

Traffix Group

Traffic Works Assessment

Proposed Development Plan

81-95 Burnley Street & 26-34 Doonside Street,
Richmond

Prepared for
Gurner

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Appendix A Intersection Concept Layout Plan

Appendix B SIDRA Analysis Summaries

1. Introduction

Traffix Group has been engaged by Gurner to undertake a Traffic Works Assessment for the Proposed Development Plan at 81-95 Burnley Street & 26-34 Doonside Street, Richmond.

In 2020, the Yarra Planning Scheme was amended (Amendment C122) to incorporate a Schedule to the Development Plan Overlay for the site.

Schedule 15 to Clause 43.04 requires that Development Plan be prepared to guide the future development of the site for the purposes of a Mixed Use Development, including commercial and residential uses.

A Traffic Works Assessment is required to accompany the Development Plan Application and must include:

- *An existing conditions assessment, including existing and approved vehicle and loading access arrangements associated with the Victoria Gardens Shopping Centre with capacity to interact with traffic from the development.*
- *Details of any development staging.*
- *Consultation with the owner of the Victoria Gardens Shopping Centre*
- *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 Transport Works Assessment must 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.*
- *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.*
- *Measures to reduce conflict and improve pedestrian and bicycle amenity (if applicable).*
- *Indicative 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.*
- *Estimate the type and number of loading/unloading activities associated with the development and provide information on appropriate loading/unloading facilities to service the various uses proposed.*
- *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*

This report has been prepared to incorporate all requirements of the Schedule to the Development Plan Overlay.

This report is based on the Development Plan (DP) report dated February 2023.

In the course of preparing this report we inspected the subject site, reviewed the background documentation for the Planning Scheme Amendment and rely upon some of the data and information provided particularly within the Ratio and Traffix Group Traffic Reports prepared by the Land Owner and Council respectively.

Components of this report also respond to Council RFI and Internal Referral commentary from previous versions of the DP / Traffic Works Assessment.

2. Existing Conditions

2.1. Subject Site

2.1.1. Location

The subject site is 81-95 Burnley Street, Richmond and is also known as 'Harry the Hirer'. The development site is located on the east side of Burnley Street, between Doonside Street and Appleton Street, in Richmond.

A photograph of the site and a locality plan are provided at Figure 1 and Figure 2, respectively.

2.1.2. Site Conditions & Access

The site is approximately 1.3 hectares in size and has extensive frontages to Burnley Street (80m), Doonside Street (170m) and Appleton Street (130m).

The site is tenanted by 'Harry the Hirer', a party and marquee hire company. Information provided by the proponent indicates that the business historically operated with 115 staff and was open between 8am-5:30pm weekdays and 9am-12pm Saturdays¹.

The site has primary vehicle access to Doonside Street (six crossovers provided). However, there are historical crossovers to Burnley Street (one) and Appleton Street (one) which appear to be disused. The site a level of on-site car parking for the existing use.

We understand that the primary loading access for the site takes place from Doonside Street, with vehicles manoeuvring on-site and loading/unloading.

There is an existing permit for the Harry the Hirer use that also permits through access to Appleton Street for loading vehicles associated with the current use/development.

2.1.3. Zoning and Surrounding Uses

The site is zoned Mixed Use Zone under the Yarra Planning Scheme as presented in Figure 3. It is also located within the Victoria Street East Precinct of the Richmond UDF.

Nearby land uses in the immediate vicinity are a mixture of industrial and residential uses. Victoria Gardens Shopping Centre is located to the north of the site, with the Shopping Centre land holdings extending to the northern side of Doonside Street.

Development in the area has resulted in increased housing density and increased commercial use on former industrial lots.

¹ As stated in the Ratio Traffic Report, dated December, 2018



Figure 1: Subject Site – Burnley Street/Doonside Street corner

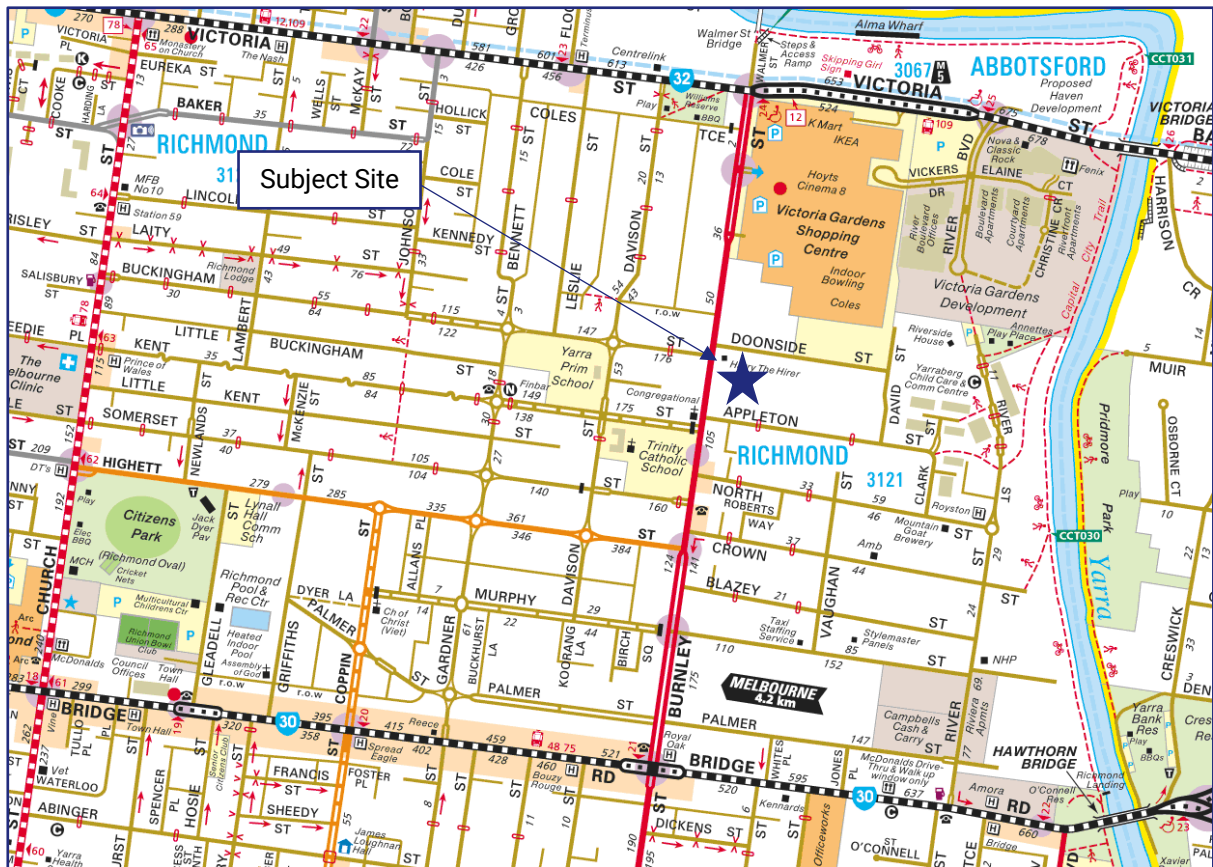


Figure 2: Locality Plan

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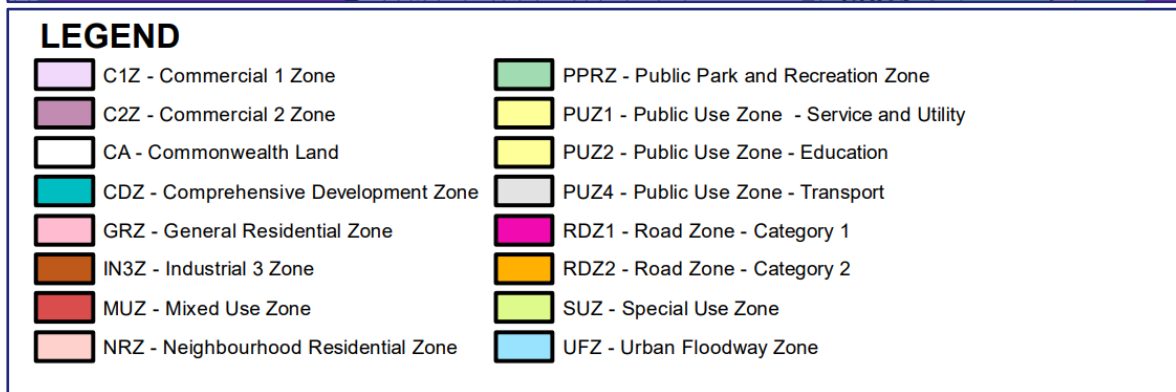
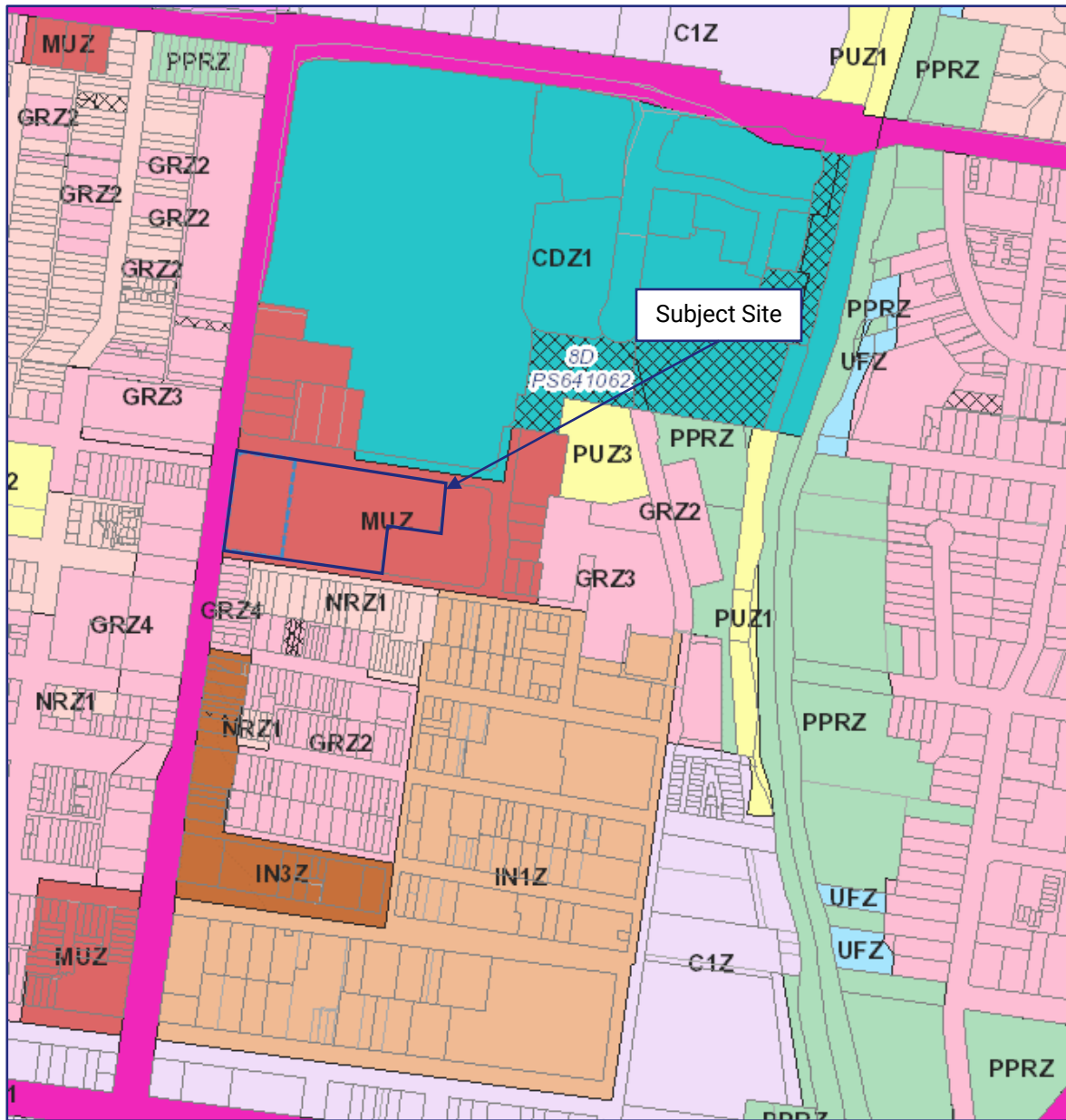


Figure 3: Land use zoning map

2.2. Existing Road Network & Access

2.2.1. Existing Road Network

Burnley Street is a State Arterial Road and Road Zone Category 1 aligned in a north south direction.

