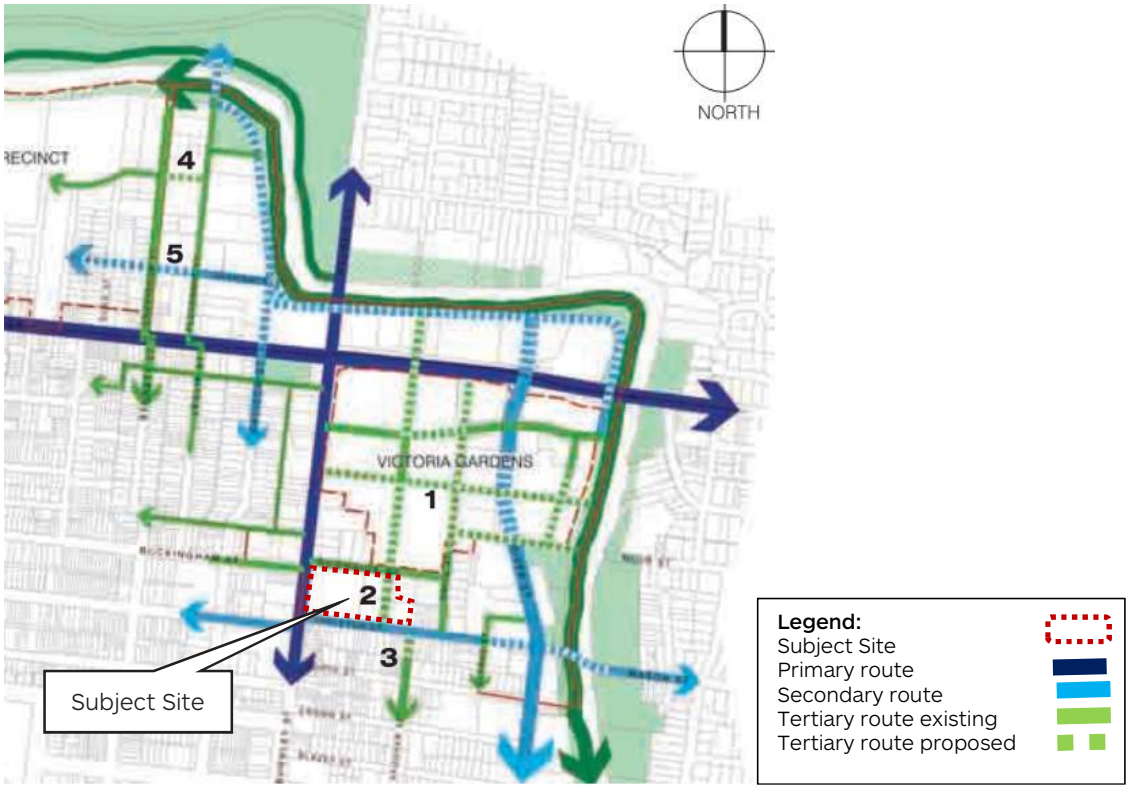
Tertiary Pedestrian Routes

3.5.8 The study identifies five tertiary pedestrian improvements, with the following two relevant to the subject site:

1. *"Multiple routes through Victoria Gardens, extending and linking with existing. These include internal links through the shopping centre, although preference should be given to the creation of open-air routes that are fully accessible to the public at all hours."*
2. *"Victoria Chemical Company (new north-south street past 26 Doonside Street" (i.e. through the eastern end of the subject site);*

3.5.9 A plan outlining the primary, secondary and tertiary pedestrian routes through the precinct is shown in Figure 3-15.

Figure 3-15: Victoria East Precinct Pedestrian Routes



3.5.10 As shown the preceding figure, Appleton Street is proposed as a strong east west pedestrian route through the precinct, second only to Victoria Street.

3.5.11 Doonside Street is shown as a Tertiary Route continuing to the west along Buckingham Street but dissipating to the east at David Street.

3.5.12 The proposed pedestrian link through the subject site is shown as a continuation through the Victoria Gardens Shopping Centre all the way from Appleton Street to Victoria Street.

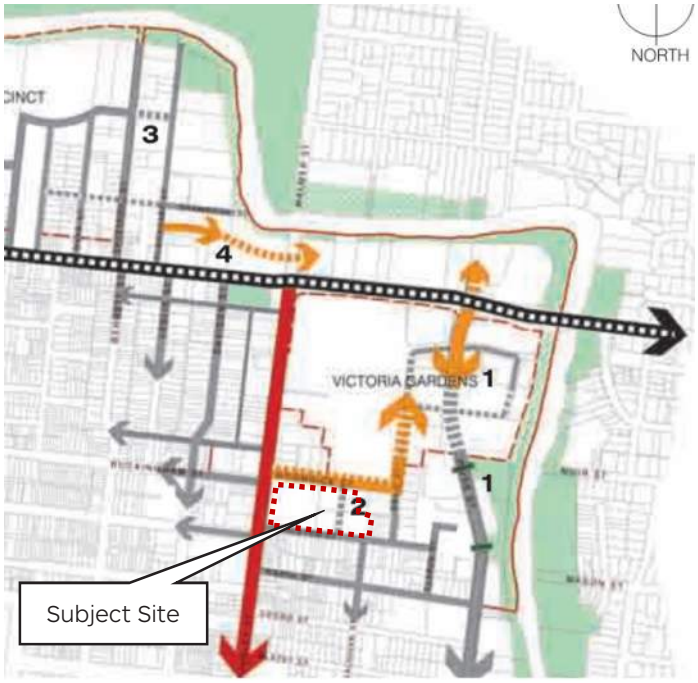
Traffic Access Routes

3.5.13 A number of recommendations are made in the UDF under the Traffic Access Routes section, with the following relevant to this assessment:

2. *"Doonside Street should be improved as a major vehicular entry to Victoria Gardens and the area to its south, to keep traffic away from Victoria Street and housing south of Appleton Street. Doonside Street should be widened (on the north side) to create an overall road reserve width of 18 to 20m) and extended north into Victoria Gardens via David Street.*

3.5.14 A plan of the identified traffic routes through the precinct is shown in Figure 3-16.

Figure 3-16: Victoria Street East Traffic Access Routes



Discussion

3.5.15 The ambition of providing vehicular access to Victoria Gardens via Doonside Street and David Street, states that it is to protect residents south of Appleton Street. Whilst this may be a worthwhile ambition, it doesn't take into account that Doonside Street will also be home to residents if the Amendment proceeds.

3.5.16 The proposed widening of Doonside Street also needs to be questioned in the context of the proposal. The existing road reserve is approximately 15.2 metres, comprising a 2.4m wide footpath on the northern side, 9.9m of road pavement and a 2.9m footpath on the southern side. The existing road pavement allows for vehicles to park on both sides of the road (assuming 2.1m) with a 5.7m pavement remaining, which is sufficient to allow two vehicles to pass each other at low speed.

3.5.17 The UDF suggests widening Doonside Street on the northern side to create an 18 to 20m wide road reserve. This would require an additional 4.8-6.8m of land on the northern side to achieve. It is not clear what the intention of the widening is for, whether to increase the width of the footpath of the road pavement or a combination of both.

3.5.18 The purpose of the Doonside Street widening is unclear. Doonside Street is not identified as a key pedestrian route, therefore the widening can only be assumed to be for landscaping or to increase the width of the road pavement.

3.5.19 In my opinion the only reason to increase the road pavement width would be to accommodate additional trucks associated with operations at Victoria Gardens. The existing road reserve is considered appropriate for the proposed Mixed Use development on the subject site.

3.5.20 Widening Doonside Street to the north would have a negative impact on the potential alignment of a future cross intersection with Buckingham Street as it would pull the centre line of Doonside Street further north from Buckingham Street.

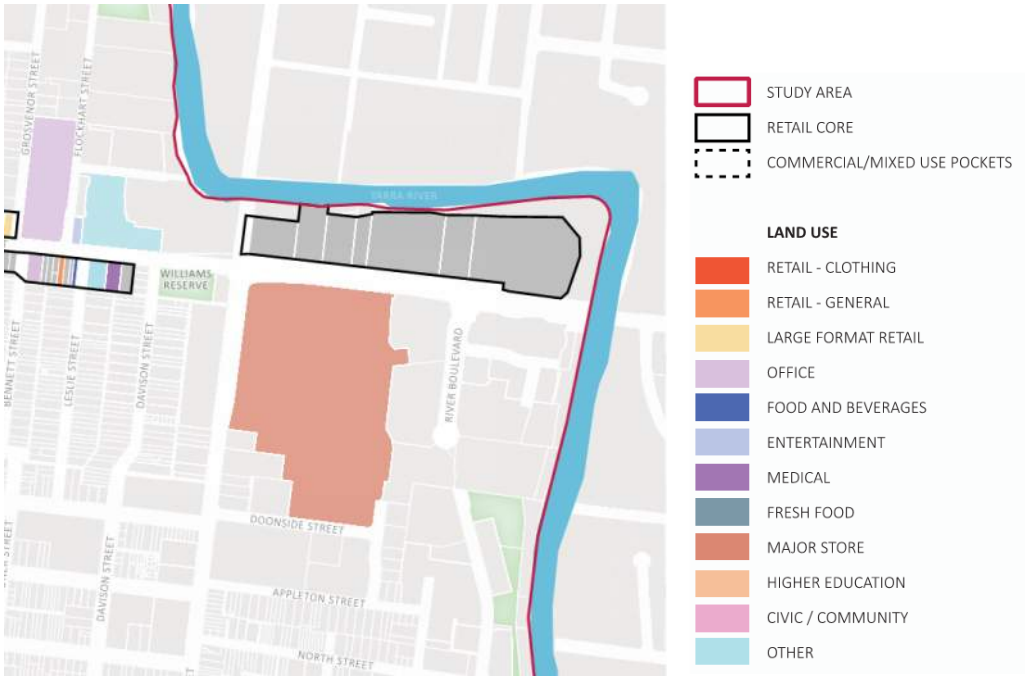
3.5.21 The promotion of Doonside Street and David Street as a key access point to Victoria Gardens also has implications on the traffic at the Doonside Street / Burnley Street intersection and has not been taken into account in the traffic analysis up to date.

3.6 Victoria Street Built Form Framework

3.6.1 A built form framework for both the Bridge Road and Victoria Street Retail High Streets was commissioned by the City of Yarra in 2018. The document aims to identify opportunities and constraints along the Victoria Street and Bridge Road corridors and guide the built form of future development.

3.6.2 A portion of Figure 74 of the Framework, titled 'Land Use – Victoria Street East' is reproduced in Figure 3-17.

Figure 3-17: Potential Land Use – Victoria Street East



3.6.3 The preceding figure, identifies 'Major Store' extending from the existing Victoria Gardens Shopping Centre all the way to Doonside Street.

3.6.4 The framework also identifies both buildings on the eastern side of the Doonside Street / Burnley Street intersection as being subject to Heritage Overlay.

4 Amendment C223:

4.1 Overview

4.1.1 An application was made to rezone the subject site from Industrial 3 Zone to Mixed Use Zone. A Mixed-Use Zone allows for the land to be used and developed as a mix of residences and employment opportunities, both retail and commercial.

4.1.2 The proposed rezoning requires an amendment of the Yarra Planning Scheme, which will include the following changes:

- Rezone the land from Industrial 3 Zone (IN3Z) to Mixed Use Zone (MUZ);
- Apply the Development Plan Overlay Schedule 15 (DPO15) to the subject site;
- Apply an Environmental Audit Overlay (EAO) to the subject site.

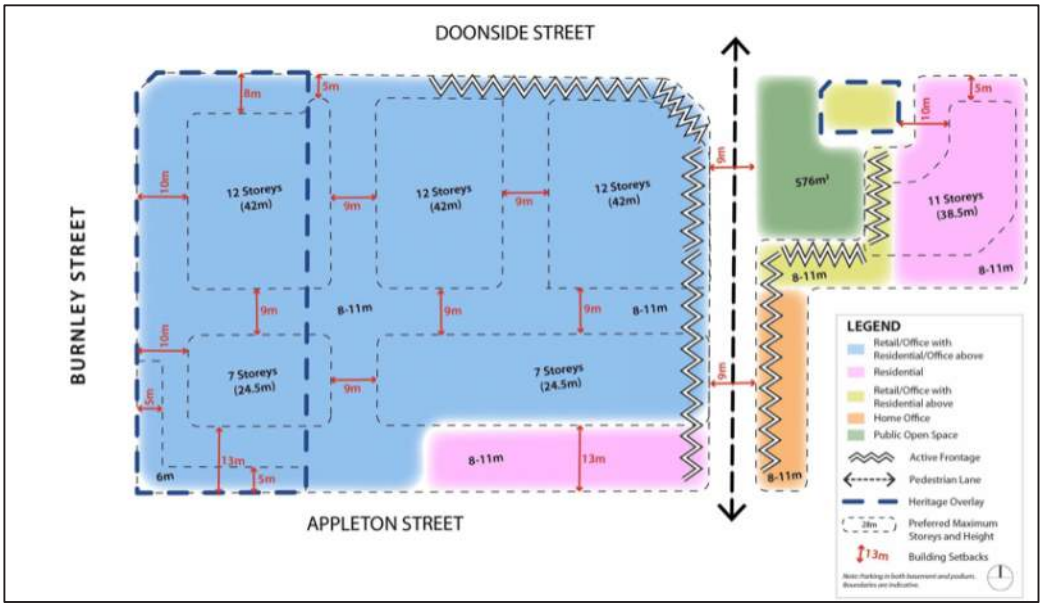
4.2 Development Plan Overlay - Schedule 15

4.2.1 The proposed DPO15 includes an indicative framework plan that sets out the structure for future development and land use. DPO15 allows:

- Approximately 500 dwellings in six buildings;
- 576 square metres of public open space;
- A 9 metre wide pedestrian link running through the site from Doonside Street to Appleton Street; and,
- At least 9,000 square metres of commercial / retail floor space.

4.2.2 The Draft Framework Plan is shown in Figure 4-1.

Figure 4-1: Framework plan for 81-95 Burnley Street & 26 Doonside Street, Richmond



4.3 Draft Development Plan Overlay Requirements

4.3.1 The draft Development Plan Overlay (Schedule 15) has a number of requirements to guide future development on the subject site. The following sections of DPO15 are relevant to this assessment:

2.2 Section 173 Agreement to provide for public infrastructure

4.3.2 *The owner ……must enter into an agreement with the Responsible Authority under Section 173……for the provision of the following items of public infrastructure in accordance with the Public Realm Plan prepared and approved in accordance with this schedule. The works may include but are not limited to:*

- *Streetscape and public realm improvements to Doonside Street;*
- *Streetscape and public realm improvements to Appleton Street; and,*
- *A minimum nine (9) metre wide pedestrian lane connecting Doonside Street and Appleton Street at the approximate mid-point of the Site, generally in accordance with the Indicative Framework Plan at Figure 1.*

2.3 Section 173 Agreement for Traffic Impact Assessment Report works

4.3.3 *The owner ….must enter into an agreement with VicRoads and the Responsible Authority under section 173 …..for the provision of works which are identified in the Traffic Impact Assessment Report prepared and approved in accordance with this schedule. The works may include but are not limited to:*

- *Mitigating works required for each development stage in the Development Plan;*
- *A two way or a four way signalised intersection between Burnley Street / Doonside Street / Buckingham Street; and,*
- *A new intersection, if required, approved by VicRoads in consultation with the Responsible Authority.*

4.3.4 *The Section 173 Agreement must be entered into prior to a planning permit being issued in accordance with the approved Development Plan.*

4.2 Section 173 Agreement for Traffic Impact Assessment Report

4.3.5 The requirements for the Traffic Impact Assessment Report are outlined within DPO15. A Traffic Impact Assessment report must be *"prepared by a suitably qualified traffic engineer to the satisfaction of the Responsible Authority and VicRoads."*

4.3.6 The Traffic Impact Assessment must include and demonstrate the following:

- An existing condition assessment;
- Details of any development staging;
- A site layout plan showing convenient and safe primary vehicle access, including:
  - Primary vehicle access to/from Doonside Street;
  - Any vehicle access to Appleton Street to be a secondary access point; and
  - No direct vehicle access to/from the site via Burnley Street.
- Details regarding the layout, cross section and function of any internal street or laneway network;
- On-site car parking and bicycle parking provisions and allocations;
- Expected traffic volumes and impact on the existing road network, including but not necessarily limited to Doonside Street, Appleton Street and Burnley Street;
- The TIA is to include consideration of any development stages and approved/current development applications within the immediate area surround the site. The assessment is to:
  - Identify mitigating works required for each development stage in the Development Plan;
  - Assess whether a two-way or a four-way signalized intersection between Burnley Street / Doonside Street/Buckingham Street is required and the

trigger for providing the signalized intersection to the satisfaction of VicRoad; and,

- Identify a new intersection layout and operation, if required, approved by VicRoads in consultation with the Responsible Authority.