In the vicinity of the site, Burnley Street provides a traffic lane and shared bicycle/parking lane in each direction.

A 60km/h speed limit applies to Burnley Street, with a 40km/h school zone applying to the south of the site.

Doonside Street is a Local Road aligned in an east-west direction between Burnley Street and David Street. Doonside Street has a pavement width of approximately 10 metres adjacent to the subject site², which provides for a traffic lane in each direction and parking on both sides of the road.

A 'Stop' sign facing Doonside Street controls its intersection with Burnley Street.

A 40km/h area speed limit applies to Doonside Street.

Doonside Street provides access to the rear of the Victoria Gardens shopping centre site and this includes limited access for a semi trailer servicing the Coles dock.

Appleton Street is a Local Road aligned in an east-west direction between Burnley Street and Clarke Street.

Appleton Street has a pavement width of approximately 8 metres, which provides for kerbside parking on both sides of the road and a single traffic lane for two-way traffic.

The intersection of Appleton Street and Burnley Street is controlled by a 'Stop' sign facing Appleton Street and only left-in/left-out traffic movements are permitted.

A 40km/h area speed limit applies to Appleton Street.

Buckingham Street is a Local Road aligned in an east-west direction between Burnley Street and Church Street.

Buckingham Street provides for a traffic lane in each direction and parking on both sides of the road.

The intersection of Buckingham Street and Burnley Street is controlled by a 'Give-Way' sign facing Buckingham Street. Right turns into Buckingham Street are prohibited between 7-9am (7 days) and left turns into Buckingham Street are prohibited between 7:30-9am Mon-Fri. A 40km/h area speed limit applies to Buckingham Street.

Figure 4 illustrates the existing road network and the turn bans that apply to various local roads within close proximity to the site.

Doonside Street is the only local street on the east side of Burnley Street (between Victoria Street and Highett Street) where right turns are permitted into and out of Burnley Street.

² Its carriageway width narrows to approximately 8m at its eastern end (to widen the footpath) around 44 Doonside Street.

Accordingly, the intersection of Burnley Street/Doonside Street has an important function of distributing traffic to/from the north from properties on the east side of Burnley Street.

2.2.2. Victoria Gardens Shopping Centre Access Needs

We have had discussions with the owners of the Victoria Gardens Shopping Centre land, and their traffic engineers to discuss access requirements for the existing and future land that abuts Doonside Street.

We are advised that:

- There is no public access to car parking currently utilising Doonside Street for retail parking
- There is access for some commercial buildings associated with the Shopping Centre and/or land owners, but this is primarily office and is generally limited to cars and some waste collection vehicles
- There is a Coles loading dock for the Centre that is accessed from Doonside Street and is serviced by a 19.0 metre semi trailer. It enters and exits via Doonside Street to/from Burnley Street, and then turns up David Street to enter the site. This deliver occurs in the order of 1-2 times a day.
- There is some additional loading activity that takes place from Doonside Street, but it is limited to 8.8 metre service vehicles.
- A future development proposed at the south-eastern corner of the Shopping Centre site is proposed with residential and staff vehicle access from David Street, there will be some modifications to existing loading, but the Coles dock will continue to be required to be serviced from Doonside Street. That is, 19.0 metre semi access will continue to be required.

Figure 4 illustrates the local road network and key traffic management measures around the subject site, including access to the Victoria Gardens Shopping Centre.

Notably, many local roads have turn restrictions at Burnley Street.

Photographs depicting the surrounding road network are presented in Figure 5 to Figure 12.



Figure 4: Existing Traffic Conditions

Source: Nearmap



Figure 5: Burnley Street – view north



Figure 6: Burnley Street – view south



Figure 7: Doonside Street – view east from Burnley Street



Figure 8: Doonside Street – view west from David Street



Figure 9: Appleton Street – view east from Burnley Street



Figure 10: Appleton Street – view west



Figure 11: Buckingham Street – view west from Burnley Street



Figure 12: David Street – view south from Doonside Street

2.3. Road Safety Review

A review of road casualty crash statistics for the past 5 years of available data (1st January, 2014 to 31st December, 2018). The review area is shown in the figure below.

There have been no casualty crashes within the review area within the review period. Accordingly, there is no apparent road safety issues in the vicinity of the subject site based on a review of current road accident statistics.

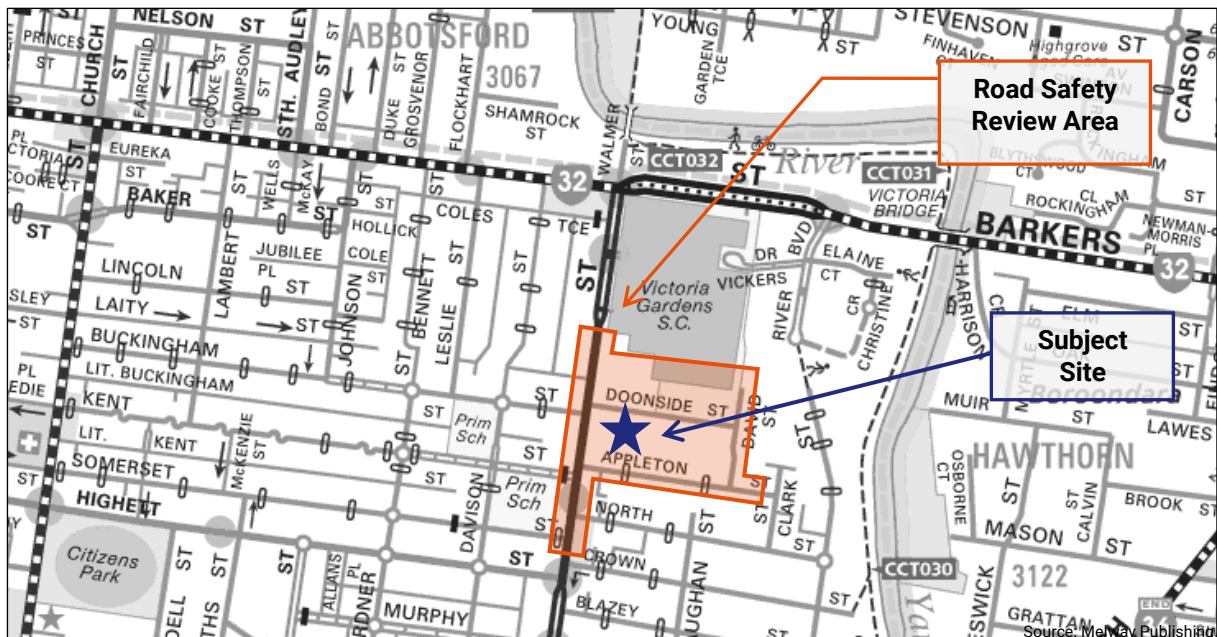


Figure 13: Road Safety Review Area

2.4. Existing Parking Conditions

Traffic Group completed an inventory of on-street parking for an area of up to 200m around the subject site. The inventory was collected at 11am on Monday 27th April, 2020.

The purpose of the survey was to assess the supply and management of the on-street car parking in the vicinity of the site. It was not to assess the demand for car parking (which would have been unrepresentative given Covid19 restrictions which applied at the time of inspection).

A map of the inventory area is provided below.

There are 302 on-street car spaces within the identified area. Of these spaces, 130 are long term (8P) or unrestricted car spaces. The remainder are a combination of short-term restrictions and Permit Zones.

There are 48 car spaces along the subject site’s frontages to Burnley Street, Appleton Street and Doonside Street, all of which are unrestricted.

Whilst parking is generally unrestricted, it is likely that as this precinct further evolves, Council will place short term restrictions, with future residential and commercial development occupants ineligible for on-street parking permits.

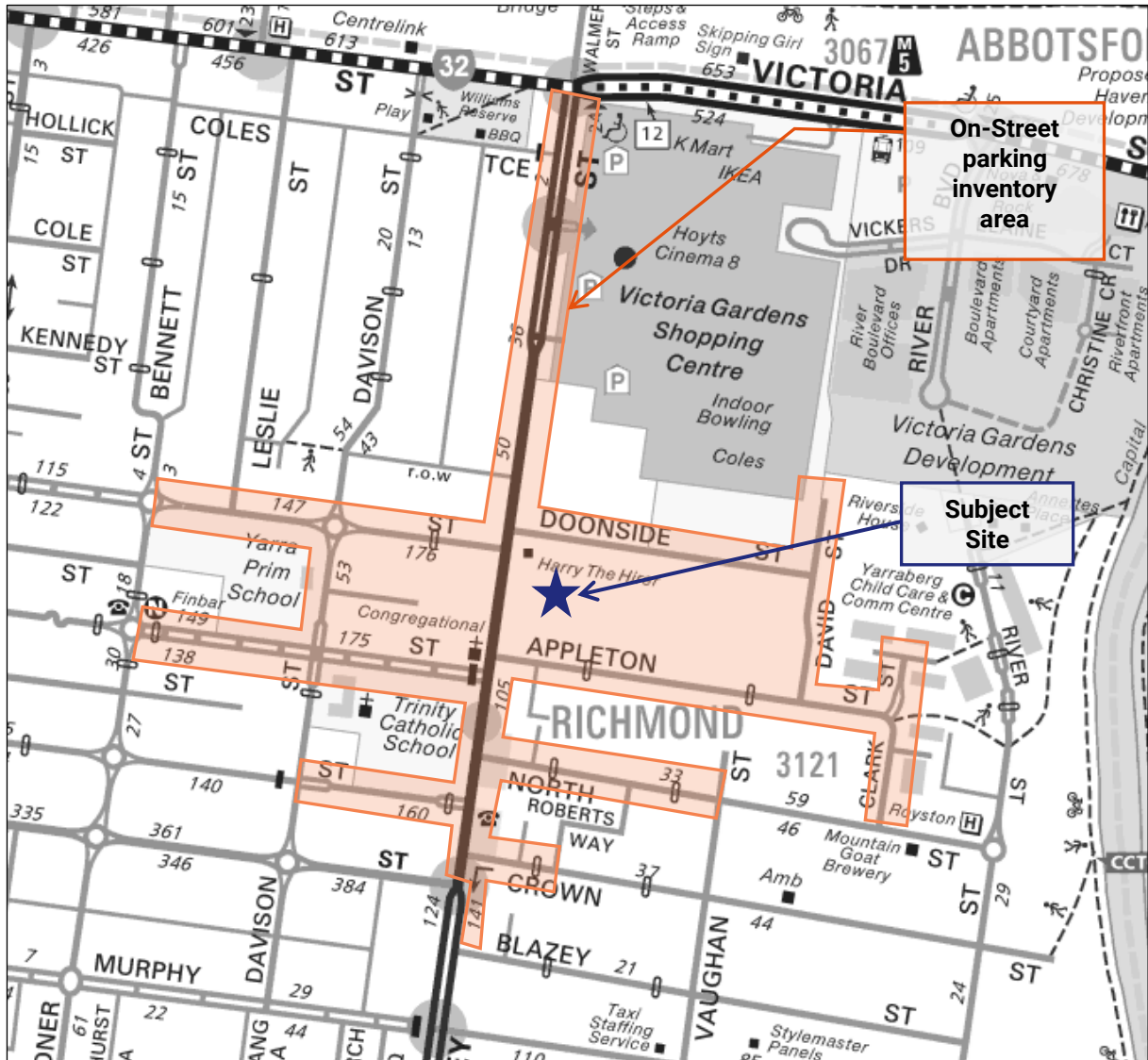


Figure 14: Parking Inventory Area

2.5. Alternative Transport Modes

2.5.1. Walking

The site is highly walkable. Walkscore³ rates the site as scoring 92 out of 100 and classifies this location as a 'walker's paradise, daily errands do not require a car'.

The diagrams at Figure 15 shows the 20 minute catchments for walking from the subject site.

³ <https://www.walkscore.com/score/81-burnley-st-richmond-vic-australia>



Figure 15: 20 minute Walking Catchment (Courtesy of WalkScore)

2.5.2. Public Transport

The site is well served by public transport services.

Tram Routes 12 and 109 are accessible via Victoria Street, approximately 350m north of the site, and Tram Routes 48 and 75 are accessible on Bridge Road, approximately 500m south of the site,

The available public transport services within an appropriate walking distance of the site are presented in Figure 16.

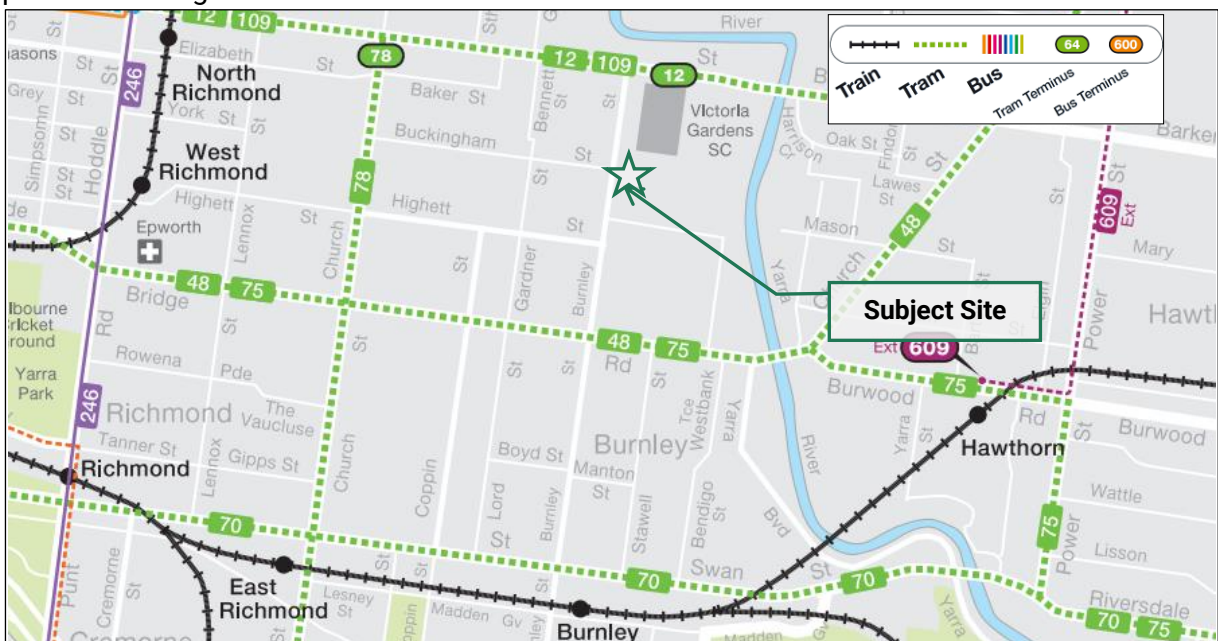


Figure 16: Public Transport Services Map

Source: www.ptv.vic.gov.au

The site is located within the Principal Public Transport Network (PPTN) area as presented in Figure 18. The diagram Figure 17 shows the 20 minute catchments for public transport from the subject site.



Figure 17: 20 minute Public Transport Catchment (Courtesy of WalkScore)

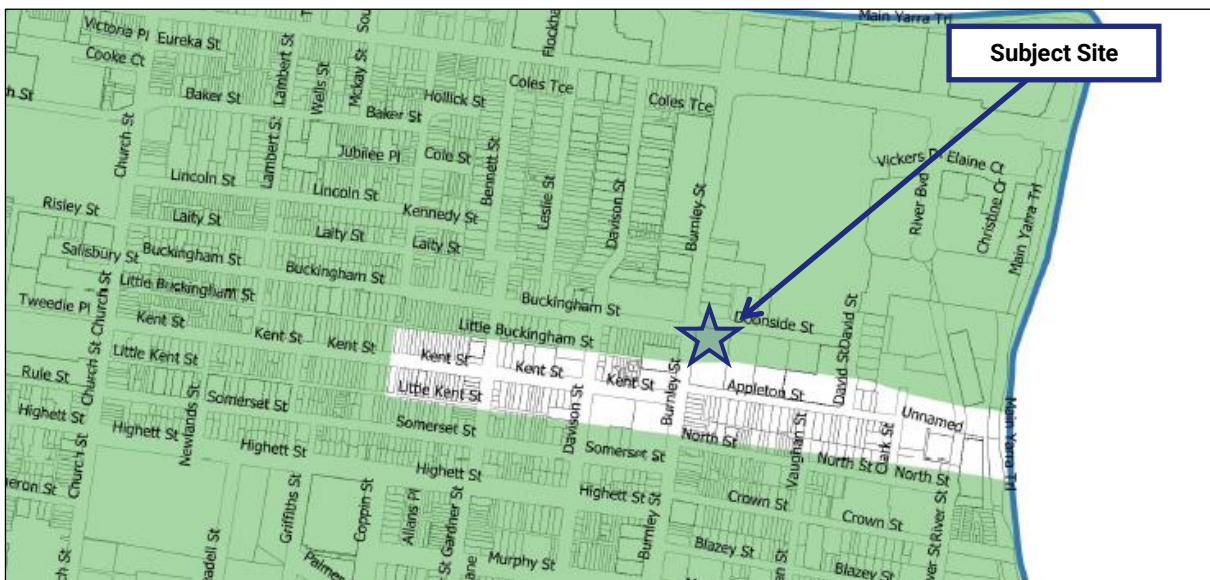


Figure 18: Principal Public Transport Network Area

2.5.3. Bikes

The site enjoys a high level of access to bicycle infrastructure including formal and informal bicycle routes on many roads surrounding the site.

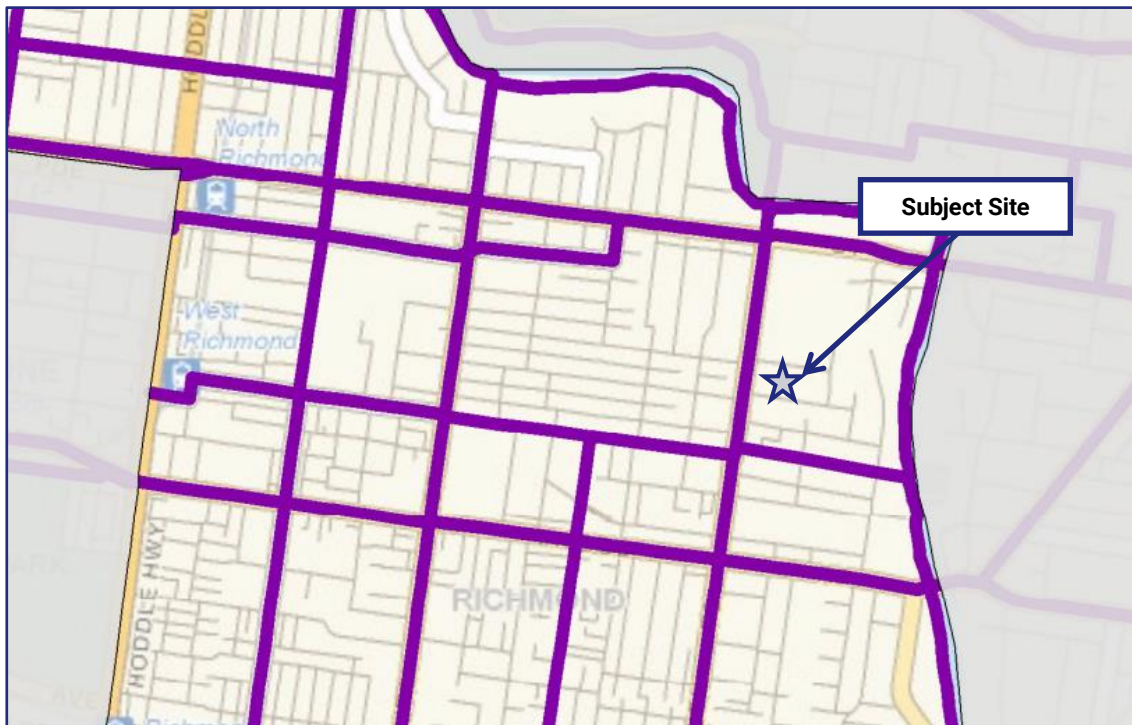


Figure 19: Principal Bicycle Network Excerpt - Yarra

The diagram at Figure 20 shows the 20 minute catchments for cycling from the subject site.