- Details of any works or treatments proposed to Doonside Street or Appleton Street or the nearby road network;
- Details regarding the impact on pedestrian and bicycle routes;
- Measures to reduce conflict and improve pedestrian and bicycle amenity;
- Details regarding loading arrangements, with loading to be undertaken on-site and conflict between the loading bay(s) and car parking areas and non-motorised transport to be minimised;
- Access to the site by trucks is to be via Doonside Street; and,
- Details regarding on-site waste collection with waste vehicles accessing the site from Doonside Street.

4.2 Concept Plans

4.3.7 The requirements for Concept Plans are outlined within DPO15. Concept plans must include the following:

- The total number of dwellings across the entire site;
- The proposed use of each building and estimated floor area for each use;
- At least 9,000 square metres of Gross Floor Area provided for employment generating activities;
- An indication of the location and approximate commercial and retail yield for the site;
- A north-south pedestrian lane:
  - With a minimum width of 9 metres;
  - That provides safe and pleasant pedestrian and cycling access between Doonside Street and Appleton Street;
  - That will not be accessible by private vehicles at any time (with the exemption of emergency services and public/authority services).
- The provision of at least 4.5% of the total site (576 square metres) for public open space which fronts Doonside Street and adjoins the pedestrian lane. The plan must show the area of public open space in square metres and its percentage of overall site area; and,
- Vehicular, pedestrian, cyclist and loading access points and connections.

4.4 Preliminary Development Concept

4.4.1 The preliminary concept plans prepared by the applicant for the proposed rezoning, include six new buildings across three lots and varying between 7-12 storeys. The preliminary yield analysis indicated that the development would comprise in the order of:

- 557 dwellings;
- 15,410 square metres of net commercial floor area; and
- 519 square metres of leasable retail floor area.

4.4.2 A detailed traffic analysis was prepared by Ratio (Dec 2018) based on the preceding yield to accompany the rezoning application.

4.4.3 Council commissioned Traffix Group to undertake a peer review of the Ratio analysis and were generally satisfied with the extent and findings of the study.

4.5 Council Review

4.5.1 Following advertisement of Amendment C223, Council have referred the matter to review by Planning Panels Victoria.

4.5.2 Council Officers have sought clarification on the definition of "secondary access" and whether further refinements are required within DPO15. Traffix during their peer review provided a definition of "secondary access" as follows:

(a) A secondary access services are less convenient than the primary access, does not provide for loading or truck access and additionally it may service only limited number of car spaces or service only as an entry or an exit.

4.5.3 Officers and Traffix have reviewed DPO15 and are satisfied that there is sufficient policy guidance to manage traffic access and movement along Appleton Street to achieve an outcome that aligns with the preceding definition.

4.5.4 Traffix consultants were also engaged by Council, to review submissions raising traffic matters and, in response, have advised officers they are satisfied with the DPO15 requirements to limit access to Appleton Street and do not recommend any refinements.

4.5.5 Council in their submission to the Panel have adopted a position of support for Amendment C223, including traffic matters.

4.6 Third Party Objections

4.6.1 A number of submissions were received following exhibition of Amendment C223. Some of the submissions did not raise issues with traffic or parking related matters, the remainder that did are summarised as follows:

- Proposed parking rates too low
- Availability of on-street parking
- Capacity constraints on traffic along Burnley Street, Doonside Street and Appleton Street in particular.
- Traffic signals at Burnley Street / Doonside Street, with concerns about the number of signals, whether there was sufficient room and if they would actually improve congestion.
- Traffic analysis didn't take account of surrounding developments
- Capacity constraints on public transport
- Pedestrian congestion and safety
- Concerns about access to Appleton Street
- Definition of Secondary Access in regard to Appleton Street

4.6.2 The following report addresses the preceding issues and outlines changes to the wording of the exhibited DPO15 requirements.

5 Car Parking Provision:

5.1 Overview

5.1.1 The exhibited DPO15 does not contain specific parking rates for future uses. This is appropriate in my opinion, as the parking rates will vary depending on the ultimate development proposal, which will need to respond to the interaction between the proposed uses.

5.1.2 Nevertheless, parking rates have been suggested within the Ratio application traffic assessment and peer reviewed by Traffix Group. Submissions have been made by third parties questioning the appropriateness of the indicative parking rates.

5.1.3 The subject site is in a location that seeks to promote sustainable transport use and reduce reliance on private vehicles. In particular the following assessment takes into account Clause 21.06 – 'Transport' of the Yarra Planning Scheme, which states that Yarra needs to reduce car dependency by promoting walking, cycling and public transport use as viable and preferable alternatives. Whilst Clause 21.06 acknowledges that the scope of the Planning Scheme is limited in its ability to manage an integrated transport system, Council have committed to improving walking and cycling infrastructure.

5.1.4 Clause 21.06 also makes an important point, stating that:

"Parking availability is important for many people, however in Yarra unrestricted car use and parking is neither practical nor achievable. Car parking will be managed to optimise its use and to encourage sustainable transport options."

5.2 Proposed Parking Rates

5.2.1 The subject site is within the Principal Public Transport Network (PPTN) and as such would be assessed against the column B rates of Clause 52.06 of the Yarra Planning Scheme, noting that the site is not subject to a Parking Overlay.

5.2.2 The following indicative parking rates were included in the Traffic Assessment prepared by Ratio as part of the rezoning application and are compared to the Column B Clause 52.06 rates.

Table 5-1: Indicative Recommended Parking Rates

Use	Unit	Planning Scheme Rates	Indicative Parking Rates
Residents	to each one-bedroom	1	0.5 - 0.7
	to each two-bedroom	1	0.7 - 0.9
	to each three-bedroom	2	1.0 - 1.5
Visitors	No on-site car parking	0	0
Retail (shop)	Space to each 100sqm LFA	3.5	1 per tenancy (staff)
Commercial (office)	To each 100sqm of NFA	3	1.0 - 2.5

5.2.3 As shown in the preceding table, the indicative parking rates would result in a parking dispensation. This is typical of a large mixed use development and supported by the extensive list of criteria within the Planning Scheme to justify such dispensations.

5.2.4 In my opinion, the proposed rates for retail and commercial uses are considered appropriate as a guide but should be flexible enough to enable sharing of spaces if appropriate.

5.2.5 It is understood that the proposed residential car parking rates have adopted the 2016 census data for Richmond. The 2016 census data is the latest data available of existing demand for the area. Although a relevant reference point, it doesn't allow for current trends to be taken into account, which indicate increasing reliance on sustainable transport modes and increasing numbers of residents deliberately choosing to live without a private vehicle.

5.2.6 Given the development in the area, it is likely that the number of car share pods will be increased and bicycle infrastructure improved. It is noted that Yarra Council formally adopted its Car Share Policy on 16/7/2019, which state that North Richmond currently (2019) has 16 car share spaces and they are seeking to increase this to 45 car share spaces by 2024.

5.2.7 The 2016 ABS data for one, two and three bedrooms flats, units or apartments within a three storey block or less in Richmond is shown in Table 5-2. The category of three storeys or less has been adopted to avoid inclusion of housing commission apartments, which have a different demographic.

Table 5-2: ABS Car Ownership Data (Richmond)

Dwelling Type		Average Car Ownership	Percentage of Households with zero vehicles
Flat, unit or apartment	1 Bedroom	0.76 cars per dwelling	33.5%
	2 Bedroom	0.99 cars per dwelling	23.7%
	3 Bedroom	1.15 cars per dwelling	23.8%

5.2.8 As shown in the preceding table, 1 in 3 (34%) one bedroom apartments do not currently own a car, with almost 1 in 4 (24%), two and three bedroom dwellings choosing to live without a car.

5.2.9 On that basis, it is my opinion that the proposed rates for residential dwellings are overly conservative and could be reduced to reflect the existing demand for apartments in this area without parking. In my opinion, the demand for accommodation without parking is likely to increase, especially in a location within a major activity centre.

5.2.10 In my opinion, it would be a missed opportunity, if one of the residential buildings was proposed to be an affordable and sustainable zero car parking development, such as the Nightingale model of apartments, but was unable to do so because the Development Plan required a minimum parking provision.

5.2.11 Therefore, I recommend that the parking rates for both 1 and 2 bedroom dwellings should start at zero. I am happy for the proposed upper limit to remain, to ensure a flexible approach to the future dwelling mix can be achieved.

5.3 Appropriateness of Parking Dispensation

5.3.1 In order to determine whether a parking dispensation should be supported in this location, I have undertaken the following review:

5.3.2 The Planning Scheme rates are applicable throughout Victoria and are based on rates for individual uses rather than a mixed use development as proposed. Given that different locations have different levels of access to alternative modes of transport, goods and serves, and that a range of uses on site or in the area, can operate in a complimentary fashion, which reduces the overall parking demand of the individual elements, I strongly support a parking dispensation in this location.

5.3.3 The subject site has good public transport access as well as other sustainable transport options, such as an extensive bicycle network and good pedestrian connectivity.

5.3.4 The site is located within an Activity Centre including full line supermarkets as well as other goods and services within convenient walking distance.

5.3.5 If a vehicle is required on occasion, there are a number of car share pods within walking distance, as well as taxi / uber services and the like.

5.4 Summary of Opinion

5.4.1 In my opinion there are three fundamentals required to support a significant car park dispensation, including zero spaces, which are as follows:

- Convenient access to alternative modes of transport.
- Walking distance to good and services.
- Access to a vehicle when and if the need arises.

5.4.2 A car park dispensation is considered appropriate for the proposed mixed-use development, given its locality within an Activity Centre, access to sustainable transport options and access to numerous car share facilities.

5.4.3 The extensive parking restrictions in the area and the existing high level of parking demand in the vicinity of the site, will make it difficult for future residents or employees to park a vehicle for an extended period of time in close proximity to the subject site.

5.4.4 In my opinion the subject site has the infrastructure required to support a significantly reduced car parking development, whilst the on-street parking conditions and restrictions will also discourage vehicle ownership.

5.4.5 The actual parking rates adopted will be subject to approval by the responsible authority during the detailed planning application process.

6 On-Street Parking:

6.1 Concerns

6.1.1 A large number of submissions listed the availability of on-street parking as a concern related to the propose rezoning and subsequent redevelopment of the site.

6.2 Existing Conditions

6.2.1 The parking surveys previously undertaken during the initial application process identified in the order of 350 on-street car parking spaces within an approximate 300 metre walk of the subject site.

6.2.2 During the day, parking within the walkable area is generally a mixture of unrestricted and time restricted (generally 1P and 2P) parking. At night, parking in the area is generally unrestricted.

6.2.3 Along the site frontages, there are approximately 60 on-street car parking spaces which includes a number of unrestricted spaces.

6.2.4 Previous car parking surveys have found that parking along the site frontage was heavily utilised with minimal vacant parking available. Recent site observations indicate that car parking conditions in the area surrounding the subject site have not markedly changed since the detailed observations.

6.3 On-Street Parking Management

6.3.1 Many submissions raised concern with the impact regarding on-street parking.

6.3.2 One way to reduce on-street parking is by encouraging sustainable methods of travel rather than relying on a private vehicle. This can be promoted by making sure that long term parking on-street is not available in the immediate vicinity of the subject site.

6.3.3 It is recommended that parking restrictions within the vicinity of the site are changed to 2P to prevent long-term parking by residents or employees and encourage short-term parking suitable for future visitors of the subject site.

6.3.4 The management of on-street parking is a matter for Council and is outside the planning process. Council has a policy (Parking Restrictions Guidelines) which provides a process for the management of parking restrictions on street.

6.4 Summary

6.4.1 In order to achieve the best planning outcome, it is recommended that a review of on-street car parking restrictions is undertaken by Council.

6.4.2 A holistic overview of on-street parking restrictions in line with the changing use in the area, would provide a better outcome for existing residents and the subject site, noting that on-street parking is a public resource to be shared by all land uses in the area.

7 Traffic and Transport Assessment

7.1 Limitations

7.1.1 Due to the Covid-19 pandemic, traffic conditions throughout Melbourne are extremely low and do not represent typical conditions. Therefore, I have been unable to conduct traffic and /or parking surveys in the process of preparing this statement.

7.1.2 I have however, been able to source traffic survey data for the intersections of Doonside Street / Burnley Street and Appleton Street / Burnley Street, collected in November 2019. As the surveys were collected less than 6 months ago, they are considered appropriate. The following review is based on the 2019 data as well as a holistic review of traffic management in the area.

7.2 Existing Traffic Volumes

7.2.1 The traffic surveys were undertaken on Thursday, 21st November 2019, between 7:30am and 9:30am and again between 4:00pm and 6:00pm.

7.2.2 The overall peak hour occurred between 8:15-9:15am and 5:00-6:00pm. The peak hour volumes are displayed in Figure 7-1.