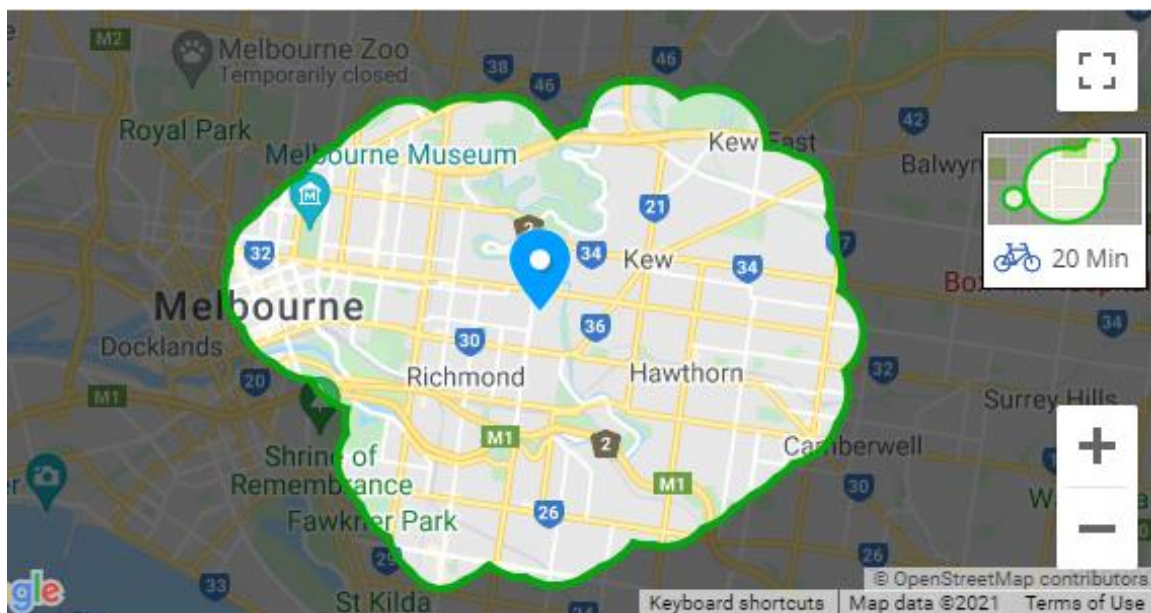


Figure 20: 20 minute Cycling Catchment (Courtesy of WalkScore)

2.5.4. Car Share

There are multiple car share vehicles within close proximity to the site. The nearest pods are located on Burnley Street, between Doonside Street and Victoria Street (2 pods).

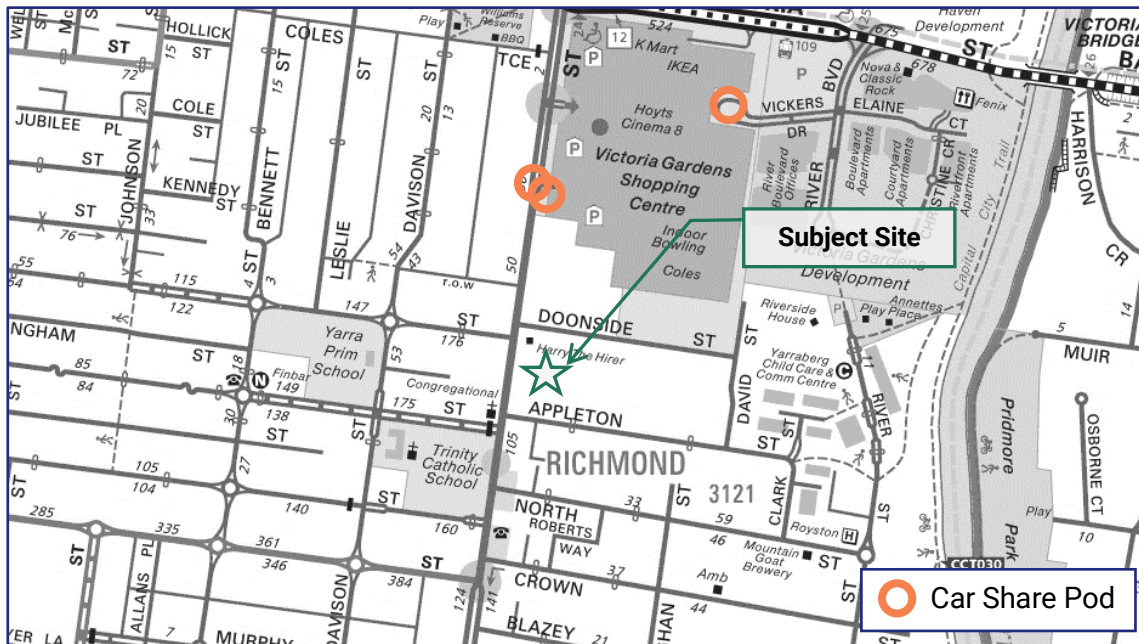


Figure 21: Proximate Car Share Pods

3. Development Plan

3.1. The Development

The application proposes to develop the site for the purposes of a mixed use development comprising residential and commercial uses generally in accordance with the Development Plan requirements under Schedule 15 to the Development Plan Overlay.

An excerpt of the proposed Development Plan is provided at Figure 22.

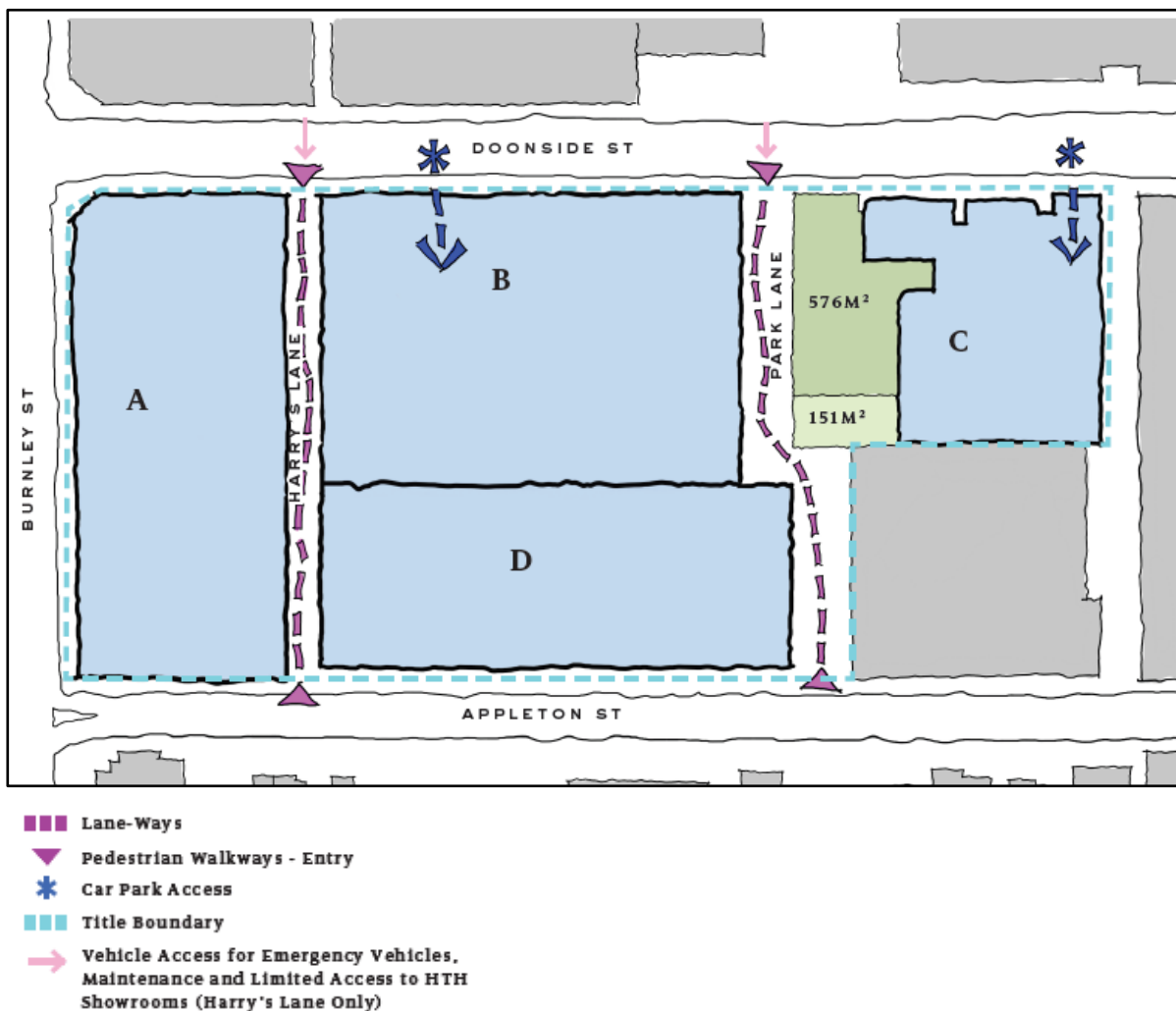


Figure 22: Development Plan Site Layout

The existing Harry the Hirer use is to remain on-site with the western portion of the new development.

The contemplated development schedule (and staging) is provided in Table 1.

Table 1: Contemplated Development Yields and Staging

Stage/Building	Land Use	Dwellings	Commercial Floor Area
Stage 1 / Building A	Commercial ⁴ & Residential	120-135 no.	4,500-5,500 m ²
Stage 2 / Building B	Commercial & Residential	275-330 no.	4,000-5,000 m ²
Stage 3 / Building D	Commercial & Residential	85-100 no.	2,000-3,500 m ²
Stage 4 / Building C	Commercial & Residential	65-80 no.	1,500 - 2,000m ²
Total		545-645 no.	12,000-16,000 m²

In relation to potential uses, we understand that the ultimate development is likely to include a mixture of uses such as:

- The retention and continued operation of the Harry the Hirer (restricted retail) use.
- Shop & Food and Drink uses, including a small grocer and/or providore/deli convenience.
- A gymnasium.
- Office space.

Residential apartments will include a mix of 1, 2 and 3 bedroom apartments with a townhouse product expected to front Appleton Street.

3.2. Access

3.2.1. Pedestrian Access

The Development Plan includes a series of laneways and internal pedestrian active spaces at ground level. This includes two a north-south linkages between Doonside Street and Appleton Street, with the one at the east at 9 metres width as dictated by the Schedule to the Development Plan Overlay.

The Harry the Hirer tenancy will take primary pedestrian access from the existing location, which is at the corner of Doonside Street and Burnley Street. It will have secondary pedestrian access from Appleton Street and the new internal lane and also internal access from car parking.

Building A will be provided with primary pedestrian access from the western laneway that operates within the site.

Building B and C will be provided with lobby access from Doonside Street and potential secondary access to the internal laneways.

Building D will have access opportunities from the western and eastern laneways.

Townhouses are proposed fronting Appleton Street, which will have direct pedestrian access

⁴ Commercial in Stage 1/Building A includes existing and proposed Harry the Hirer Floor Areas

to the footpath along Appleton Street. They will also be provided with rear access to/from the Tower D core for access between parking and the dwellings.

Access to the ground floor retail tenancies will be provided from abuttals to the adjacent streets, laneways and/or the new public park.

Access to the Level 1 Commercial Tenancies will be via their respective Building lobbies.

Further discussion of the Laneway Arrangements is provided later within this report.

3.2.2. Cyclist Access

Burnley Street provides on-street bicycle lanes and will be the key linkage for residents, staff and visitors to access the site via bicycle, supported by Doonside Street, Appleton Street and the other surrounding road connections.

The internal site laneways will be designed to accommodate ride-up trips and will provide for visitor parking at-grade.

Bicycle parking for residents and staff will be provided within secure areas either at ground, basement or podium (or a mix). Where on a level other than ground, they will be accessible via passenger lifts (including some with dedicated bike shuttle lifts).

Softer ramping is proposed on the western vehicle ramp from ground level which will allow for some confident cyclists to ride up and down the ramps between levels.

3.2.3. Vehicle Access

All vehicle access is proposed from Doonside Street. There is no vehicular access to Burnley Street or Appleton Street.

Two separate access points are proposed to Doonside.

The western access will provide access to loading and car parking, which could be as a mixture of ground, basement and/or podium parking.

The eastern access will be a car parking ramp only providing access to basement.

Temporary vehicle access is proposed to Harry's Lane from Doonside Street during events.