Figure 7-1: Peak Hour Traffic Volumes – Burnley St / Doonside St / Buckingham St

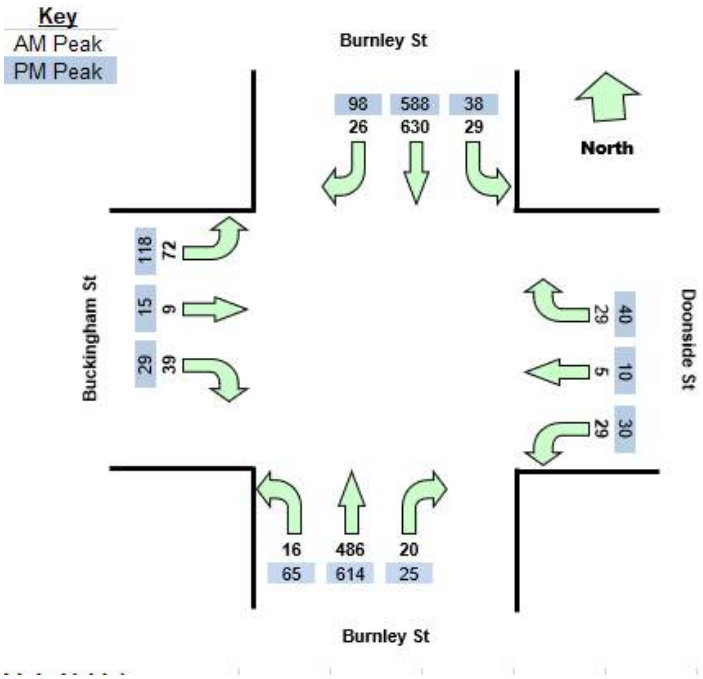
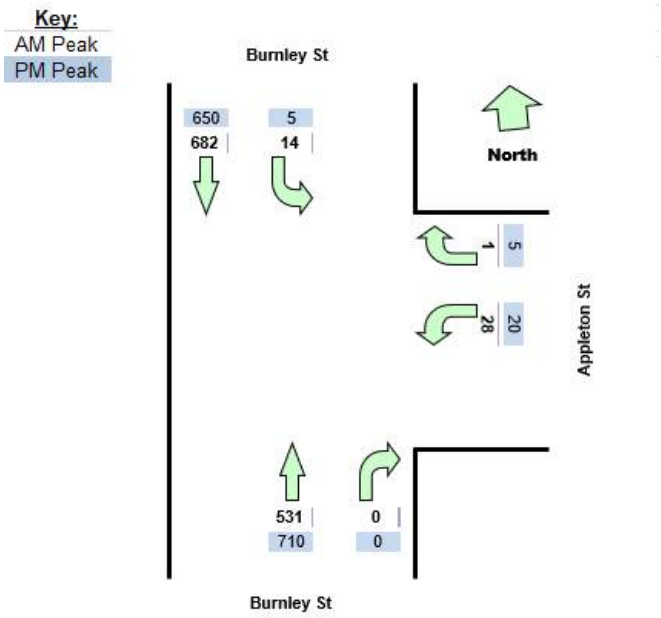


Figure 7-2: Peak Hour Traffic Volumes – Burnley Street / Appleton Street



7.2.3 A review of the peak hour traffic volumes indicates that Doonside Street, Appleton Street and Burnley Street are currently carrying the following peak hour traffic volumes.

Table 7-1: Doonside Street Peak Hour Traffic Volumes (2019)

Peak Hour	Eastbound	Westbound	Two Way
AM Peak	58	63	121
PM Peak	78	80	158

Table 7-2: Appleton Street Peak Hour Traffic Volumes (2019)

Peak Hour	Eastbound	Westbound	Two Way
AM Peak	14	30	44
PM Peak	5	25	30

Table 7-3: Burnley Street, north of Doonside Street Peak Hour Traffic Volumes (2019)

Peak Hour	Northbound	Southbound	Two Way
AM Peak	587	725	1,312
PM Peak	812	724	1,536

7.2.4 A further analysis of the existing travel patterns was undertaken at Doonside Street / Burnley Street to understand the distribution of vehicle movements to and from Doonside Street.

7.2.5 The distribution percentage during the AM and PM peak hours is shown in Table 7-4.

Table 7-4: Percentage Distribution of Doonside Street Vehicle Movements

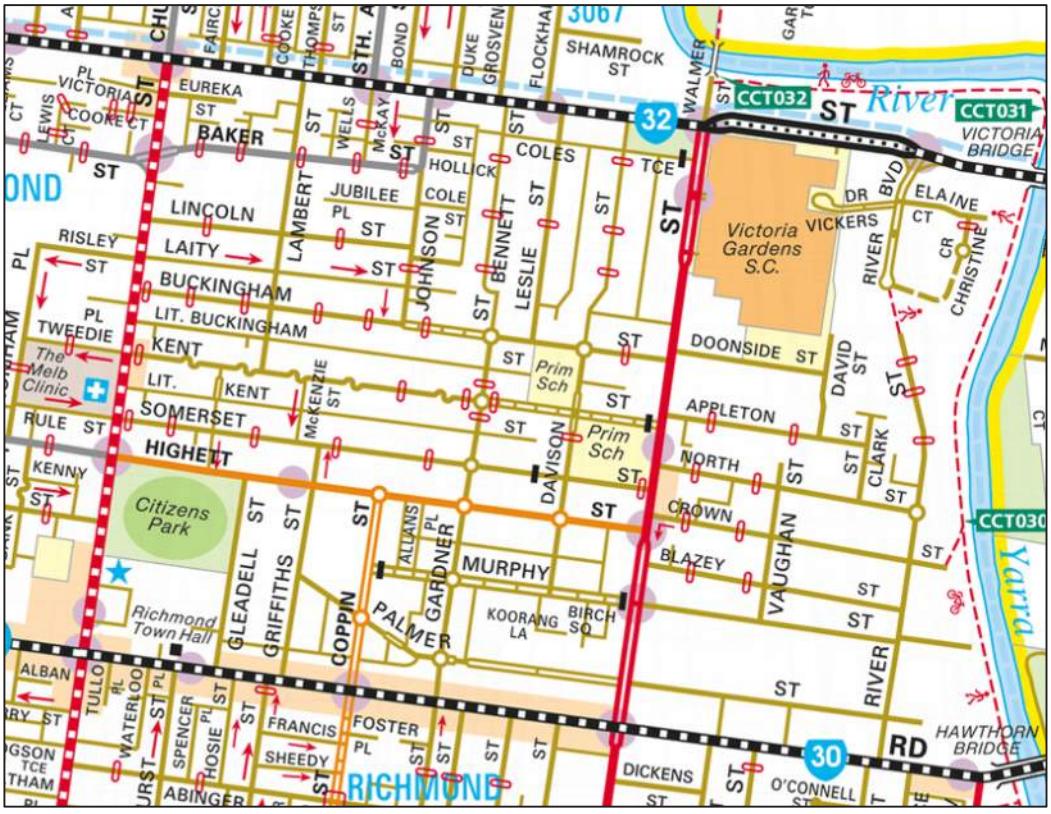
Direction	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Burnley Street North	50%	46%	49%	50%
Buckingham Street	16%	8%	19%	12%
Burnley Street South	34%	46%	32%	38%
Total	100%	100%	100%	100%

7.3 Existing Traffic Management

7.3.1 The Melway demonstrates the extent of traffic management in the vicinity of the site.

7.3.2 The area bound by Victoria Street to the north, Yarra River to the east, Bridge Road to the south and Church Street to the west is shown in Figure 7-3.

Figure 7-3: Existing Traffic Management in the vicinity of the site



Source: www.melway.com.au

7.3.3 The distance between north south arterial roads (Burnley Street and Church Street) is approximately 800m, with a distance of approximately 900m between the east west arterials (Victoria Street and Bridge Road).

7.3.4 There are currently 6 sets of traffic signals, including a signalised pedestrian crossing, along Burnley Street, including its intersections at Victoria Street and Bridge Road.

7.3.5 Traffic signals are currently located approximately 220m north of Doonside Street providing access to Victoria Gardens Shopping Centre. A signalised pedestrian crossing is located approximately 135m south of Doonside Street (35m south of Appleton Street).

7.3.6 The preceding figure also demonstrates, the extent of traffic management that has been installed on the local road network to encourage appropriate vehicle speeds and discourage through traffic.

7.3.7 The additional restrictions on movements to and from Burnley Street, such as the left in / left out only at Appleton Street and the ban on right turns into Buckingham Street from 7am-9am on all days of the week are not shown.

7.4 Existing Conditions Intersection Analysis

Overview

7.4.1 An intersection analysis has been undertaken of Doonside Street / Burnley Street and Appleton Street / Burnley Street during the AM and PM peak hours to determine the current operating conditions adjacent to the subject site on Burnley Street.

SIDRA Parameters

7.4.2 The key parameters used to determine the operational capacity of an intersection are queue length, average delay and degree of saturation (or volume to capacity ratio).

7.4.3 Degree of Saturation is a ratio of arrival (or demand) flow to capacity. Degrees of saturation above 1.0 represent oversaturated conditions and degrees of saturation below 1.0 represent undersaturated conditions.

7.4.4 The operational rating associated with the degree of saturation is summarised in Table 7-5.

Table 7-5: Ratings of Degree of Saturation

Degree of Saturation (DOS)	Rating
Up to 0.6	Excellent
0.61 – 0.70	Very Good
0.71 – 0.80	Good
0.81 – 0.90	Fair
0.91 – 1.00	Poor
Greater than 1.00	Very poor

7.4.5 Although operating conditions with a degree of saturation around 1.00 are undesirable, it is acknowledged that this level of congestion is typical of many metropolitan intersections during the AM and PM peak hours.

7.4.6 The 95th percentile queue length is the value below which 95 percent of all observed cycle queue lengths fall, or 5 percent of all observed queue lengths exceed.

7.4.7 Average Delay is the average time, in seconds, that all vehicles making a particular movement can expect to wait at an intersection.

Existing Conditions Results

7.4.8 The results of the analysis are attached as Appendix B and summarised in Table 7-6.

Table 7-6: Doonside Street / Burnley Street Existing Conditions Analysis

Leg	Movement	AM Peak Hour			PM Peak Hour		
		D.O.S.	95%ile Queue (m)	Avg Delay (s)	D.O.S.	95%ile Queue (m)	Avg Delay (s)
Burnley Street (S)	Through	0.35	5	1	0.48	10	1
	Right	0.35	5	8	0.48	10	10
Doonside Street	Left	0.08	2	15	0.09	3	14
	Right	0.14	3	24	0.28	7	35
Burnley Street (N)	Left	0.02	0	6	0.02	0	6
	Through	0.39	0	1	0.38	0	1
Intersection Total		**0.39**			**0.48**		

Table 7-7: Appleton Street / Burnley Street Existing Conditions Analysis

Leg	Movement	AM Peak Hour			PM Peak Hour		
		D.O.S.	95%ile Queue (m)	Avg Delay (s)	D.O.S.	95%ile Queue (m)	Avg Delay (s)
Burnley Street (S)	Through	0.30	0	0	0.42	0	1
Appleton Street	Left	0.07	2	15	0.04	1	14
Burnley Street (N)	Left	0.41	0	6	0.37	0	6
	Through	0.41	0	1	0.37	0	0
Intersection Total		**0.41**			**0.42**		

7.4.9 As shown in the preceding tables both intersections are currently operating with 'excellent' conditions with minimal queues and delays.

7.5 Existing Travel Characteristics

Discussion

7.5.1 I have undertaken a review of existing travel characteristics for Inner Melbourne, using the Victorian Integrated Survey of Travel and Activity (VISTA). VISTA is an ongoing survey of household travel activity, collected by the Victorian State Government to assist in transport and land use planning.

7.5.2 The VISTA data indicates that people undertake 2.9 trips per person per day on average in the Inner Melbourne area. Trips were split between private vehicle, public transport and active transport modes.

Mode of Transport

7.5.3 The mode of transport used in the AM and PM peak hours and over the course of a day in Inner Melbourne for all trip types is summarised in Table 7-8.

Table 7-8: Mode of Transport Used (VISTA data for Inner Melbourne)

Transport Mode	AM Peak (7-9am)	PM Peak (3-6pm)	Daily
Car as driver	40%	39%	41%
Car as passenger	14%	17%	15%
Walking	17%	23%	25%
Bicycle	7%	5%	5%
Train	12%	10%	7%
Tram	6%	4%	4%
Bus	2%	2%	2%
Other	1%	1%	1%
Total	100%	100%	100%

NB: Daily data from VISTA data collected 2013-2014 and Peak Hour data collected in 2009-2010

7.5.4 As shown in the preceding table, of all trips undertaken in the Inner Melbourne area, 40% of those trips were undertaken by someone driving a car, a further 15% of those trips were as a passenger in a car. Therefore, approximately 55% of all trips are currently undertaken in a private vehicle.

7.5.5 The remaining 45% of trips are undertaken by another mode, including public transport, walking, cycling and so on.

7.5.6 Of the private vehicle trips undertaken, whether as a passenger or as a driver, the VISTA data reveals that those trips were undertaken for the reasons outlined in Table 7-9

Table 7-9: Trip Purpose of Private Vehicle Trips (VISTA Inner Melbourne)

Trip Purpose	AM Peak (7-9am)	PM Peak (3-6pm)	Daily
Work related	43%	22%	28%
Education	13%	6%	7%
Pick up / Drop Off / Accompany	29%	31%	16%
Shopping	3%	16%	12%
Social / Recreational	6%	17%	27%
Personal Business	6%	8%	7%
Other	0%	0%	3%
Total	100%	100%	100%

NB: Daily data from VISTA data collected 2013-2014 and Peak Hour data collected in 2009-2010

7.5.7 As shown in the preceding table, 28% of private vehicle trips over a day were work related, this increases to 43% during the morning peak hour and drops to 22% during the PM peak hour.

7.5.8 The preceding table clearly demonstrates that a large proportion (72%) of vehicle trips by Inner Melbourne residents are for purposes other than going to work, such as education, shopping, pick up / drop off etc.

7.6 Trip Generation

Residential

7.6.1 The ABS census data for 2016 indicates that there were 2.10 people on average per household in the City of Yarra. Applying the VISTA rate of 2.9 trips per person to 2.10 people per household results in an estimated 6.09 trips per dwelling per day. Noting that the 6.09 trips per day is across all modes of transport.

7.6.2 The proposed development is anticipated to contain in the order of 557 dwellings. Applying a rate of 6.09 trips per day per dwelling, results in approximately 3,392 trips. Assuming that 10% of all trips occur in the AM and PM peak hours, results in 339 total peak hour movements.

7.6.3 The following table estimates the number of private vehicle trips, public transport, walking and cycling trips that could be anticipated by the proposed development.

Table 7-10: Anticipated Trip Generation

Transport Mode	AM Peak		PM Peak		Daily	
	%	Trips (vph)	%	Trips (vph)	%	Trips (vph)
Private Vehicle Driver	40%	136	39%	132	41%	1391
Passenger	14%	47	17%	58	15%	509
Walking	17%	58	23%	78	25%	848
Bicycle	7%	24	5%	17	5%	170
Public Transport	20%	85	16%	64	13%	441
Other	1%	3	1%	0	1%	34
Total	100%	339	100%	339	100%	3392

7.6.4 As shown in the preceding table, the dominant form of travel is still by private vehicle, however 30% of trips per day are expected to be undertaken using an active mode of transport (walking or cycling) with a further 13% per day using public transport.

7.6.5 Applying the number of vehicle movements to the number of dwellings (557) results in a rate of 0.24 vehicle movements per dwelling in the AM peak and PM peak hours, with a daily rate of 2.5 vehicle movements per dwelling (assuming all dwellings generate a vehicle movement).

7.6.6 The application traffic report assumed a rate of 3.0 vehicle movements per dwelling per day with 10% in the peak hours, equivalent to 0.3 vehicle movements per dwelling. The adopted rate of 3.0 vehicle movements per dwelling is considered appropriate as it was only applied to dwellings with a car space.

7.6.7 Applying a rate of 3.0 vehicle movements per day to the proposed 557 dwellings, less the assumed 20% without a car space, results in a traffic generation of 1337vpd with **134vph** in the AM and PM peak hours.

Commercial

7.6.8 The traffic generation of office / commercial developments is directly related to the parking provision. Meaning that if generous parking is provided on site, there is an incentive for employees to drive. If there is limited parking on site and employees need to rely on an off site parking space, there is more incentive to use an alternative transport modes if on-street parking is constrained.

7.6.9 The application report assumed that parking was provided at the upper limit of the recommended range, equivalent to 2.5 parking spaces per 100sqm.

7.6.10 For consistency, I have adopted the same conservative assumption and assumed that 50% of those spaces will either arrive or depart during the AM and PM peak hours. Although I think the 50% assumption is probably on the low side, it is offset by the high parking provision.

7.6.11 Applying these assumptions to the proposed minimum floor area of 9,000sqm and the proposed floor area of 15,410sqm, results in a traffic generation between 113 and **193 vehicle movements per hour** during the AM and PM peak hours. The anticipated traffic generation will be lower if less parking spaces are provided.

Surrounding Development

7.6.12 Three proposed developments were identified in close proximity to the subject site within the application traffic report. Of these three developments only the one at 171 Buckingham Street is still in construction and would not have contributed vehicle movements to the updated 2019 traffic surveys.

7.6.13 171 Buckingham Street is under construction and expected to contain 176 apartments and 3 townhouses. This development has been included in the following analysis.

7.7 Traffic Distribution

7.7.1 In terms of distribution between inbound and outbound movements, I have adopted the following typical splits for residential and commercial uses:

Table 7-11: Adopted Traffic Distribution between Inbound and Outbound Movements

Direction	Residential		Commercial	
	AM Peak	PM Peak	AM Peak	PM Peak
Inbound	20%	60%	90%	10%
Outbound	80%	40%	10%	90%

7.7.2 The wider distribution assumed in the application traffic report, is considered reasonable and has been adopted as follows:

Table 7-12: Percentage of Development Traffic per Intersection

Percentage Distribution per Intersection	Inbound	Outbound
Doonside Street / Burnley Street	90%	50%
Appleton Street / Burnley Street	0%	40%
River Street / Bridge Road	10%	10%
Total	100%	100%

7.7.3 Traffic volumes on Doonside Street currently comprise a mixture of commercial and residential movements with relatively unconstrained operating conditions at Doonside Street.

7.7.4 Therefore, the existing distribution of traffic to and from Doonside Street is considered a reasonable basis for distributing future traffic generated by the subject site at this intersection.

7.7.5 Unlike the application report, I have included vehicle movements to and from Buckingham Street as per existing conditions. The following distribution has been used for future traffic anticipated to enter and exit the site via the Doonside Street / Burnley Street intersection:

Table 7-13: Distribution of Traffic at Doonside Street / Burnley Street

Direction	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Burnley Street North	50%	50%	50%	50%
Buckingham Street	15%	15%	15%	15%
Burnley Street South	40%	40%	40%	40%
Total	100%	100%	100%	100%

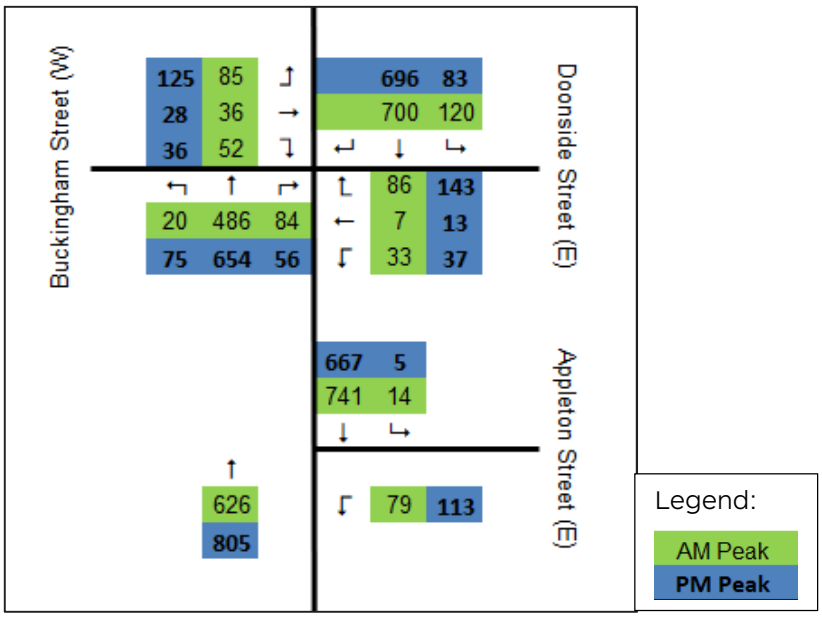
7.7.6 The application traffic study estimated that the subject site would generate in the order of 330 vehicle movements in the AM and PM peak hours.

7.7.7 No allowance was previously made for vehicles either entering or departing the site via Buckingham Street.

7.8 Future Traffic Volumes

7.8.1 Based on the preceding analysis, the resultant anticipated post development peak hour traffic volumes at the Burnley Street / Doonside Street and Burnley Street / Appleton Street intersections are shown in Figure 7-4.

Figure 7-4: Post Development Peak Hour Traffic Volumes



7.9 Future Conditions Intersection Analysis

Overview

7.9.1 A SIDRA analysis has been undertaken using the 2019 traffic volumes, adding the approved development on Buckingham Street and the anticipated traffic generated by the subject site.

Doonside Street / Appleton Street Post Development with Existing Geometry

7.9.2 The results of the analysis are attached as Appendix C and summarised as follows:

Table 7-14: Burnley Street / Appleton Street Future Conditions Analysis

Leg	Movement	AM Peak Hour			PM Peak Hour		
		D.O.S.	95%ile Queue (m)	Avg Delay (s)	D.O.S.	95%ile Queue (m)	Avg Delay (s)
Burnley Street (S)	Through	0.35	0	0	0.45	0	1
Appleton Street	Left	0.21	5	16	0.27	8	16
Burnley Street (N)	Left	0.42	0	6	0.40	0	6
	Through	0.42	0	1	0.40	0	1
Intersection Total		**0.42**			**0.45**		

7.9.3 As shown in the preceding table, the intersection is expected to continue operating with 'excellent' conditions in the AM and PM peak hours with minimal queues and delays.

Doonside Street / Burnley Street Post Development with Existing Geometry

7.9.4 The results of the analysis are attached as Appendix C and summarised as follows:

Table 7-15: Doonside Street / Burnley Street Future Conditions Analysis

Leg	Movement	AM Peak Hour			PM Peak Hour		
		D.O.S.	95%ile Queue (m)	Avg Delay (s)	D.O.S.	95%ile Queue (m)	Avg Delay (s)
Burnley Street (S)	Through	0.50	27	4	0.55	24	2
	Right	0.50	27	11	0.55	24	11
Doonside Street	Left	0.09	2	15	0.12	3	15
	Right	0.51	15	37	1.10	113	182
Burnley Street (N)	Left	0.07	0	6	0.05	0	6
	Through	0.39	0	0	0.39	0	1
Intersection Total		**0.51**			**1.10**		

7.9.5 As shown in the preceding table, the intersection is expected to continue operating with 'excellent' conditions in the AM Peak with minimal queues and delays.

7.9.6 The intersection will also operate well in the PM peak, with the exception of the right turn out of Doonside Street, which is expected to operate with 95th percentile queues of up to 113m and delays of 3 minutes for right turning vehicles.

7.9.7 The PM peak indicates a Degree of Saturation of 1.10, however, the through traffic on the arterial road network (Burnley Street) is not impacted and will continue to operate with 'excellent' conditions.

7.9.8 Although the delay may inconvenience Doonside Street, the impact is confined to this one local road and will not adversely impact the wider road network.

Sensitivity Analysis

7.9.9 A sensitivity analysis was undertaken of the Doonside Street / Burnley Street intersection, indicating that if drivers accepted slightly lower gaps in the Burnley Street traffic flow than the conservative conditions of the AustRoads Standards, which often happens in the peak hours, then the right turn would operate well within capacity, with a DOS of 0.73, a queue of 22m and an average delay of only 37 seconds.

7.9.10 Consideration was also given to a redistribution of traffic, i.e. as queues and delays increase for the right turn out of Doonside Street, some vehicles may choose an alternative route.

7.9.11 The analysis indicates that it would only take a redistribution of 20% of the right turners during the PM peak, equivalent to 28 vehicle movements to again reduce the intersection to acceptable operating conditions.

7.10 Potential Traffic Mitigation

Overview

7.10.1 A number of submissions raised concerns with the potential signalisation of the Doonside Street / Burnley Street intersection, expressing concerns that another set of signals may not be required, questioning whether it would be physically possible and of benefit.

7.10.2 The preceding sensitivity analysis clearly indicates that minimal changes to the development would negate the need for any modification of the existing road network adjacent to the subject site.

7.10.3 For example, if there was a change in the distribution assumed for the proposed development, then the right turn from Doonside Street onto Burnley Street may reduce. Also if the proposed floor areas, number of dwellings and/or parking provision reduced from the indicative numbers put forward at this early stage of the planning process, then the traffic generation would be expected to decrease, which would improve the anticipated operation of Doonside Street / Burnley Street intersection.

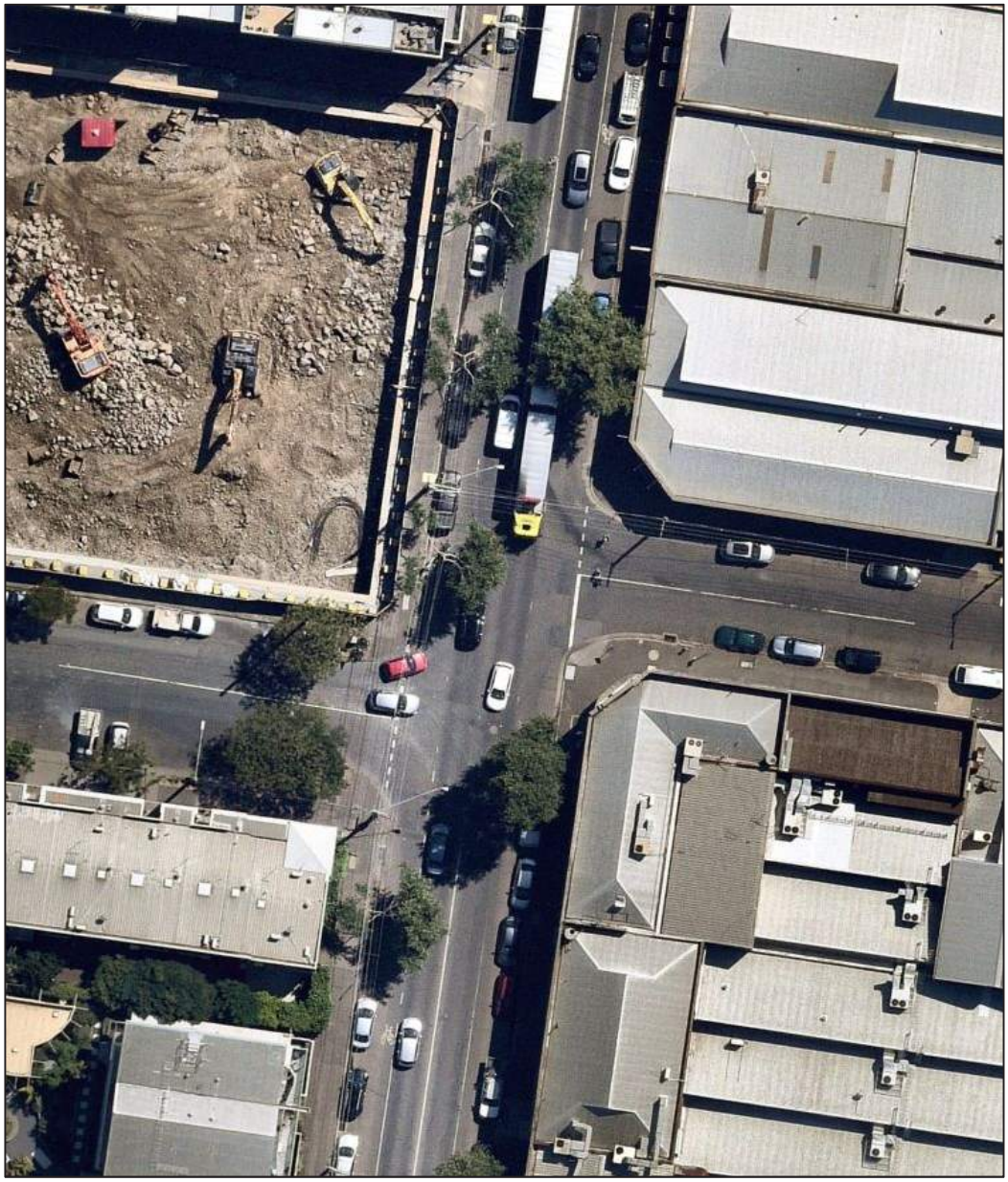
7.10.4 Furthermore, the DOS of 1.10 for one hour of the day on weekdays, is not dissimilar to the operating conditions of numerous intersections throughout Melbourne and particularly in built up areas like Richmond.

7.10.5 In my opinion, the potential for delays of right turning traffic on Doonside Street during the PM peak hour, should not be the sole consideration of whether the Doonside Street / Burnley Street intersection needs to be signalised.

Burnley Street / Doonside Street Intersection

7.10.6 The existing geometry of the Doonside Street / Burnley Street intersections and its relationship to Buckingham Street is shown in Figure 7-5.

Figure 7-5: Doonside Street / Burnley Street / Buckingham Street Intersection



Source: www.nearmap.com.au

7.10.7 The distance between the centre line of Doonside Street and the centre line of Buckingham Street is approximately 15m.

7.10.8 The UDF suggests that Doonside Street may be widened by 3-5m on the northern side. If this occurs the centreline of Doonside Street would be expected to move further north, i.e. further away from Buckingham Street.

7.10.9 It is also noted that the north west corner of the site and the building opposite on the northern side of Doonside Street are subject to Heritage Overlays.

Traffic Analysis of Traffic Signals at Doonside Street / Burnley Street

7.10.10 An analysis has been undertaken of a signalised T-intersection and a cross intersection that includes Buckingham Street.

7.10.11 The results of the analysis are attached as Appendix C and summarised as follows:

Table 7-16: Doonside St / Burnley St Post Development Signalised T-Intersection

Leg	Movement	AM Peak Hour			PM Peak Hour		
		DOS.	95%ile Queue (m)	Avg Delay (s)	DOS.	95%ile Queue (m)	Avg Delay (s)
Burnley Street (S)	Through	0.65	153	8	0.77	249	12
	Right	0.65	153	11	0.77	249	15
Doonside Street	Left	0.24	17	61	0.28	20	56
	Right	0.63	39	64	0.74	64	62
Burnley Street (N)	Left	0.09	11	8	0.06	9	9
	Through	0.57	101	4	0.57	121	6
Intersection Total		**0.65**			**0.77**		

Table 7-17: Doonside St / Burnley St Post Development Signalised Cross Intersection

Leg	Movement	AM Peak Hour			PM Peak Hour		
		DOS.	95%ile Queue (m)	Avg Delay (s)	DOS.	95%ile Queue (m)	Avg Delay (s)
Burnley Street (S)	Left	0.78	217	32	0.89	372	44
	Through	0.78	217	27	0.89	372	39
	Right	0.78	217	32	0.89	372	45
Doonside Street	Left	0.73	59	66	0.89	99	74
	Through	0.73	59	61	0.89	99	69
	Right	0.73	59	66	0.89	99	74
Burnley Street (N)	Left	0.45	21	15	0.25	15	15
	Through	0.71	185	14	0.70	192	15
Buckingham Street	Left	0.75	80	63	0.87	95	72
	Through	0.75	80	58	0.87	95	66
	Right	0.75	80	63	0.87	95	72
Intersection Total		**0.78**			**0.89**		

7.10.12 As the offset between east and west roads is a left / right stagger, right turns from Burnley Street into the adjacent side streets would overlap and effectively block up the intersection. Therefore, the preceding analysis assumes that right turns into Buckingham Street would be permanently banned, rather than just during the AM peak as per current conditions.

7.10.13 As shown in the preceding analysis, the T-intersection is anticipated to operate with 'very good' to 'good' conditions in the AM and PM peak hours respectively. I believe fully directional access could be maintained to Buckingham Street in this arrangement but would be assisted by a Keep Clear line marking or hashed keep intersection clear line marking.

7.10.14 Inclusion of Buckingham Street reduces the overall capacity of the intersection making the degree of saturation slightly higher in the AM and PM peak. Nevertheless, cross intersection traffic signal would operate with 'good' to 'fair' conditions in the AM and PM peak respectively, which is acceptable.