The laneways will also permit emergency vehicle and maintenance access.

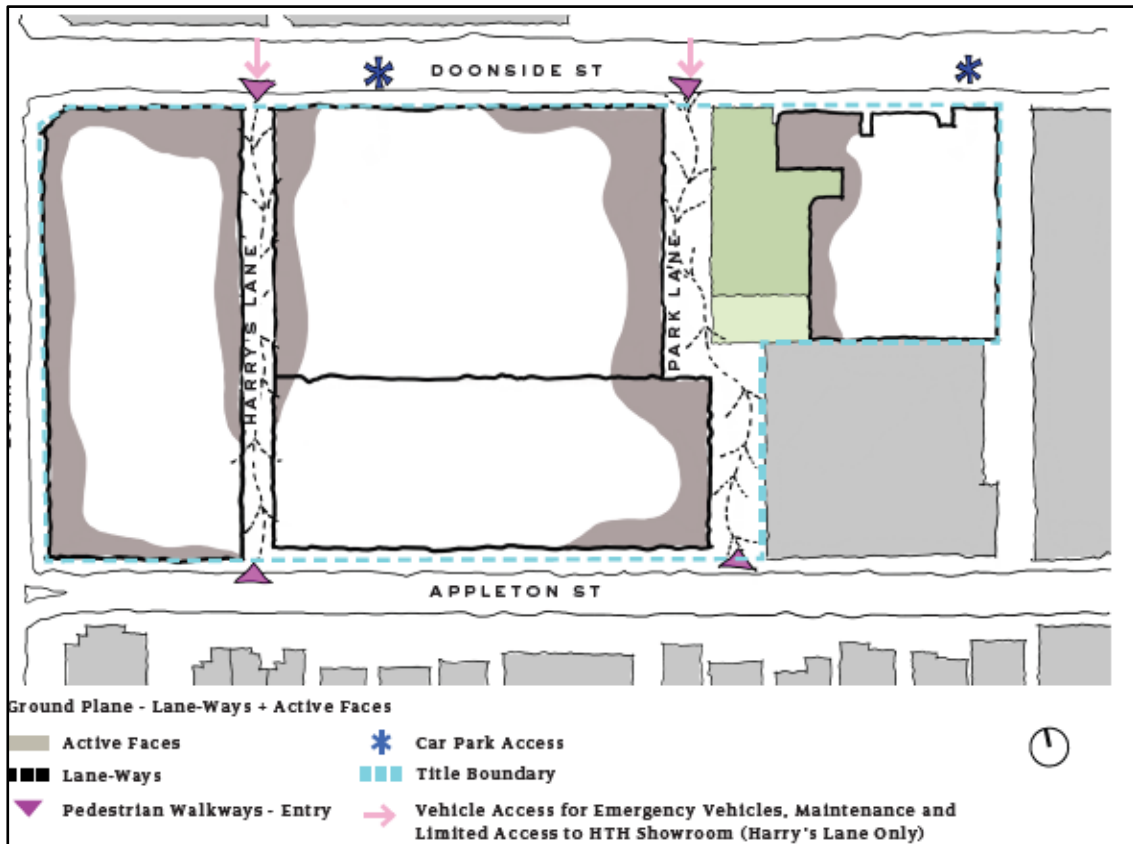


Figure 23: Development Plan Access Strategy showing Access Points for Each Mode

3.3. Parking

3.3.1. Bicycle Parking & End of Trip Facilities

The proposal will include a generous offering of bicycle parking and targets the following provisions/allocations:

- Staff parking provided at a typical rate of 1 space per 100 square metres (approximately 120-160 staff parking spaces)
- Resident parking at a minimum rate of 1 space per dwelling, provided within separate secure areas (approximately 545-645 spaces expected to be provided).
- Parking for visitors will primarily be provided at ground level, and will achieve minimum rates of 1 space per 10 dwellings, plus 1 space per 500 square metres of commercial floor area (at least 84 visitor spaces are expected)

End of Trip facilities are proposed on-site for staff and will achieve a minimum rate of 1 shower/changeroom per 10 bikes. They will be conveniently located to encourage use by staff for all buildings.

3.3.2. Car Parking

The proposal intends to provide in the order of 775-825 car parking spaces on-site. Car parking will be provided on-site within a potential mixture of basement, ground floor and/or podium parking areas. Parking above ground will be sleeved with other uses as much as practical to prevent parking being visible from the street.

A target of 10% of car spaces provided as Electric Car Charging spaces is proposed. There will be a mix of residential, office and visitor charging spaces.

A minimum of 2 car share spaces are proposed on-site from Day 1, to be managed by the Owners Corp (including potentially leased out to a Commercial Operator as required).

In the ultimate arrangement, car parking is intended to be allocated generally as:

- 2 car share spaces.
- Approximately 220-270 car spaces for the commercial uses, as a mixture of staff and visitor provisions (this equates to an average rate of 1.5 spaces per 100 square metres).
- The remaining circa 550-560 car spaces allocate for residents on demand (an average rate of 0.85-1.0 cars per dwelling).

Internal car parking areas will include spaces for short term pick-up/drop-off and valet arrangements which could include functions for site valet and/or taxi/uber.

3.3.3. Motorcycle Parking

The application proposes in the order of 15-20 motorcycle parking spaces at a general rate of 1 space per 50 car spaces within the car parking areas.

3.3.4. Parking Summary

A summary of the parking provisions is provided in Table 2.

Table 2: Proposed Parking Provisions

Use		Proposed
Bike Parking	Resident	545-645 spaces
	Staff	120-160 spaces
	Visitor	>84 spaces
Motorcycle Parking		15-20 spaces
Car Parking	Car Share	2 spaces
	Commercial Uses	240-270 spaces
	Residents	550-560 spaces
	Total	775-825 spaces (including approx. 80 electric charging)

3.4. Loading & Waste Collection

Primary loading will take place on-site within dedicated loading areas.

The Harry the Hirer Use will have a dedicated dock to cater for Hire Bump-ins/outs and will accommodate three 8.8 metre Medium Rigid Vehicles (MRVs).

The residential and other commercial uses will utilise shared on-site loading areas accommodating a mix of 8.8 metre long MRVs or smaller vans, couriers and rigid vehicles.

A temporary loading area is also proposed within the north-south section of Harry Lane. The temporary loading area will be used for display vehicles, boats and other larger products and will accommodate vehicles up to an 8.8 metre long MRV.

Further discussion on access and loading is provided in Section 7 of this report.

4. Car Parking Considerations

4.1. Statutory Requirements – Clause 52.06

The car parking requirements for the proposed development are outlined under Clause 52.06 of the Yarra Planning Scheme. The purpose of Clause 52.06 is:

- To ensure that car parking is provided in accordance with the Municipal Planning Strategy and the Planning Policy Framework.
- To ensure the provision of an appropriate number of car parking spaces having regard to the demand likely to be generated, the activities on the land and the nature of the locality.
- To support sustainable transport alternatives to the motor car.
- To promote the efficient use of car parking spaces through the consolidation of car parking facilities.
- To ensure that car parking does not adversely affect the amenity of the locality.
- To ensure that the design and location of car parking is of a high standard, creates a safe environment for users and enables easy and efficient use.

Clause 52.06-5 states that:

“Column B rates apply to a site if any part of the land is identified as being within the Principal Public Transport Network Area as shown on the Principal Public Transport Network Area Maps”

The subject site falls within the PPTN area map and therefore Column B rates apply.

The current Development Plan contemplates a range of uses and range of floor areas. This could include food and drink, a grocer, shop, gymnasium, office uses, restricted retail and other similar uses.

Applicable rates under Clause 52.06 are provided at Table 3.

Table 3: Statutory Car Parking Requirements (Clause 52.06)

Use	Statutory Requirement
Residential Dwellings	1 car space to each 2-bed dwelling for residents
	2 car spaces to each 3-bed dwelling for residents
	No visitor parking requirement
Restricted Retail (Harry the Hirer)	2.5 spaces to each 100 square metres
Shop / Food and Drink	3.5 spaces to each 100 square metres
Office	3 spaces to each 100 square metres
Gymnasium	Parking to the Satisfaction of the RA

The Development Plan seeks a reduction in the statutory parking requirements under Clause 52.06 as the average parking rates for residential use are likely to fall below 1 space per dwelling and the average parking rates for the commercial uses fall below 2 spaces per 100 square metres.

Clause 52.06-7 of the Planning Scheme allows a permit to be granted to vary the statutory car parking.

Planning Practice Note (June, 2015) specifies that the provisions draw a distinction between the assessment of likely demand for parking spaces, and whether it is appropriate to allow the supply of fewer spaces. These are two separate considerations, one technical while the other is more strategic. Different factors are taken into account in each consideration.

An assessment of the appropriateness of reducing the car parking provision below the statutory requirement is set out as follows.

Particular reference is made to the discussions from the Panel Report and Expert Evidence provided at the Planning Scheme Amendment, as well as assumptions for the likely uses on the site.

4.2. Car Parking Demand Assessment

The Scheme requires the assessment of car parking demand likely to be generated by the proposed use to have regard for listed factors, as appropriate, including:

- *The likelihood of multi-purpose trips within the locality which are likely to be combined with a trip to the land in connection with the proposed use*
- *The variation of car parking demand likely to be generated by the proposed use over time*
- *The short-stay and long-stay car parking demand likely to be generated by the proposed use.*
- *The availability of public transport in the locality of the land.*
- *The convenience of pedestrian and cyclist access to the land.*
- *The provision of bicycle parking and end of trip facilities for cyclists in the locality of the land.*
- *The anticipated car ownership rates of likely or proposed visitors or occupants (residents or employees) of the land.*
- *Any empirical assessment or case study.*

An assessment of the projected car parking demand for the proposed development, accounting for these factors follows.

4.2.1. Sustainable Modes of Transport

The site is very well accessed by multiple sustainable transport modes which reduces the need for owning and using a car to access the site.

A generous provision of bicycle and end of trip facilities, motorcycle parking, electric car charging, on-site car share and the preparation of a Green Travel Plan will actively encourage and support access to the site by alternative modes.

This will not only support those uses which are provided with reduced parking, but also encourage those uses that are provided with parking not to utilise a car unless it is necessary (rather than just perceived to be convenient).

4.2.2. Anticipated Parking Demand

Residential

A review of ABS car ownership data for Richmond suggests the following average car ownership rates for all apartment types:

- 0.75 cars per one-bedroom dwelling
- 0.98 cars per two-bedroom dwelling
- 1.13 cars per three-bedroom dwelling

These rates (and lower) were presented at the Panel and it was generally accepted that reduced residential parking provisions could be supported.

The proposal is likely to allocate parking for residents generally at rates of:

- 0.7-0.9 cars per one-bedroom dwelling
- 1 car per two-bedroom dwelling
- 1.5-2.0 cars per three-bedroom dwelling

In general, these rates are reduced from those listed within the Planning Scheme but comparable with the average car ownership rates in the area. These provisions are considered an acceptable balance between meeting market demands for dwellings, and encouraging strategically lower parking provisions for long term users.

We are satisfied that the allocation of in the order of 550 car spaces for residents is acceptable under the following key decision guidelines of Clause 52.06-7:

- It is in line with Council's sustainable transport policies and objectives.
- The site has good access to public transport.
- The site is well served by local amenities and services, particularly via Victoria Gardens.
- It reduces the traffic impacts of the proposal and supports sustainable transport modes.
- Residents will not have access to parking permits and those without on-site car parking will not be able to maintain a car on-street given the prevailing parking restrictions.