7.11 Traffic Impact Summary

Appleton Street

7.11.1 There is clear policy support to increase development density in the vicinity of the site. Due to the limited opportunities for road connectivity between Victoria Street, Burnley Street and the Yarra River, each available piece of the existing road network needs to be critically assessed and used to support the proposed growth.

7.11.2 On that basis, it is my opinion that the proposed restrictions on access to Appleton Street and the requirement for Secondary Access are unnecessary and somewhat redundant, due to the left in / left out arrangement at Burnley Street.

7.11.3 Appleton Street currently fronts onto Industrial 3 Zone and Industrial 1 Zone, therefore, it would be reasonable to assume that a certain level of truck activity already exists on Appleton Street. Residential and commercial uses typically generate less truck activity than Industrial Use.

7.11.4 As access from Burnley Street to Appleton Street is already restricted to left in / left out, it will therefore remain a Secondary access to the area due to its limitations on movements.

7.11.5 Due to the existing road width, vehicles currently need to find an appropriate location to pause while giving way to oncoming vehicles. Due to the modest number of driveways and the high demand for on-street parking, I would assume that there are limited opportunities for this to occur at busy times.

7.11.6 Providing vehicular crossings from the subject site to Appleton Street would potentially increase the number of passing opportunities currently available. Council also have the ability to improve traffic flow on Appleton Street by reducing the number of on-street parking spaces at peak times to create passing opportunities.

Doonside Street

7.11.7 The preceding analysis clearly demonstrates that traffic signals at Doonside Street / Burnley Street may not be required from a traffic function perspective or desired from a road network perspective.

7.11.8 Before deciding on whether traffic signals are appropriate at this location, careful consideration needs to be given to the following:

- Proximity to signals north and south of Doonside Street and whether introduction of another set of signals would create a safety issue on Burnley Street.
- Determine the east west pedestrian priority and whether existing signals south of Appleton Street are sufficient to address pedestrian crossing issues.
- A degree of saturation of just over 1.0 for a short period during one of the peak hours is not sufficient justification in its own right to install traffic signals and is more likely to result in a redistribution of traffic before the intersection reached congested conditions.

- Installation of 7 traffic signals in an overall road length of approximately 800metres is generally undesirable, due to an increased likelihood of motorists driving through traffic signals as the road conditions become confusing.
- In my opinion a cross intersection arrangement that includes Buckingham Street would increase the attractiveness of using Buckingham Street for both existing and future traffic.
- Potential impacts on landscape, on-street parking and on-street bicycle paths.
- Limitations on the geometry. There is limited ability to improve the alignment of Doonside Street with Buckingham Street. There is also limited opportunity to move the Doonside Street further away to improve the separation from Buckingham Street and road widening into the subject site or elsewhere does not appear feasible due to heritage constraints and existing permits.

8 Public Transport:

8.1 Issue

8.1.1 The issue of public transport capacity was raised in submissions to Amendment C223 and although this is not the responsibility of the applicant, I have reviewed the existing provision, potential improvements and quantified the number of anticipated additional trips.

8.2 Principal Public Transport Network (PPTN)

8.2.1 The vast majority of the Yarra Council area is included in the Principal Public Transport Network (PPTN). The PPTN in the vicinity of the site is shown in Figure 8-1.

Figure 8-1: PPTN in the Vicinity of the Subject Site

8.2.2 As shown in the preceding figure, the surrounding area is included in the PPTN, with the exception of a relatively small section between the Yarra River, extending approximately 820m to the west that is 120m in width.

8.2.3 The subject site is partially located within the PPTN. Under Clause 52.06 of the Yarra Planning Scheme, the PPTN applies if:

'any part of the land is identified is being within the Principal Public Transport Network Area as shown on the Principal Public Transport Network Area Maps (State Government of Victoria August 2019)'

8.3 Existing Public Transport

8.3.1 Existing public transport services in the area are shown on Figure 8-2 and summarised in Table 8-1.

Figure 8-2: Public Transport Map

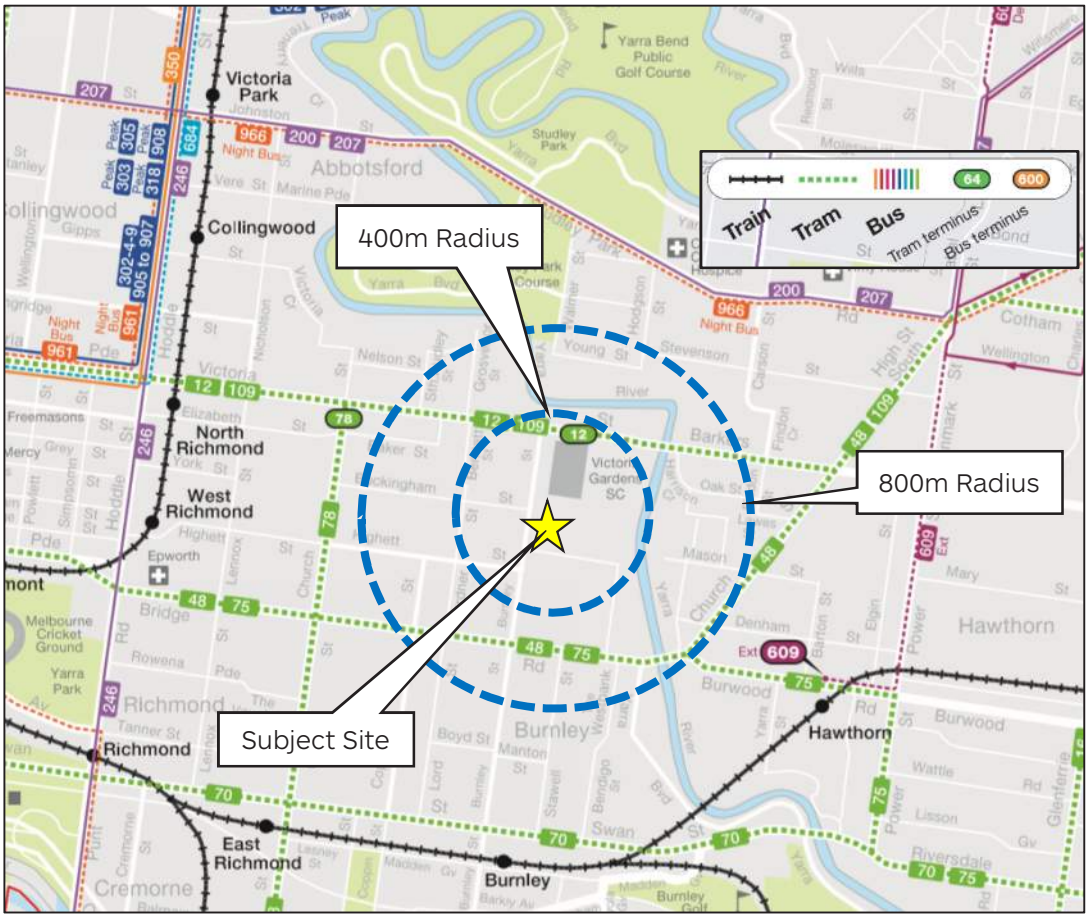


Table 8-1: Public Transport Provision

Service	Route No's	Route	Nearest Stop	Approximate Walking Distance	No. of services in peak hour
Tram	12	Victoria Gardens – St Kilda	Burnley St / Victoria St	350m	9
	109	Box Hill – Port Melbourne			8
	48	North Balwyn – Victoria Harbour Docklands	Burnley St / Bridge Rd	450m	8
	75	Etihad Stadium Docklands – Vermont South			6
	78	North Richmond – Balaclava via Prahran	Kent St / Church St	850m	6
Train	Glen Waverley, Alamein, Belgrave and Lilydale Lines		Burnley Station	1.4km	
	Hurstbridge and South Morang Lines		North Richmond Station	1.8km (accessible via tram 12 and 109)	
	Alamein, Belgrave and Lilydale Lines		Hawthorn Station	2km (accessible via tram 48 and 75)	

8.3.2 As shown in the preceding figure, the only public transport services within a 400m radius of the subject site are tram routes 12 and 109 along Victoria Street to the north. Within an 800m radius, tram routes 48 and 75 are also available on Bridge Road to the south.

8.3.3 The closest train station is Burnley Station, approximately 1.4km from the subject site, however this station is not directly accessible via public transport from the subject site.

8.3.4 North Richmond Station is located approximately 1.8km from the subject site, which is accessible via the existing tram routes on Victoria Street. Similarly, Hawthorn Station is located approximately 2.0km from the subject site and is accessible via tram routes 48 and 75.

8.4 Anticipated Additional Public Transport Trips

8.4.1 As discussed in Section 7.6, the proposed residential dwellings are expected to generate 85 public transport trips in the AM peak and 64 in the PM peak, with a total of 441 public transport trips per day.

8.4.2 To determine the public transport trips to and from the office, journey to work data for the City of Yarra (2016) has been sourced, which indicates that 28% of trips to places of employment in Yarra are made by public transport (train, tram and bus). Applying this to the proposed 15,400sqm of office would result in approximately 217 public transport trips in the AM and PM peak hours.

8.4.3 It would be reasonable to assume that public transport trips for office use are similar to vehicle arrivals and departures (ie 90% in AM and 90% out PM).

8.4.4 The anticipated additional public transport trips are summarised as follows:

Table 8-2: Anticipated Public Transport Trips

Use	AM Peak			PM Peak		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Residential	17	68	85	38	26	64
Commercial	195	22	217	22	195	217
Total	212	90	302	60	221	281

8.4.5 As shown in the preceding table, approximately 302 trips in the AM Peak and 281 trips in the PM peak are expected to be made by the various public transport services in the vicinity of the site.

8.4.6 The preceding analysis is based on the higher yield potential of the site and will decrease if the level of dwellings and office floor area is reduced. However, if the parking provision for the development is reduced from the levels assumed in this assessment, then it would be reasonable to assume that the proportion of public transport use would increase.

8.5 Public Transport Submission

8.5.1 The applicant has lodged a submission with the Department of Transport to review public transport services in the area. The submission includes a suggested north south bus route along Burnley Street.

8.5.2 A bus route along Burnley Street would remove the current gap from the preceding PPTN map and would ensure that the entire subject site was within 400m of a public transport service.

8.5.3 It is anticipated that a service along Burnley Street would also increase the accessibility of Victoria Gardens Shopping Centre and provide additional public transport options for local residents, schools and employees, including a direct link to Burnley Station located off Burnley Street to the south.

8.6 Summary of Opinion

8.6.1 The potential increase in public transport patronage by a proposed development, is not a metric commonly included in a development application.

8.6.2 Although Council and the applicant are unable to directly influence the provision of public transport services, providing data to assist Council in lobbying the relevant authorities would be useful in my opinion.

8.6.3 I agree with the that there is opportunity to improve public transport in the vicinity of the site, with one option being a bus route along Burnley Street. Other options would include additional services on the existing tram routes.

8.6.4 The current mechanism for public transport improvements is increased demand. If the demand was to increase in this area as is currently occurring and proposed, there is more incentive for the State Government and the relevant authorities to review and improve the existing services in the area.

8.6.5 Therefore, although I acknowledge that public transport services are rarely perfect, there is existing infrastructure and opportunities for future residents to access key destinations and live and work in this location using existing public transport services, without reliance on a private vehicle.

8.6.6 It is also noted that there is strong policy support to prioritise sustainable transport above the use of private vehicles, which gives me confidence that improvements will continue to be made, not only to public transport but also pedestrian and bicycle routes.

9 Loading Considerations:

9.1 Overview

9.1.1 In response to the proposed restrictions of truck movements associated with the rezoning, I have reviewed the loading arrangements and current access arrangements for trucks.

9.2 Planning Scheme Requirements

9.2.1 Clause 65.01 'Approval of an Application or Plan' of the Yarra Planning Scheme outlines the provision of loading requirements, and states the following:

"Before deciding on an application or approval of a plan, the responsible authority must consider, as appropriate:

— *The adequacy of loading and unloading facilities and any associated amenity, traffic flow and road safety impacts."*

9.3 Existing Requirements

9.3.1 There are a number of land uses in the area, including the subject site, that currently require access to loading facilities via the local road network.

9.3.2 This includes the industrial land uses to the east of the subject site and the loading activities associated with Victoria Gardens that currently take place at the northern end of David Street.

9.3.3 The occurrence of these movements was recorded in the traffic surveys that were undertaken in 2019. During the AM peak a total of 11 heavy vehicles were recorded on Doonside Street and 1 heavy vehicle in the PM peak hour.

9.4 Future Requirements

9.4.1 The future loading / unloading (excluding waste collection) requirements of the subject site will comprise a wide range of activities from residents moving in and out, to food and parcel deliveries etc.

9.4.2 The DPO refers to details of loading arrangements, requiring them to be undertaken on site, and to minimise conflict between car parking and non-motorised transport.

9.4.3 In consideration of the extensive street frontage and the increasing demand for quick drop off deliveries, it is considered suitable for loading / unloading activities to be undertaken on-street. This is a typical arrangement for the majority of office and residential buildings.

9.4.4 Furthermore, loading bays on site for residential and/or commercial uses may compromise some of the other objectives, such as streetscape improvements to Doonside Street and Appleton Street and minimizing conflict with pedestrian movements.

9.4.5 The DPO also references that all trucks are to access the site via Doonside Street.

9.4.6 The subject site is currently zoned Industrial 3 Zone, with Industrial 1 Zoned land at the eastern end of Appleton Street.

9.4.7 In the event that on-street loading was appropriate for some activities if not all, then it would make sense for vehicles to enter Appleton Street proceed around the block in a forwards direction to use on-street loading bays along the frontage of the site and exit via Doonside Street to Burnley Street in a forwards direction, with the need to reverse.

9.4.8 The proposed rezoning of the site to mixed use, is likely to result in a decrease of truck movements to the subject site compared to the existing industrial zoning.

9.5 Summary

9.5.1 In order to achieve the best outcome for all of the various activities that are likely to occur on the subject site, a holistic overview of loading / unloading activities in conjunction with the proposed development plan would provide a better outcome for the subject site and the surrounding road network.

9.5.2 Therefore, I don't believe that the wording to restrict truck movements from Appleton Street is required within the DPO and would be better implemented if that was Council's preferred outcome, during the Planning Permit stage.

10 Exhibited DPO15 Issues and Suggested Wording:

10.1 Section 173 Agreement for Traffic Mitigation

10.1.1 The following wording is suggested in the exhibited DPO15:

10.1.2 The owner ….must enter into an agreement with VicRoads and the Responsible Authority under section 173 …..for the provision of works which are identified in the Traffic Impact Assessment Report prepared and approved in accordance with this schedule. The works may include but are not limited to:

- *Mitigating works required for each development stage in the Development Plan;*
- *A two way or a four way signalised intersection between Burnley Street / Doonside Street / Buckingham Street; and,*
- *A new intersection, if required, approved by VicRoads in consultation with the Responsible Authority.*

10.1.3 The Section 173 Agreement must be entered into prior to a planning permit being issued in accordance with the approved Development Plan.

Issues

10.1.4 I am concerned that the inclusion of the 173 Agreement requiring identification of mitigating works at the start of the project will encourage inappropriate traffic management to be required, before the actual composition of the development is understood.

10.1.5 Based on the analysis undertaken within this report, I am not convinced that traffic signals are warranted by this development and that if they are it will be associated with one of the last stages of works.

10.1.6 If the development mix changed to reduce the amount of commercial floor area or increased the number of dwellings without a car space then this would have an impact on the projected future traffic volumes.

10.1.7 As the site borders Burnley Street (RDZ1), VicRoads will be a referral authority throughout the development stages and will have ample opportunity to condition the proposed development as it feels would be appropriate, given the traffic conditions and overall road network strategy.

10.1.8 Therefore I don't feel that the requirement for the 173 Agreement is required or will provide the best outcome for the adjacent road network.

10.2 DPO15 Transport Assessment Requirements

10.2.1 The draft DPO outlines the following requirements for a Traffic Assessment.

A Traffic Impact Assessment Report (TIAR) prepared by a suitably qualified traffic engineer to the satisfaction of the Responsible Authority and Vic Roads. The Traffic Impact Assessment must include and demonstrate the following:

- An existing conditions assessment.
- Details of any development staging.
- A site layout plan showing convenient and safe primary vehicle access, including:
  - Primary vehicle access to and from Doonside Street;
  - Any vehicle access to Appleton Street to be a secondary access point;
  - No direct vehicle access to or from the site via Burnley Street.
- Details regarding the layout, cross section and function of any internal street or laneway network.
- On site car parking and bicycle parking provisions and allocations.
- Expected traffic volumes and impact on the existing road network, including but not necessarily limited to Doonside Street, Appleton Street and Burnley Street. This assessment is to include details of any assumptions relied upon.
- The TIAR is to include consideration of any development stages and approved/current development applications within the immediate area surrounding the site. The assessment is to:
  - identify mitigating works required for each development stage in the Development Plan
  - assess whether a two way or a four way signalised intersection between Burnley Street/Doonside Street/Buckingham Street is required and the trigger for providing the signalised intersection to the satisfaction of VicRoads
  - identify a new intersection layout and operation, if required, approved by VicRoads in consultation with the Responsible Authority.
- Details of any works or treatments proposed to Doonside Street or Appleton Street or the nearby road network.
- Details regarding the impact on pedestrian and bicycle routes.
- Measures to reduce conflict and improve pedestrian and bicycle amenity.
- Details regarding loading arrangements, with loading to be undertaken on site and conflict between the loading bay(s) and car parking areas and non-motorised transport to be minimised.
- Access to the site by trucks is to be via Doonside Street.
- Details regarding on-site waste collection, with waste vehicles accessing the site from Doonside Street.

10.3 Potential Issues and Proposed Wording of Transport Assessment Section of DPO15

Secondary Access

10.3.1 In regard to the third dot point, I believe the wording 'safe' should be modified to appropriate or similar. An appropriately designed access does not guarantee it is safe. As engineers, we endeavor to make the road environment as safe as practicable, however until such time as human judgement is removed from the driving process, there is no guarantee that the access will be 'safe'.

10.3.2 The wording should also be modified in regard to the third dot point which states "Any vehicle access to Appleton Street to be a Secondary Access point".

10.3.3 Given the size of the site, it is reasonable to assume that if the site is rezoned, that it may contain a number of buildings, which could be developed in stages. As such

some buildings would be expected to front Doonside Street, whilst others may front Appleton Street, and although there may be a common basement this is not guaranteed.

10.3.4 It would be reasonable for the individual buildings to each have a single point of access from the on-site parking to the adjacent road network. Therefore, a building fronting Appleton Street could have a single 'primary' access point to Appleton Street.

10.3.5 This doesn't mean that the objective of Doonside Street carrying more of the traffic from the future development than Appleton Street won't be achieved.

10.3.6 Doonside Street provides fully directional access to Burnley Street, whilst Appleton Street is restricted to left in / left out, thereby reducing the capacity of Appleton Street in comparison to Doonside Street.

10.3.7 Furthermore, the larger scale buildings proposed in the framework, which will presumably generate more traffic, front Doonside Street.

10.3.8 Future users of the site may choose to drive from Appleton Street to Doonside Street via David Street, in order to head north, rather than being forced to turn left at Appleton Street and have to undertake a circuitous route through the local road network to the west in order to head north.

10.3.9 In my opinion, unless Appleton Street was converted to a fully directional access which I don't believe has been proposed, Appleton Street will operate as a 'Secondary' access by default.

10.3.10 On that basis I would suggest that the wording could read as follows:

A site layout plan showing convenient and appropriate vehicle access locations to the subject site, with no direct access to or from Burnley Street.

On site car parking and bicycle parking

10.3.11 The 5th dot point states the following:

10.3.12 "On site car parking and bicycle parking provision and allocations"

10.3.13 The preceding requirement is considered too restrictive and unnecessary for the Development Plan stage and is more appropriately addressed once detailed architectural plans are prepared for the individual stages.

Any future change in land use would provide an opportunity to reallocate car and/or bicycle spaces accordingly.

Remove requirement

Identification of Mitigating Works

10.3.14 Dot point 7 requires a traffic analysis that include consideration of any development stage and approved / current development application with the immediate area surrounding the site.

10.3.15 I have two concerns with the above requirement. Firstly, the area to include surrounding developments is undefined. Secondly, if nearby developments and their potential impacts on the road network are to be considered, then it seems any resulting mitigating works should be apportioned to include those developments.

10.3.16 I would also suggest that for clarity, the second dash under dot point 7 be reworded to say:

Assess whether a signalised intersection at Burnley Street / Doonside Street is required and if so whether Buckingham Street should be included as a fourth leg or alternatively treated, as well as identifying the trigger for any traffic signal, to the satisfaction of the Department of Transport.

Details of proposed works on Doonside Street or Appleton Street

10.3.17 Dot point 8 requires 'details' of any works or treatments proposed to Doonside Street or Appleton Street or the nearby road network.

10.3.18 The preceding requirements use of the term 'details' lacks clarity. If a written description of any such works is sufficient, then description of works on the adjacent road network would suffice, alternatively if a detailed plan is required, then this requirement should be moved to the concept plan requirements to ensure the Responsible Authority receives the appropriate level of detail.

Move to concept plan requirements

Impact on Pedestrian and Bicycle Routes

10.3.19 An increase in density will undoubtedly increase pedestrians and cyclists in the area.

10.3.20 Although it's possible to predict the likely number of additional pedestrian and bicycle movements, identifying the 'Impact' of those movements is significantly more complicated. To my knowledge, we don't currently have metrics on the capacity of bicycle infrastructure or footpaths to be able to quantify the impact.

10.3.21 As this will be a development aiming to achieve a high level of sustainable transport usage, the measurement of pedestrian numbers and bicycle users is considered appropriate.

10.3.22 Therefore, I would suggest rewording the requirement, such that the traffic assessment quantifies future pedestrian and bicycle movements generated by the subject site and prepares a plan demonstrating pedestrian desire lines to key destinations and demonstrates that appropriate connectivity within the subject site to those destinations has been considered. Noting that the improvement of infrastructure beyond the subject site is Council's responsibility.

Determine the likely increases to pedestrian and bicycle movements generated by the site and the likely distribution of those movements. Demonstrate how the subject site will prioritise those movements and provide convenient connections to existing infrastructure.

Truck Access

10.3.23 Dot point 11 and 12.

10.3.24 Dot point 11 refers to details of loading arrangements, requiring them to be undertaken on site, and to minimise conflict between car parking and non-motorised transport.

10.3.25 I believe the preceding requirement is too prescriptive for this stage of the development. Loading / unloading (excluding waste collection) will comprise a wide range of activities from residents moving in and out, to food and parcel deliveries etc. To insist that all loading activity occurs on site, does not allow consideration of the extensive street frontage the site has or the increasing demand for quick drop off type deliveries.

10.3.26 Loading bays on site for residential and commercial uses are also uncommon and may compromise some of the other objectives, such as streetscape improvements to Doonside Street and Appleton Street and minimizing conflict with pedestrians and cyclists.

10.3.27 In order to achieve the best outcome for all of the various activities that are likely to occur on the subject site, a holistic overview of loading / unloading activities in conjunction with the proposed development plan would provide a better outcome for the subject site and the surrounding road network.

Estimate the type and number of loading / unloading activities associated with the development and provide detail on appropriate loading / unloading facilities to service the various uses proposed.

Truck Access via Doonside Street

10.3.28 Dot point 12 requires all trucks to access the site via Doonside Street. I don't believe the protection of Appleton Street is necessary or consistent with surrounding land use.

10.3.29 The subject site is currently zoned Industrial 3 Zone, with Industrial 1 Zoned land at the eastern end of Appleton Street. It is assumed that a number of trucks currently use Apppleton Street and have been doing so for many years.

10.3.30 The proposed rezoning of the site is likely to result in a decrease of truck movements to the subject site.

10.3.31 In line with the discussion above regarding a holistic approach to design of loading areas, it is my opinion that this requirement be removed. In the event that on-street loading was appropriate for some activities, then it would make sense for vehicles to enter Appleton Street proceed around the block in a forward direction to use the on-street loading bays along the frontage of the subject site and exit via Doonside Street to Burnley Street.

10.3.32 Any reduction in reversing trucks in a mixed-use environment, like the one proposed, is in my opinion an opportunity to reduce conflict between vehicles and non-motorised movements as suggested in the preceding dot point.

10.3.33 On that basis, it is my opinion that the preceding requirement to quantify and provide details of appropriate loading facilities will give Council sufficient information to determine if a restriction on access via Appleton Street provides the best outcome for the subject site and surrounding development.

Remove requirement

Waste Collection

10.3.34 For the reasons outlined in the preceding discussion, the requirement for all waste trucks to access the site via Doonside Street is not appropriate.

10.3.35 As discussed previously, some parts of the future development may only have access to Appleton Street from their car park. Typically, waste is stored within car parks, making the collection from Doonside Street impractical. The distance between Appleton Street and Doonside Street is approximately 87m, making the transfer of bins through the site highly undesirable.

10.3.36 Furthermore, Appleton Street is lined by residential dwellings at the western end and industrial / warehouse uses at the eastern end, which I assume are currently served by regular waste collection vehicles. In my opinion, restricting waste collection to Doonside Street is not only undesirable but also impractical.

10.3.37 Suggest wording stays the same with the removal of Doonside Street.

Details regarding on-site waste collection.

11 Summary of Opinion:

11.1 Development Plan Overlay

11.1.1 I support the adoption of the DPO, however, I believe the current wording within the Transport Assessment criteria, is too prescriptive and may hamper a robust assessment of the site as a whole.

11.1.2 I have recommended modified wording for 5 of the 13 proposed dot points, deletion of 2 dot points and relocation of one to the concept plan requirements, as detailed in the previous Section.

11.2 Submissions

Issues Raised

11.2.1 A number of issues were raised in submissions which were previously summarised in Section 4.6 are as follows:

- Proposed parking rates too low
- Availability of on-street parking
- Capacity constraints on traffic along Burnley Street, Doonside Street and Appleton Street in particular.
- Traffic signals at Burnley Street / Doonside Street, with concerns about the number of signals, whether there was sufficient room and if they would actually improve congestion.
- Traffic analysis didn't take account of surrounding developments
- Capacity constraints on public transport
- Pedestrian congestion and safety
- Concerns about access to Appleton Street
- Definition of Secondary Access in regard to Appleton Street

11.3 Parking Rates

11.3.1 A mixed use development in this location, satisfies the requirement for a significant parking dispensation against the standard Planning Scheme statutory parking requirements.

11.3.2 Although the actual parking provision will be determined at a later date and is not included in the proposed Development Plan, I believe that if indicative parking rates are to be put forward, then the range for one and two bedroom apartments should start at zero.

11.3.3 This would ensure that sustainable transport developments could be achieved on site.

11.4 Availability of On-Street Parking

11.4.1 In my opinion on-street parking is a public resource to be shared amongst all surrounding land uses, to primarily support short term parking demands associated with visitors, tradespeople, deliveries and so on.

11.4.2 In order to achieve a more equitable access to on-street parking I recommend that Council undertake a review of existing parking restrictions in the area and restrict any unrestricted spaces to one or two hours. This will discourage long term parking in the area and create a higher turnover of spaces.

11.5 Traffic Analysis and Potential Signals

11.5.1 Based on the analysis I have undertaken and a review of Burnley Street and traffic management in the area, I am not convinced traffic signals will either be required or desirable at the intersection of Doonside Street / Burnley Street due to this development.

11.5.2 The only benefit of putting in traffic signals is to make it easier for egressing vehicles from Doonside Street to turn right on Burnley Street. It will not benefit through traffic on Burnley Street, which as the main north south arterial road through the area should be the priority from a traffic function perspective.

11.5.3 Although traffic signals may potentially benefit pedestrians, there are already two signalised crossing opportunities in close proximity to Doonside Street that currently provide this function.

11.5.4 Based on my analysis, which includes known developments that are yet to be completed, I am satisfied that 80% of the development as currently proposed could be completed and occupied prior to the right turn reaching capacity and that it would only take a relatively minor modification to the proposed parking supply or development schedule to allow the development to operate satisfactorily without signals.

11.5.5 Therefore, I don't believe it would be appropriate to lock in traffic mitigation measures through a 173 Agreement prior to a permit even being issued. There is opportunity to include a condition on permit for the signals if they are deemed an appropriate traffic management tool in conjunction with a later stage of development.

11.6 Public Transport

11.6.1 The subject site currently has good access to public transport with a number of tram services within walking distance.

11.6.2 I agree that the development will most likely generate additional demand for public transport services, as would have the recently completed apartment buildings nearby.

11.6.3 I also agree that encouraging density on sites such as the one being reviewed should encourage a review of public transport infrastructure in the area.

11.6.4 However, public transport is the responsibility of the state government and its various authorities and is not within the power of the applicant or Council to modify.

11.6.5 The submission by the applicant to the Department of Transport seeking a review of public transport in the area including a bus route on Burnley Street, is to be encouraged and ideally have the full support of Council and Victoria Gardens Shopping Centre.

11.7 Pedestrian Congestion and Safety

11.7.1 Pedestrian infrastructure in the area is considered reasonable in my opinion.

11.7.2 Concerns were also raised in regard to the street lighting in the area and associated safety concerns. I am not qualified to comment on the adequacy of lighting, but note that activation of the subject site with the proposed mixed use development will improve existing conditions and surveillance on Doonside Street and Appleton Street at night.

11.8 Appleton Street

11.8.1 Various concerns have been raised in regards to Appleton Street and a suggestion that truck movements from the subject site are not allowed to use Appleton Street.

11.8.2 I acknowledge that the existing geometry and popularity of parking in the area, means that oncoming vehicles have to give way to each other.

11.8.3 The introduction of driveways on Appleton Street to the proposed development would assist in providing additional passing areas.

11.8.4 I see no need to restrict future truck movements from Appleton Street, which given its proximity to industrial land use is expected to already cater for truck movements. The proposed development is anticipated to reduce the number of truck movements associated with the site compared to the existing industrial zoning.

11.8.5 Allowing some truck movements along Appleton Street would enable delivery vehicles and other small trucks to park along the frontage of the site, either on Appleton Street or Doonside Street without needing to turn around on the local road network.

11.8.6 Given the existing left in / left out restrictions at Appleton Street / Burnley Street intersection I don't believe there is a need to define the road as a Secondary route as it is currently functioning this way be default and will continue to do so as long as the left in / left out restrictions remain.