Importantly, parking allocations for the residential component could vary, and be further reduced from the above rates, or include some increases to the parking allocations and can be considered as part of individual permit applications as appropriate.

Office

A review of ABS ‘journey to work’ data for the 2016 Census identifies that employees in the Richmond SA2 statistical area are more likely to use alternate transport modes to travel to work in comparison to the Greater Melbourne average (which is 64%).

This data, split between purely office workers and then all employment uses, is summarised in Table 4.

Table 4: Journey to Work Data (based on place of employment) - 2016 Census

% Mode of Travel for ‘journey to work’ trips	Work within Richmond SA2 Area (Office Uses Only)	Work within Richmond SA2 Area (All Employment Uses)
Car as driver	46%	50%
Public Transport	30%	25%
Walking	6%	6%
Cycling	4%	3%
Other Mode of Travel ^(Note 1)	14%	16%

Note 1: Includes car as passenger, motorcycle, taxi, and other modes and people who did not travel to work, or state method of travel.

The proposed development has excellent accessibility to public transport and bicycle infrastructure. Further, on-street parking in the surrounding area is predominantly short-term in nature specifically during business hours, and there is limited free-of-charge long-term parking available within the surrounding area.

The general approach across the municipality of City of Yarra and inner City Municipalities is to apply a target rate of 1 space per 100 square metres for staff parking. There are many examples of Yarra City Council approving significant office developments throughout Richmond, Cremorne and Collingwood with car parking at levels at, or less than, this rate.

This rate is consistent with that presented at the Panel, which was not contested.

Shop & Restricted Retail

The Development Plan includes a mixture of retail uses and typologies, including different sizes and locations.

In general, the smaller shop tenancies are likely to operate as service retail, providing convenient access to food and drink, retail and other essential services for neighbouring properties. In this case, the proposed development will include over 14,000 square metres of commercial floor area and in excess of 500 new dwellings and is therefore likely to draw a fair proportion of its trade from these new uses.

These smaller tenancies would generate typically only staff demands, at a rate of 1 space per 100 square metres.

It is likely that there will be a larger shop/grocer tenancy as well as the Harry the Hirer (restricted retail) tenancy that may generate some visitor car parking demands as these are more destination based by car.

There will still be a significant proportion of walk-up trade for these uses, and therefore for the purposes of this assessment we expect a rate of 2.5 spaces per 100 square metres would be appropriate.

Retail peak demands typically occur of lunchtime/afternoon on a weekend.

Gymnasium

The NSW RTA Guide to Traffic Generating Developments suggests parking provisions for gymnasiums of 3.0 spaces per 100 square metres for a gym located within a central business district.

Case study data held by Traffix supports this generation, however, it is expected this will be a conservative rate as a significant proportion of the patronage of the gymnasium is likely to come from the residential and commercial uses within the proposal.

Accordingly, a target rate of 2 spaces per 100 square metres is suggested for a gymnasium use.

Gym patronage typically peaks of an early morning and late afternoon / early evening, with higher patronage expected at the start of the week, diminishing toward the weekend.

Projected Demands and Variations in Demand

The Development Plan includes a range of yields for commercial uses, and does not distinguish between the different types of uses.

We have sought some advice from the Applicant to contemplate likely demands for the site, and they have advised that of the overall commercial floor area, it is likely that the upper limit of commercial yields would be split approximately as:

- Circa 5,000 m² for Harry the Hirer (Restricted Retail).
- Circa 4,000 m² of shop/food and drink use, including a larger grocer tenancy of around 2,000 m².
- Circa 5,000 m² of office use.
- Circa 1,000 m² of gymnasium use.

Each of the commercial uses will have a varying peak. To establish the expected peak site demand, and identify potential for sharing of parking on the site, we have prepared the tables at Table 5 and Table 6.

Table 5: Percentage of Peak Demand by Period of Day/Week

Use	Weekday			Weekend		
	Morning	Lunch	Afternoon	Morning	Lunch	Afternoon
Office	100%	100%	100%	0%	0%	0%
Retail	50%	50%	50%	100%	100%	100%
Gym	100%	25%	100%	75%	75%	50%

Table 6: Likely Parking Demands by Period of Day/Week

Use	Absolute Peak Demand	Weekday			Weekend		
		Morning	Lunch	Afternoon	Morning	Lunch	Afternoon
Office Staff	50	50	50	50	0	0	0
Small Retail Staff	20	20	20	20	20	20	20
Harry the Hirer and Grocer	175	87	87	87	175	175	175
Gym	20	20	5	20	15	15	10
Total		177	162	177	210	210	205

The tables above identify that the peak demands across the site are likely to be experienced on a weekend, when there may be a demand for up to 210 vehicles. The provision of 240-270 spaces on-site will cater for these demands.

We are of the view that this is acceptable having particular regard to the discussions at the Panel, Council’s Strategic Policies in relation to reducing traffic congestion by suppressing car parking demands, but still provides for a suitable parking outcome.

It is likely that in the event that the lower end of the range of development yields are achieved on-site, then parking would be commensurately reduced to reflect the likely demands.

This model relies on a shared use of the office parking for visitors and customers and a Car Parking Management Plan and suitable access management and controls should be in place to ensure that the variations in demands are appropriately managed.

5. Traffic & Access Considerations

5.1. General

As part of this assessment, we will consider a number of scenarios and key questions to respond to the requirements of the Development Plan Overlay.

These are summarised as follows:

- Existing 'Base Case' Analysis**, including identifying suitable a 'base case' for the existing network volumes (inclusive of approved and constructed development) and subsequent SIDRA analysis of the intersection of Burnley Street/Doonside Street and Burnley Street/Buckingham Street
- Proposed Development Traffic Generation & Impact**, including identifying the projected trip generation of the site (inclusive of all modes) and establishing future intersection volumes to identify the need for intersection upgrades and at what stage.
- Allowing for Additional Surrounding Development**, including identifying what impact there will be on the intersection and network operations as a result of the additional development contemplated on the Victoria Gardens Site.

The following is provided.

5.2. Existing 'Base Case' Analysis

5.2.1. Traffic Surveys

Reference is made to existing traffic surveys at the intersection of Burnley Street, Doonside Street and Buckingham Street undertaken in November 2019, and provided in the Ratio Traffic Evidence at Panel.

The peak hour summaries for 8:15-9:15am and 5-6pm are shown in Figure 11.

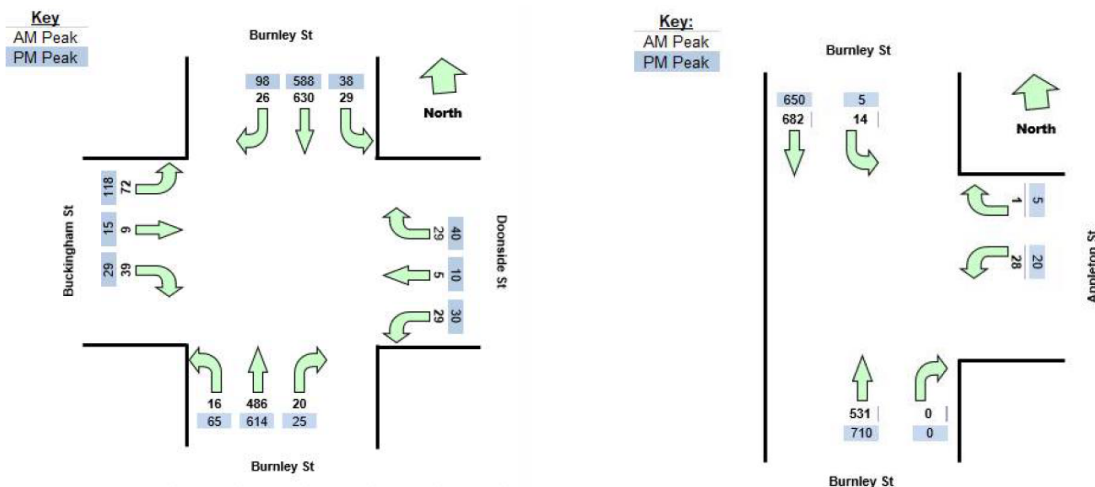


Figure 24: Existing Traffic Volumes – 21st November 2019

Supplementary data has also been sourced for Thursday 13th May 2021 and is provided in Figure 25 for the AM and PM peak hours.

Figure 26 provides a summary of the peak hour pedestrian crossing movements at the intersection.

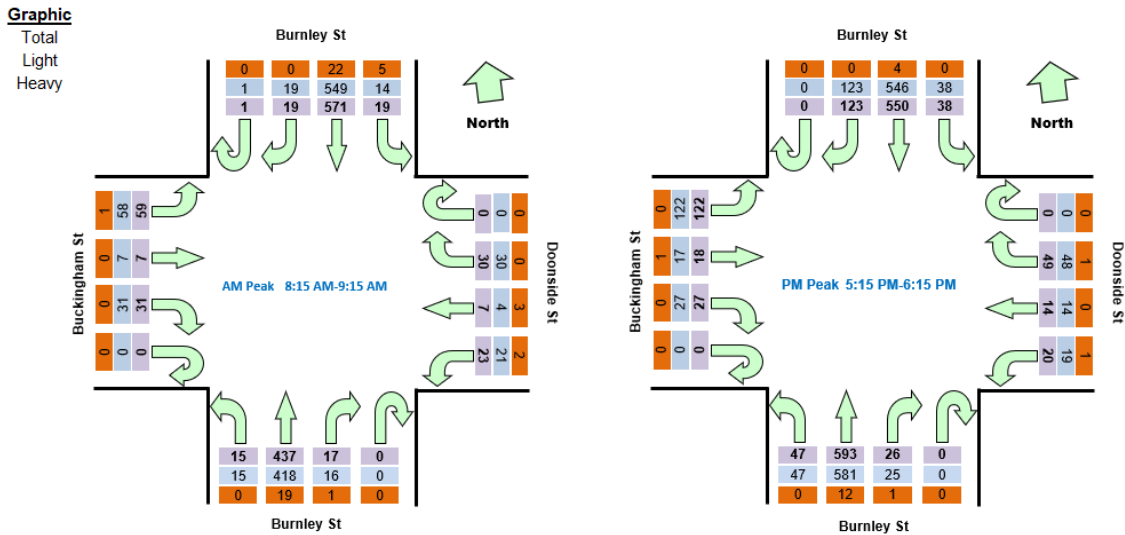


Figure 25: Existing Traffic Volumes – 13th May 2021

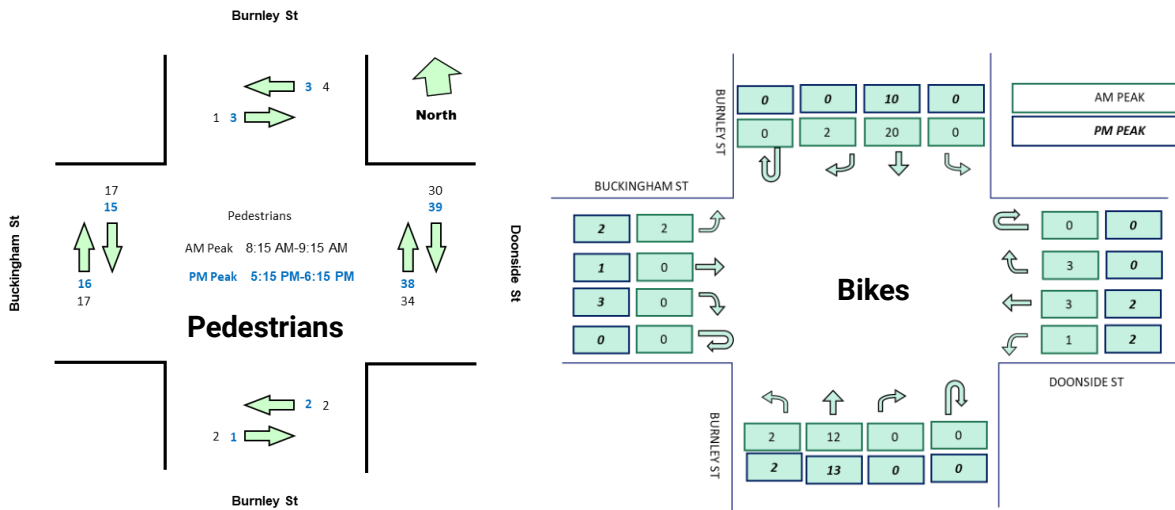


Figure 26: Existing Peak Hour Pedestrian & Bicycle Movements

A review of the traffic volume data from 2021 compared with the 2019 data identifies that peak hour volumes through the intersection are marginally lower in 2021. This may be due to changes in traffic conditions as a result of lingering COVID restrictions during May 2021 and changes in working from home.