Appendix A **Traffic Survey Results:**

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Burnley Street and Appleton Street, Richmond

GPS	-37.815334, 145.009083						
Date:	Thu 21/11/19	North:	Burnley St	Survey Period	AM:	7:30 AM-9:30 AM
Weather:	Fine	East:	Appleton St		PM:	4:00 PM-6:00 PM
Suburban:	Richmond	South:	Burnley St	Traffic Peak	AM:	8:15 AM-9:15 AM
Customer:	Undisclosed	West:	N/A		PM:	4:45 PM-5:45 PM

All Vehicles

Time		North Approach Burnley St			East Approach Appleton St			South Approach Burnley S			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
7:30	7:45	0	172	1	0	0	7	0	0	105	1204	
7:45	8:00	0	156	3	0	0	5	0	0	142	1234	
8:00	8:15	0	177	2	0	0	9	0	0	108	1236	
8:15	8:30	0	175	2	0	0	11	0	0	129	1257	Peak
8:30	8:45	0	174	5	0	0	4	0	0	132	1239	
8:45	9:00	0	168	3	1	0	5	0	0	131		
9:00	9:15	0	165	4	0	1	8	0	0	139		
9:15	9:30	0	155	0	0	2	2	0	0	140		
16:00	16:15	0	167	3	0	0	7	0	1	170	1309	
16:15	16:30	0	148	1	0	0	5	0	0	151	1320	
16:30	16:45	0	138	2	0	1	2	0	0	171	1371	
16:45	17:00	0	159	0	0	3	5	0	0	175	1390	Peak
17:00	17:15	0	170	1	0	2	5	0	0	181	1375	
17:15	17:30	0	165	2	0	0	7	0	0	182		
17:30	17:45	0	156	2	0	0	3	0	0	172		
17:45	18:00	0	147	2	0	1	9	0	0	168		

Peak Time		North Approach Burnley St			East Approach Appleton St			South Approach Burnley S			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
8:15	9:15	0	682	14	1	1	28	0	0	531	1257
16:45	17:45	0	650	5	0	5	20	0	0	710	1390

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Doonside St and Burnley St, Richmond

GPS	-37.814510, 145.009217						
Date:	Thu 21/11/19	North:	Burnley St	Survey Period	AM:	7:30 AM-9:30 AM
Weather:	Fine	East:	Doonside St		PM:	4:00 PM-6:00 PM
Suburban:	Richmond	South:	Burnley St	Traffic Peak	AM:	8:15 AM-9:15 AM
Customer:	Undisclosed	West:	Buckingham St		PM:	5:00 PM-6:00 PM

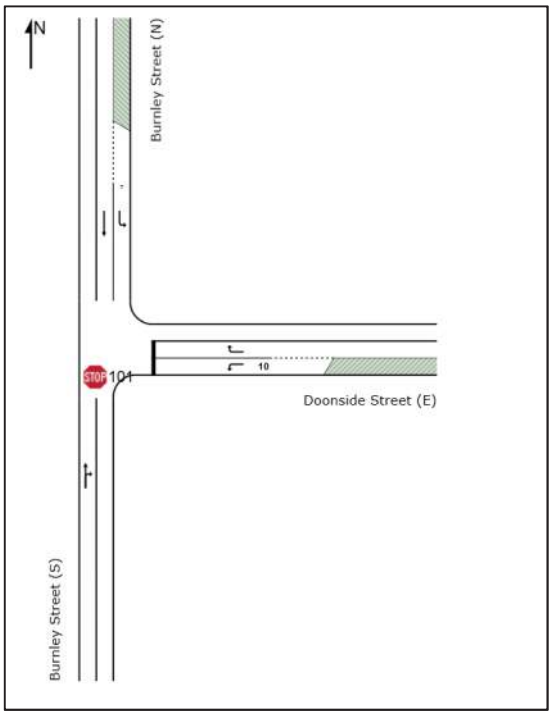
All Vehicles

Time		North Approach Burnley St				East Approach Doonside St				South Approach Burnley St				West Approach Buckingham St				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
7:30	7:45	1	2	159	5	0	8	1	2	0	13	94	4	0	8	4	9	1324	
7:45	8:00	0	1	140	10	0	4	1	8	0	19	122	5	0	10	4	11	1359	
8:00	8:15	0	3	164	10	0	9	2	9	0	9	102	3	0	8	2	13	1376	
8:15	8:30	0	1	162	7	0	6	2	11	0	6	118	1	0	12	4	15	1390	Peak
8:30	8:45	0	4	162	3	0	10	1	6	0	4	121	5	0	8	4	17	1385	
8:45	9:00	0	4	155	11	0	6	1	7	0	4	133	2	0	8	0	21		
9:00	9:15	0	17	151	8	0	7	1	5	0	6	114	8	0	11	1	19		
9:15	9:30	0	17	141	4	0	7	1	3	0	10	125	7	0	8	1	16		
16:00	16:15	1	29	150	8	0	12	2	9	0	8	139	10	0	6	0	24	1544	
16:15	16:30	0	16	141	8	0	2	1	4	0	7	147	5	0	10	2	28	1569	
16:30	16:45	0	20	136	9	0	7	2	8	0	3	156	10	0	3	3	24	1632	
16:45	17:00	0	15	141	6	0	9	2	8	0	10	163	15	0	4	2	19	1665	
17:00	17:15	0	22	150	6	0	16	4	9	0	5	160	15	0	8	2	26	1670	Peak
17:15	17:30	0	17	152	12	0	14	2	10	0	8	157	19	0	7	3	33		
17:30	17:45	0	27	148	7	0	5	3	7	0	4	159	12	0	7	4	31		
17:45	18:00	0	32	138	13	0	5	1	4	0	8	138	19	0	7	6	28		

Peak Time		North Approach Burnley St				East Approach Doonside St				South Approach Burnley St				West Approach Buckingham St				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
8:15	9:15	0	26	630	29	0	29	5	29	0	20	486	16	0	39	9	72	1390
17:00	18:00	0	98	588	38	0	40	10	30	0	25	614	65	0	29	15	118	1670

Appendix B **Existing Conditions SIDRA Analysis:**

Existing Conditions - Doonside Street / Burnley Street Intersection



Site: 101 [Burnley Street / Doonside Street - AM Existing]

Burnley Street/Doonside Street
AM Peak Existing Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	587	5.0	0.350	0.7	LOS A	0.7	5.3	0.12	0.03	0.15	58.0
3	R2	31	5.0	0.350	8.3	LOS A	0.7	5.3	0.12	0.03	0.15	54.3
Approach		618	5.0	0.350	1.1	NA	0.7	5.3	0.12	0.03	0.15	57.8
East: Doonside Street (E)												
4	L2	36	5.0	0.078	14.5	LOS B	0.3	2.0	0.63	1.00	0.63	41.4
6	R2	31	5.0	0.135	23.5	LOS C	0.4	3.2	0.83	1.00	0.83	43.0
Approach		66	5.0	0.135	18.7	LOS C	0.4	3.2	0.72	1.00	0.72	42.4
North: Burnley Street (N)												
7	L2	31	5.0	0.017	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
8	T1	733	5.0	0.388	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		763	5.0	0.388	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehicles		1447	5.0	0.388	1.5	NA	0.7	5.3	0.09	0.07	0.10	57.3

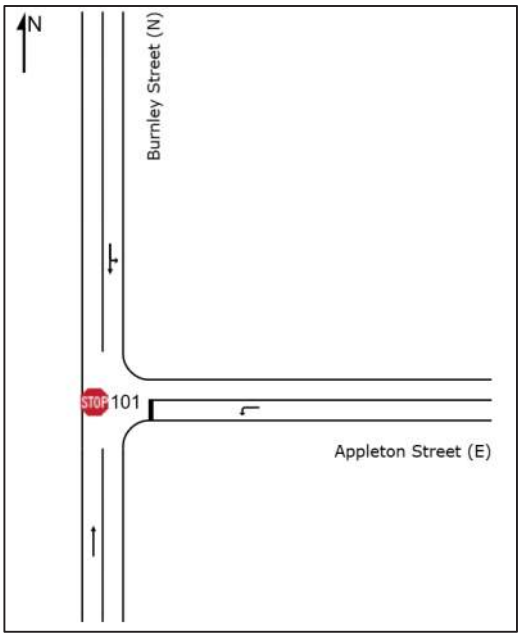
Site: 101 [Burnley Street / Doonside Street - PM Existing]

Burnley Street/Doonside Street
PM Peak Existing Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	813	5.0	0.484	0.9	LOS A	1.3	9.9	0.15	0.03	0.21	57.6
3	R2	42	5.0	0.484	9.7	LOS A	1.3	9.9	0.15	0.03	0.21	53.9
Approach		855	5.0	0.484	1.3	NA	1.3	9.9	0.15	0.03	0.21	57.4
East: Doonside Street (E)												
4	L2	42	5.0	0.360	14.4	LOS B	0.9	6.7	0.82	1.00	0.82	41.5
6	R2	42	5.0	0.377	25.0	LOS D	0.9	6.7	0.89	1.00	1.01	39.8
Approach		84	5.0	0.377	24.7	LOS C	0.9	6.7	0.76	1.00	0.92	39.1
North: Burnley Street (N)												
7	L2	42	5.0	0.022	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
8	T1	732	5.0	0.352	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		762	5.0	0.352	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.2
All Vehicles		1701	5.0	0.484	2.1	NA	1.3	9.9	0.11	0.03	0.14	58.3

Existing Conditions - Appleton Street / Burnley Street Intersection



Site: 101 [Burnley Street / Appleton Street - AM Existing]

Burnley Street/Appleton Street
AM Peak Existing Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	559	5.0	0.296	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		559	5.0	0.296	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Appleton Street (E)												
4	L2	29	5.0	0.070	15.2	LOS C	0.2	1.7	0.66	1.00	0.66	47.8
Approach		29	5.0	0.070	15.2	LOS C	0.2	1.7	0.66	1.00	0.66	47.8
North: Burnley Street (N)												
7	L2	15	5.0	0.411	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	57.9
8	T1	760	5.0	0.411	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		775	5.0	0.411	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles		1363	5.0	0.411	0.4	NA	0.2	1.7	0.01	0.03	0.01	59.5

Site: 101 [Burnley Street / Appleton Street - PM Existing]

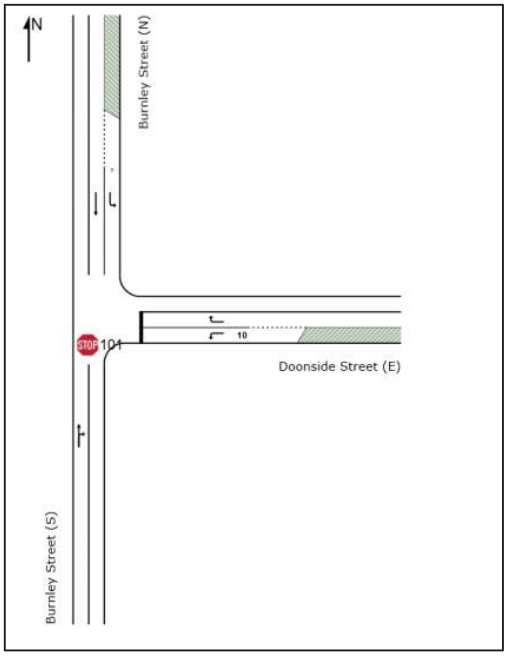
Burnley Street/Appleton Street
PM Peak Existing Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	789	5.0	0.418	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		789	5.0	0.418	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Appleton Street (E)												
4	L2	21	5.0	0.044	13.8	LOS B	0.2	1.1	0.60	0.96	0.60	48.6
Approach		21	5.0	0.044	13.8	LOS B	0.2	1.1	0.60	0.96	0.60	48.6
North: Burnley Street (N)												
7	L2	5	5.0	0.365	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	58.0
8	T1	684	5.0	0.365	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		689	5.0	0.365	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		1500	5.0	0.418	0.3	NA	0.2	1.1	0.01	0.02	0.01	59.7

Appendix C **Future Conditions SIDRA Analysis:**

Future Conditions - Doonside Street / Burnley Street Intersection Existing Geometry



Site: 101 [Burnley Street / Doonside Street - AM Future]

Burnley Street/Doonside Street
AM Peak Future Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	601	5.0	0.495	3.5	LOS A	3.7	27.2	0.48	0.14	0.68	52.3
3	R2	126	5.0	0.495	10.5	LOS B	3.7	27.2	0.48	0.14	0.68	49.2
Approach		727	5.0	0.495	4.7	NA	3.7	27.2	0.48	0.14	0.68	51.7
East: Doonside Street (E)												
4	L2	42	5.0	0.092	14.7	LOS B	0.3	2.4	0.63	1.00	0.63	41.3
6	R2	91	5.0	0.512	37.3	LOS E	2.0	14.7	0.92	1.09	1.29	37.1
Approach		133	5.0	0.512	30.1	LOS D	2.0	14.7	0.83	1.06	1.08	37.8
North: Burnley Street (N)												
7	L2	126	5.0	0.070	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
8	T1	737	5.0	0.390	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		863	5.0	0.390	0.9	NA	0.0	0.0	0.00	0.08	0.00	58.1
All Vehicles		1723	5.0	0.512	4.7	NA	3.7	27.2	0.26	0.18	0.37	52.5

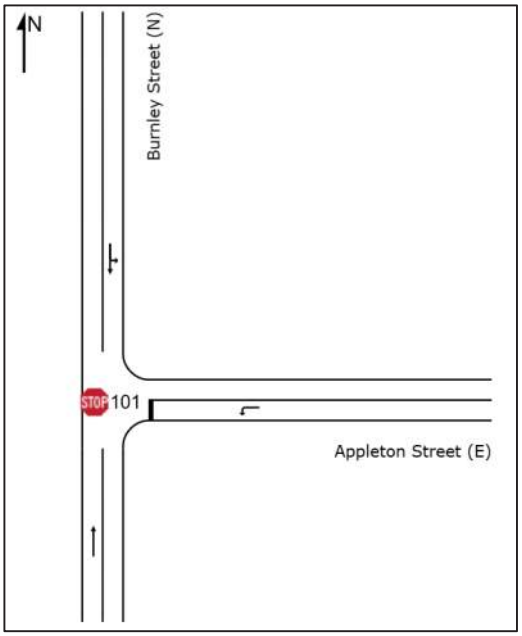
Site: 101 [Burnley Street / Doonside Street - PM Future]

Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	820	5.0	0.554	2.2	LOS A	3.3	23.9	0.33	0.07	0.48	54.6
3	R2	89	5.0	0.554	11.2	LOS B	3.3	23.9	0.33	0.07	0.48	51.3
Approach		909	5.0	0.554	3.1	NA	3.3	23.9	0.33	0.07	0.48	54.3
East: Doonside Street (E)												
4	L2	53	5.0	0.115	14.7	LOS B	0.4	3.0	0.64	1.00	0.64	41.3
6	R2	151	5.0	1.105	182.7	LOS F	15.5	112.9	1.00	2.12	5.71	14.8
Approach		203	5.0	1.105	139.2	LOS F	15.5	112.9	0.91	1.83	4.39	16.4
North: Burnley Street (N)												
7	L2	87	5.0	0.049	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.4
8	T1	733	5.0	0.388	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		820	5.0	0.388	0.6	NA	0.0	0.0	0.00	0.06	0.00	58.6
All Vehicles		1933	5.0	1.105	16.4	NA	15.5	112.9	0.25	0.25	0.69	40.7

Future Conditions - Appleton Street / Burnley Street Intersection Existing Geometry



Site: 101 [Burnley Street / Appleton Street - AM Future]

Burnley Street/Appleton Street
AM Peak Future Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	659	5.0	0.349	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		659	5.0	0.349	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Appleton Street (E)												
4	L2	83	5.0	0.206	16.3	LOS C	0.7	5.4	0.70	1.01	0.73	47.1
Approach		83	5.0	0.206	16.3	LOS C	0.7	5.4	0.70	1.01	0.73	47.1
North: Burnley Street (N)												
7	L2	15	5.0	0.421	5.7	LOS A	0.0	0.0	0.00	0.01	0.00	57.9
8	T1	780	5.0	0.421	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		795	5.0	0.421	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles		1537	5.0	0.421	1.0	NA	0.7	5.4	0.04	0.06	0.04	59.0