For the purposes of this analysis, we will adopt the 2019 volumes as a base line.

5.2.2. Additional Approved Development & Growth

With the exception of the site at the north-west corner of the Burnley Street/Doonside Street/Buckingham Street intersection (171 Buckingham Street), both survey data sets include already approved development within the precinct that has been constructed and is understood to be occupied.

Given the location of the site, and the general trends of traffic in the area, we do not expect there to be significant external traffic growth to through volumes on Burnley Street past the subject site.

Any growth to Burnley Street and Buckingham Street traffic will effectively be as a result of the subject development and neighbouring redevelopments, and will be contemplated in the traffic projections for each of those development scenarios.

171 Buckingham Street

The site at 171 Buckingham Street is currently under construction and therefore the traffic generation of this site were not included in the 2019 or 2021 surveys. It is understood that there have been a number of amendments and changes to the scheme. However, based on the most recent traffic report prepared by Ratio, we understand that the contemplates a total of 176 apartments and three townhouses as part of the development.

The original planning application for the site adopted a traffic generation rate of 0.3 vehicle movements per dwelling during the peak hour. Application of this rate to the 179 total dwellings, results in a traffic generation of 54 vehicle movements during the peak hours.

However more recent data for residential development in this area suggests a vehicular trip generation rate is more likely to be 0.2 movements per dwelling per hour. We have therefore assumed that this site would generate in the order of 36 peak hour movements.

To be consistent with the town planning application the following traffic distributions adopted as part of the application have been applied to the site at 171 Buckingham Street.

- 40% of traffic generated to the north, including:
 - 30% via Burnley Street
 - 10% via the local road network.
- 40% of traffic generated to the south, including:
 - 30% via Burnley Street
 - 10% via the local road network.
- 20% of traffic to the west towards Church Street.

Application of the preceding assumptions results in the traffic volumes illustrated at Figure 27 being generated to the intersection of Burnley Street/Doonside Street/Buckingham Street.

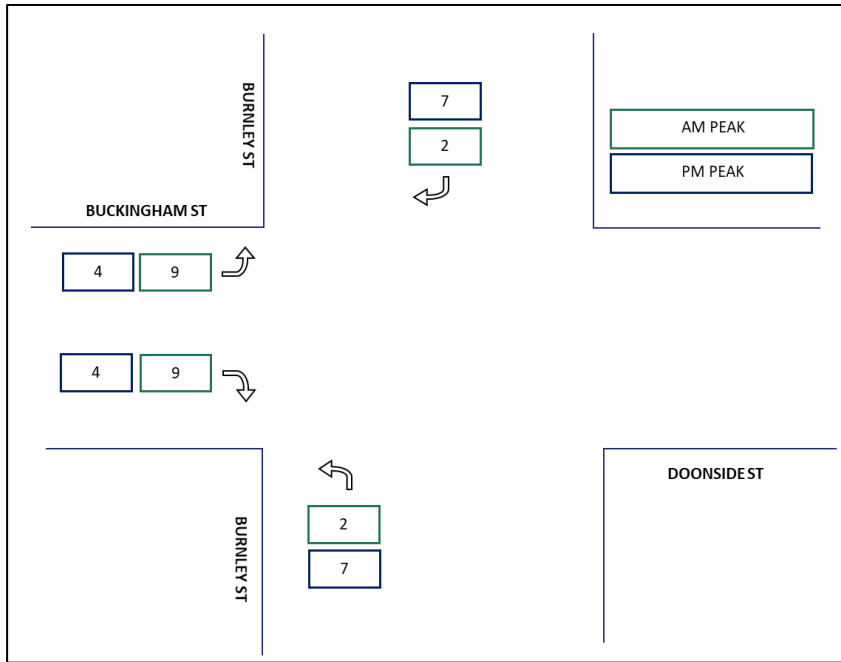


Figure 27: 171 Buckingham Street Traffic Generation

5.2.3. "Base Case" Intersection Volumes

Adopting the above volumes, and applying these to the recorded volumes from November 2019, we will adopt the volumes at Figure 28 as the existing "Base Case".

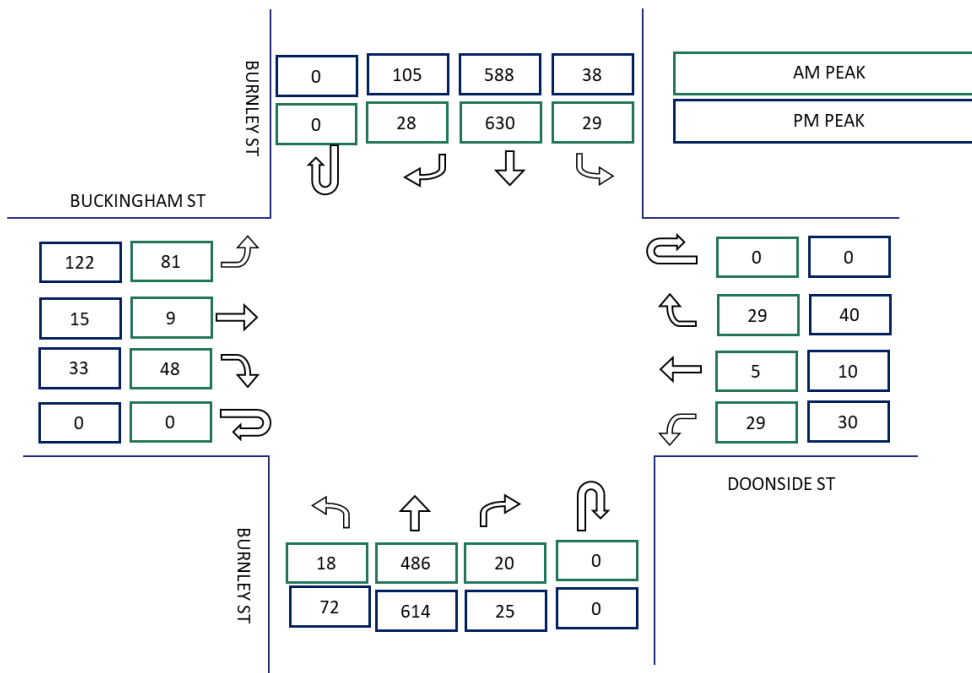


Figure 28: Existing "Base Case" Traffic Volumes – 21st November 2019 + 171 Buckingham

5.2.4. Base Case Intersection Operation

In order to understand the existing operation of the existing intersection at Burnley Street/Doonside Street, SIDRA Analysis was undertaken for the AM and PM peak hours.

The intersection as been modelled as a ‘T-intersection’ which reflects how the intersection currently operates.

To calibrate the model, we have reviewed gap and headway surveys and video footage of the May 2021 surveys to understand potential impacts of the close spacing of the intersection of Burnley Street/Buckingham Drive.

We have also included a nominal 50 north-south bicycle movements on Burnley Street to allow for potentially higher than recorded and/or growth to cycle volumes in future normal periods.

SIDRA is a computer program originally developed by the Australian Road Research Board, which can be used to analyse the operation of intersections. SIDRA provides information about the capacity of an intersection in terms of a range of parameters, as described below:

***Degree of Saturation (D.O.S.)** is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown below.*

Level of Service		Intersection Degree of Saturation	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	≤ 0.60	≤ 0.60
B	Very Good	0.60 – 0.70	0.60 – 0.70
C	Good	0.70 – 0.80	0.70 – 0.90
D	Acceptable	0.80 – 0.90	0.90 – 0.95
E	Poor	0.90 – 1.00	0.95 – 1.00
F	Very Poor	≥ 1.0	≥ 1.0

*The **95th Percentile Queue** represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour.*

***Average Delay** (seconds) is the average delay time that can be expected for all vehicles making a particular movement in the peak hour.*

The results of the existing analysis are summarised in Table 7 identifying that the intersection operates under ‘excellent’ conditions with most movements at the intersection having relatively manageable delays and queues.

Table 7: "Base Case" Intersection Analysis – Burnley Street & Doonside Street Modelled as a T-Intersection with Bikes

Approach	Movement	AM Peak			PM Peak		
		DoS	Average Delay (s)	95% Queue (m)	DoS	Average Delay (s)	95% Queue (m)
Burnley Street (S)	T	0.36	1	7	0.47	1	11
	R	0.36	12	7	0.47	14	11
Doonside Street (E)	L	0.07	14	2	0.08	14	3
	R	0.18	30	5	0.36	47	10
Burnley Street (N)	L	0.02	6	0	0.02	6	0
	T	0.37	0	0	0.38	0	0

5.3. Proposed Development Traffic Generation & Impact

5.3.1. Trip Generation Rates

Site Characteristics & Mode Choice

ABS Journey to Work data for the Richmond SA2 area for residents and employees is provided in Figure 29. It demonstrates that there is already an existing strong preference for mode choices other than personal car.

These statistics are supported by how accessible the site is by active transport modes, including walking, cycling and public transport.