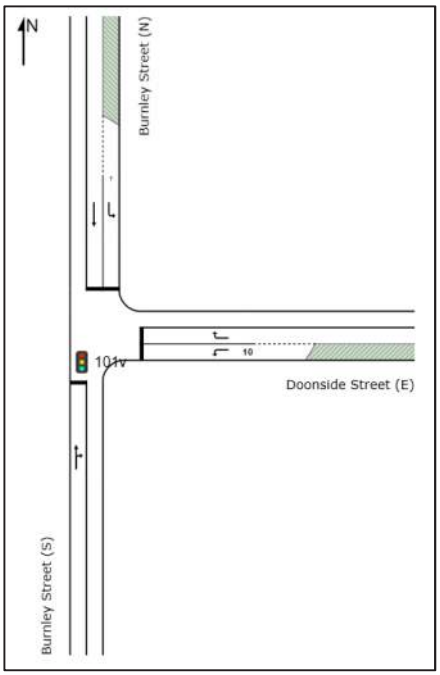
Site: 101 [Burnley Street / Appleton Street - PM Future]

Burnley Street/Appleton Street
PM Peak Future Conditions
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	847	5.0	0.449	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		847	5.0	0.449	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Appleton Street (E)												
4	L2	119	5.0	0.271	16.2	LOS C	1.1	8.0	0.70	1.00	0.69	47.2
Approach		119	5.0	0.271	16.2	LOS C	1.1	8.0	0.70	1.00	0.69	47.2
North: Burnley Street (N)												
7	L2	15	5.0	0.389	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	57.9
8	T1	753	5.0	0.389	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		768	5.0	0.389	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles		1710	5.0	0.449	1.2	NA	1.1	8.0	0.04	0.05	0.03	59.1

Future Conditions - Doonside St/ Burnley St Intersection – T-Intersection Signals



Site: 101v [Burnley Street / Doonside Street - AM Future - Signals]

Burnley Street/Doonside Street
AM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

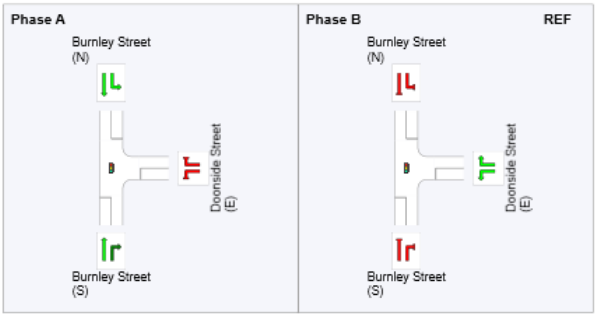
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	18	0
Green Time (sec)	96	12
Phase Time (sec)	102	18
Phase Split	85%	15%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class (MC) Running
Mixed Running & Stopped MCs
Other Movement Class (MC) Stopped
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Undetected Movement
Continuous Movement
Phase Transition Applied

Site: 101v [Burnley Street / Doonside Street - AM Future - Signals]

Burnley Street/Doonside Street
AM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	601	5.0	0.650	8.2	LOS A	20.9	152.8	0.54	0.54	0.54	47.2
3	R2	126	5.0	0.650	10.6	LOS B	20.9	152.8	0.54	0.54	0.54	44.7
Approach		727	5.0	0.650	8.6	LOS A	20.9	152.8	0.54	0.54	0.54	46.7
East: Doonside Street (E)												
4	L2	42	5.0	0.235	61.0	LOS E	2.3	17.1	0.96	0.74	0.96	20.3
6	R2	91	5.0	0.629	63.6	LOS E	5.3	38.6	0.99	0.80	1.05	28.8
Approach		133	5.0	0.629	62.7	LOS E	5.3	38.6	0.98	0.78	1.02	26.6
North: Burnley Street (N)												
7	L2	126	5.0	0.088	8.3	LOS A	1.5	11.3	0.23	0.63	0.23	51.4
8	T1	737	5.0	0.566	4.1	LOS A	13.8	100.9	0.36	0.33	0.36	53.1
Approach		863	5.0	0.566	4.7	LOS A	13.8	100.9	0.34	0.37	0.34	52.6
All Vehicles		1723	5.0	0.650	10.8	LOS B	20.9	152.8	0.47	0.48	0.48	45.5

Site: 101v [Burnley Street / Doonside Street - PM Future - Signals]

Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

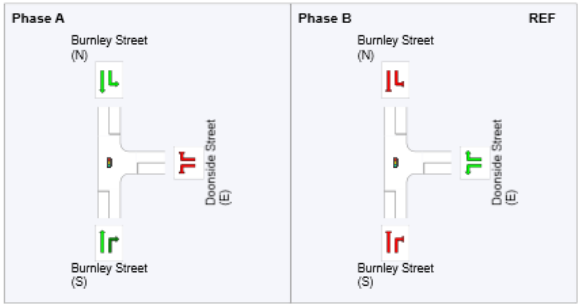
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	23	0
Green Time (sec)	91	17
Phase Time (sec)	97	23
Phase Split	81%	19%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class (MC) Running
Mixed Running & Stopped MCs
Other Movement Class (MC) Stopped
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Undetected Movement
Continuous Movement
Phase Transition Applied

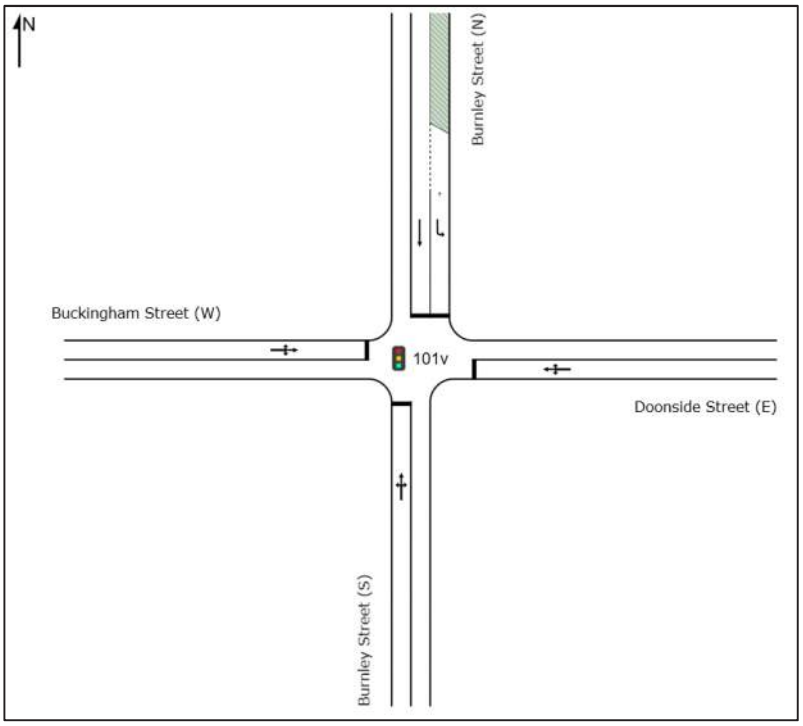
Site: 101v [Burnley Street / Doonside Street - PM Future - Signals]

Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
2	T1	820	5.0	0.771	12.4	LOS B	34.2	249.6	0.71	0.68	0.71	42.9
3	R2	89	5.0	0.771	14.8	LOS B	34.2	249.6	0.71	0.68	0.71	40.8
Approach		909	5.0	0.771	12.7	LOS B	34.2	249.6	0.71	0.68	0.71	42.6
East: Doonside Street (E)												
4	L2	53	5.0	0.282	55.5	LOS E	2.8	20.3	0.92	0.74	0.92	21.6
6	R2	151	5.0	0.741	61.5	LOS E	8.8	64.3	0.99	0.86	1.12	29.3
Approach		203	5.0	0.741	60.0	LOS E	8.8	64.3	0.97	0.83	1.07	27.8
North: Burnley Street (N)												
7	L2	87	5.0	0.064	9.4	LOS A	1.3	9.2	0.27	0.64	0.27	50.6
8	T1	733	5.0	0.570	6.0	LOS A	16.6	120.9	0.43	0.39	0.43	50.4
Approach		820	5.0	0.570	6.4	LOS A	16.6	120.9	0.41	0.42	0.41	50.4
All Vehicles		1933	5.0	0.771	15.0	LOS B	34.2	249.6	0.61	0.58	0.62	41.8

Doonside Street / Burnley Street / Buckingham Street Intersection – Four-Way Signals



Site: 101v [Burnley Street / Doonside Street/Buckingham Street - AM Future - Signals]

Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

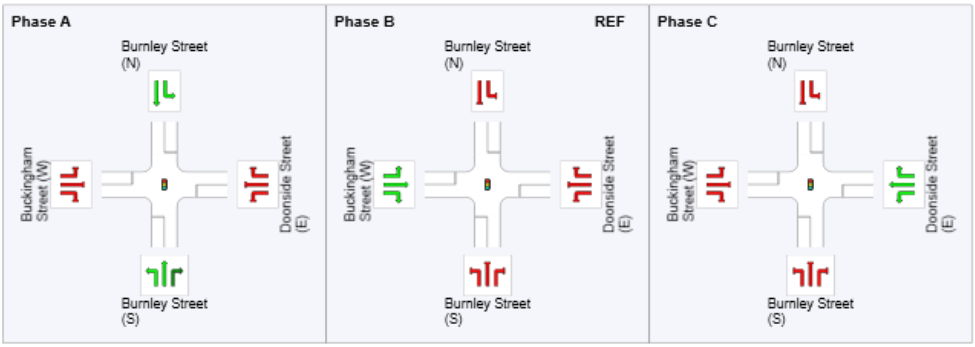
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	38	0	21
Green Time (sec)	76	16	12
Phase Time (sec)	81	21	18
Phase Split	68%	18%	15%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Site: 101v [Burnley Street / Doonside Street/Buckingham Street - AM Future - Signals]
Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
1	L2	21	5.0	0.776	32.1	LOS C	29.7	216.7	0.88	0.82	0.89	40.4
2	T1	512	5.0	0.776	26.5	LOS C	29.7	216.7	0.88	0.82	0.89	41.3
3	R2	88	5.0	0.776	32.0	LOS C	29.7	216.7	0.88	0.82	0.89	40.1
Approach		621	5.0	0.776	27.4	LOS C	29.7	216.7	0.88	0.82	0.89	41.1
East: Doonside Street (E)												
4	L2	35	5.0	0.730	66.4	LOS E	8.1	58.9	1.00	0.85	1.13	28.4
5	T1	7	5.0	0.730	60.8	LOS E	8.1	58.9	1.00	0.85	1.13	28.8
6	R2	91	5.0	0.730	66.3	LOS E	8.1	58.9	1.00	0.85	1.13	28.3
Approach		133	5.0	0.730	66.0	LOS E	8.1	58.9	1.00	0.85	1.13	28.3
North: Burnley Street (N)												
7	L2	126	5.0	0.449	14.7	LOS B	2.8	20.8	0.42	0.67	0.42	47.1
8	T1	737	5.0	0.713	13.9	LOS B	25.3	184.8	0.65	0.59	0.65	48.8
Approach		863	5.0	0.713	14.0	LOS B	25.3	184.8	0.61	0.60	0.61	48.6
West: Buckingham Street (W)												
10	L2	89	5.0	0.746	63.3	LOS E	10.9	79.6	1.00	0.87	1.11	29.2
11	T1	38	5.0	0.746	57.7	LOS E	10.9	79.6	1.00	0.87	1.11	29.7
12	R2	55	5.0	0.746	63.2	LOS E	10.9	79.6	1.00	0.87	1.11	29.1
Approach		182	5.0	0.746	62.1	LOS E	10.9	79.6	1.00	0.87	1.11	29.3
All Vehicles		1799	5.0	0.776	27.4	LOS C	29.7	216.7	0.77	0.72	0.80	41.1

Site: 101v [Burnley Street / Doonside Street/Buckingham Street - PM Future - Signals]

Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

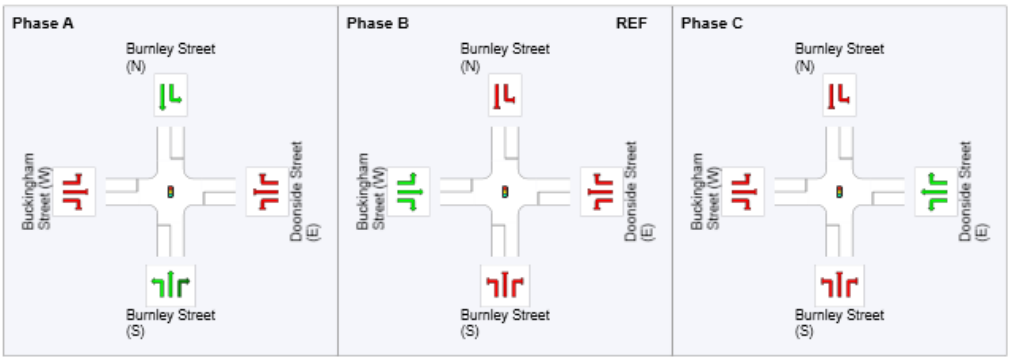
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Opposed Turns
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	40	0	20
Green Time (sec)	74	15	15
Phase Time (sec)	79	20	21
Phase Split	66%	17%	18%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement
Slip/Bypass-Lane Movement
Stopped Movement
Other Movement Class (MC) Running
Mixed Running & Stopped MCs
Permitted/Opposed
Opposed Slip/Bypass-Lane
Turn On Red
Undetected Movement
Continuous Movement

Site: 101v [Burnley Street / Doonside Street/Buckingham Street - PM Future - Signals]
Burnley Street/Doonside Street
PM Peak Future Conditions
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burnley Street (S)												
1	L2	79	5.0	0.898	45.0	LOS D	51.0	372.1	0.97	1.00	1.11	35.4
2	T1	688	5.0	0.898	39.4	LOS D	51.0	372.1	0.97	1.00	1.11	36.1
3	R2	59	5.0	0.898	44.9	LOS D	51.0	372.1	0.97	1.00	1.11	35.2
Approach		826	5.0	0.898	40.3	LOS D	51.0	372.1	0.97	1.00	1.11	35.9
East: Doonside Street (E)												
4	L2	39	5.0	0.894	74.4	LOS E	13.7	99.7	1.00	0.98	1.38	26.7
5	T1	14	5.0	0.894	68.8	LOS E	13.7	99.7	1.00	0.98	1.38	27.1
6	R2	151	5.0	0.894	74.4	LOS E	13.7	99.7	1.00	0.98	1.38	26.7
Approach		203	5.0	0.894	74.0	LOS E	13.7	99.7	1.00	0.98	1.38	26.7
North: Burnley Street (N)												
7	L2	87	5.0	0.248	15.3	LOS B	2.0	14.6	0.42	0.67	0.42	46.8
8	T1	733	5.0	0.696	15.1	LOS B	26.2	191.5	0.67	0.62	0.67	48.0
Approach		820	5.0	0.696	15.2	LOS B	26.2	191.5	0.65	0.62	0.65	47.9
West: Buckingham Street (W)												
10	L2	132	5.0	0.872	71.7	LOS E	13.0	95.2	1.00	0.97	1.32	27.3
11	T1	29	5.0	0.872	66.1	LOS E	13.0	95.2	1.00	0.97	1.32	27.7
12	R2	38	5.0	0.872	71.6	LOS E	13.0	95.2	1.00	0.97	1.32	27.2
Approach		199	5.0	0.872	70.8	LOS E	13.0	95.2	1.00	0.97	1.32	27.4
All Vehicles		2048	5.0	0.898	36.5	LOS D	51.0	372.1	0.85	0.84	0.97	37.2