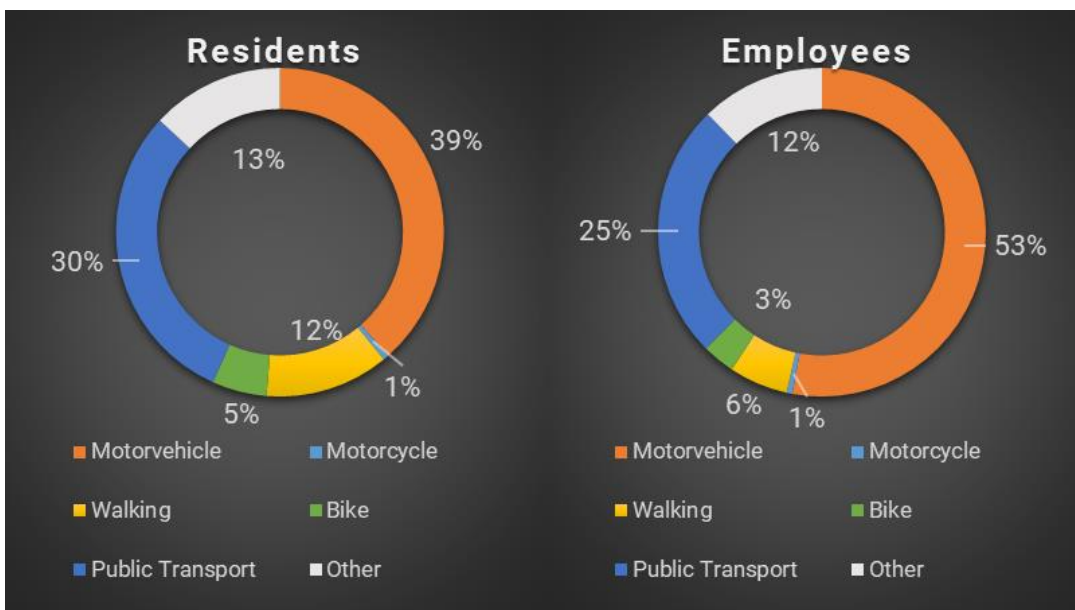


Figure 29: 2016 ABS Journey to Work Data for Travel Modes

Existing Harry the Hirer Use

For the purposes of this analysis, we will presume that there will be no additional traffic generation to the site associated with the Harry the Hirer use, that hasn’t already been recorded by the existing traffic, pedestrian and cycle surveys.

Proposed Residential Component

To establish trip generation for the proposal, we refer to VISTA data summarised in the Ratio Consultants report which provides trip generation rates for residential development (all modes) and the percentage for each mode.

It is typical to adopt a trip rate of 2.9 trips per person per day on average in the Inner Melbourne area. ABS Data indicates an average of 2.1 people per household in City of Yarra.

Application of these rates to the circa 600 future dwellings equate to some 3,654 trips per day by all modes.

Whilst ABS data provides an indication of likely travel modes, it is a snapshot in time, and there is an expectation that active transport modes will continue to take up a share of the peak hour trips for the proposal.

Accordingly, we have applied target/potential trip shares as follows, which considers the likely parking allocations for the future residents.

Table 8: Projected Percentage Mode Share for Residential Trips

Travel Mode	Residents	Adopted	Net Change
Motor Vehicle ⁵	38.5%	27.5%	-11.0%
Motorcycle	0.5%	1.0%	0.5%
Walking	12.2%	15.0%	2.8%
Bike	5.4%	9.0%	3.6%
Public Transport	30.2%	33.0%	2.8%
Other	13.1%	14.5%	1.4%

Application of these mode splits to the overall projected trip generation, and adopting a 10% proportion occurring in the peak hours in the peak hours.

⁵ Includes car as driver, car as passenger, truck, taxi

Table 9: Residential Trip Generation per Mode in a Peak Hour

Travel Mode	Movements
Motor Vehicle ⁶	100
Motorcycle	4
Walking	55
Bike	33
Public Transport	121
Other	53
Total	365

Based on the preceding the residential component of the development is expected to generate up to 100 vehicle movements during the peak hours. Allowing for the circa 600 residential dwellings proposed as part of the application, this equates to a traffic generation rate of 0.17 vehicle movements per dwelling (irrespective of parking provisions) during the peak hours.

When allowing for the residential parking provision of 550 spaces, this equates to a traffic generation rate of 0.18 movements per dwelling with a car space in the peak hours.

To determine the appropriateness of the preceding traffic volumes survey data for residential developments in the vicinity of the site, including 69 Palmer Street and 69-73 River Street in Richmond, have been sourced. The data highlights daily traffic generation rates of 1.8 and 2.13 movements per dwelling for the Palmer Street and River Street developments, respectively.

Allowing for 10% of the daily traffic to be generated during the peak hours, this equates to 0.18 and 0.213 movements per dwelling, respectively.

Supplementary case studies from existing residential development in Trenerry Crescent, Abbotsford suggests similar levels of traffic generation per dwelling with a car space, but for development with arguably lesser accessibility to surrounding amenity.

Given the range of development expected on the site, we are comfortable that the adopted trip generation rates are appropriate.

Proposed Commercial Component (Excluding Harry the Hirer Site)

Consistent with the residential component of the site, the travel modes for employees within the Richmond SA2 has been sourced.

A summary of the traffic mode splits for commercial uses is provided at Table 10.

We note that whilst these rates are for employees, and not customers, they do give some level of indication as to the transport choices that visitors might make to get to a site.

⁶ Includes car as driver, car as passenger, truck, taxi

Table 10: Commercial ABS Data - Richmond SA2 Mode Split

Travel Mode	Employees
Motor Vehicle ⁷	52.9%
Motorcycle	0.5%
Walking	5.8%
Bike	3.2%
Public Transport	25.2%
Other	12.2%

An assessment of the expected traffic mode splits is provided as follows.

Office Use

An occupancy rate of 1 employee per 10 square metres is expected for office uses. Application of this rate to the circa 5,000 square metres of office floor area equates to a total of 500 employees for the office use. We note that this floor area is at the upper end of the likely range.

Vehicle trip generation is usually related to parking provisions, whereby 50% of parking generates movements inbound in the morning and outbound in the afternoon. An estimated rate of 1 parking space per 100 square metres will be adopted for this assessment.

On the basis of restricted parking supply, the mode split associated with motor vehicles will significantly decrease when compared to the broader Richmond SA2 and alternative transport modes eg. walking, cycling and public transport will increase.

Based on the preceding, the following modal split has been adopted for the office component of the site.

Table 11: Office Travel Mode Splits

Travel Mode	Staff	Adopted	Net Change
Motor Vehicle ⁸	52.9%	10.0%	-42.9%
Motorcycle	0.5%	1.0%	+0.5%
Walking	5.8%	20.0%	+14.2%
Bike	3.2%	23.0%	+19.8%
Public Transport	25.2%	32.0%	+6.8%
Other	12.2%	14.0%	+1.8%

⁷ Includes car as driver, car as passenger, truck, taxi

⁸ Includes car as driver, car as passenger, truck, taxi

Gym & Other Retail

We will presume a maximum occupancy of 1 person per 10 square metres for the gymnasium and other retail uses, inclusive of 20% staff and 80% customers, during the peak hours.

Application of this rate to the proposed circa 5,000 square metres of additional retail and gym floor area (excludes existing Harry the Hirer) equates to a peak of 100 staff and 400 customers/patrons. We note that this floor area is at the upper end of the likely range.

For the purpose of this assessment, staff are expected to have a similar travel profile to office staff.

However it is expected that customers will generate a higher reliance on motor vehicles than the staff due to shorter term trips, the timing of the trips and them often including transport of goods. That said, there is still a limited number of on-site parking spaces, which will still encourage active transport modes, rather than private vehicle use.

In the morning commuter peak hour, we will presume a trip generation of 25% of the overall patronage, whilst in the afternoon peak we will presume 100% trip generation in the peak hour.

As such the mode splits illustrated within Table 12 have been adopted for the customers of the retail uses.

Table 12: Customer Travel Mode Split

Travel Mode	ABS Data	Adopted	Net Change
Motor Vehicle 9	52.9%	40.0%	-12.9%
Motorcycle	0.5%	0.5%	No Change
Walking	5.8%	10.0%	+4.2%
Bike	3.2%	10.0%	+6.8%
Public Transport	25.2%	27.3%	+2.1%
Other	12.2%	12.2%	No Change

Estimated Traffic Generation

Based on the preceding mode splits an assessment of the approximate travel demands generated by each mode is provided at Table 13 below.

We note that the traffic generation of the commercial floor areas contemplates yields at the upper end of the likely range. That is, if yields are lower then overall traffic generation is likely to be lower.

⁹ Includes car as driver, car as passenger, truck, taxi

Table 13: Estimated Traffic Generation

Use	Transport Mode	Mode Split	Peak Hour Trips	
			AM Peak	PM Peak
Residential				
Residents	Motor Vehicle	27.5%	100	100
	Motorcycle	1.0%	4	4
	Walking	15.0%	55	55
	Bike	9.0%	33	33
	Public Transport	33.0%	121	121
	Other	14.5%	53	53
Office				
Staff	Motor Vehicle	10.0%	25	25
	Motorcycle	1.0%	3	3
	Walking	20.0%	50	50
	Bike	23.0%	58	58
	Public Transport	32.0%	80	80
	Other	14.0%	35	35
Retail Use				
Staff	Motor Vehicle	10.0%	10	10
	Motorcycle	1.0%	1	1
	Walking	20.0%	20	20
	Bike	23.0%	23	23
	Public Transport	32.0%	32	32
	Other	14.0%	14	14
Customers	Motor Vehicle	40.0%	40	160
	Motorcycle	0.5%	1	2

Use	Transport Mode	Mode Split	Peak Hour Trips	
			AM Peak	PM Peak
	Walking	10.0%	10	40
	Bike	10.0%	10	40
	Public Transport	27.3%	27	109
	Other	12.2%	12	49
Total				
All	Motor Vehicle		175	295
	Motorcycle		9	10
	Walking		135	165
	Bike		124	154
	Public Transport		260	342
	Other		114	151
Total			815	1115

NOTES:
Office 50% of peak persons arrive during peak hours / **Retail** 25% of peak customers arrive or depart during AM peak hour / 100% of peak persons arrive or depart during PM peak hour

Based on the preceding the proposal could be expected to generate a total of 815 movements during the AM peak hour, inclusive of 175 movements by private vehicle, 9 motorcycle trips, 135 pedestrian trips, 124 bicycle trips, 260 public transport trips and 114 other trips.

During the PM peak hour, the proposal could be expected to generate a total of 1,115 trips, inclusive of 295 vehicle movements by private vehicle, 10 motorcycle trips, 165 pedestrian trips, 154 bicycle trips, 342 public transport trips and 151 other trips.

5.3.2. Traffic Distribution & Volumes

The application proposes all access to the site to occur from Doonside Street on the site’s northern boundary and therefore it is expected that a majority of traffic generated by the site will utilise the new signalised intersection at Burnley Street and Doonside Street.

Consistent with the Planning Scheme amendment reports, it is expected that a small proportion of traffic generated by the proposal will utilise River Street to the east to travel south and link to Bridge Road.

Based on the preceding we expect that 80% of traffic generated by the proposal will utilise the new signalised intersection with the remaining 20% travelling to the south to/from River Street.

To assess the inbound and outbound movements for the site the splits provided at Table 14 have been adopted for the proposal.

Table 14: Inbound & Outbound Traffic Splits

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

Of the traffic accessing the site via the new signalised intersection the existing traffic distributions at this intersection have been adopted, consistent with the Ratio Report prepared for the Planning Scheme Amendments.

The distributions summarised at Table 15 have been adopted for the new signalised intersection.

Table 15: Expected Traffic Distributions - Burnley Street/Doonside Street/Buckingham Street

Direction	AM Peak		PM Peak	
	Inbound	Outbound	Inbound	Outbound
Burnley Street (N)	50%	50%	50%	50%
Buckingham Street (W)	40%	40%	40%	40%
Burnley Street (S)	10%	10%	10%	10%
Total	100%	100%	100%	100%

Based on the preceding traffic generation rates and distributions, the traffic volumes illustrated at Figure 30 are expected as part of this proposal.

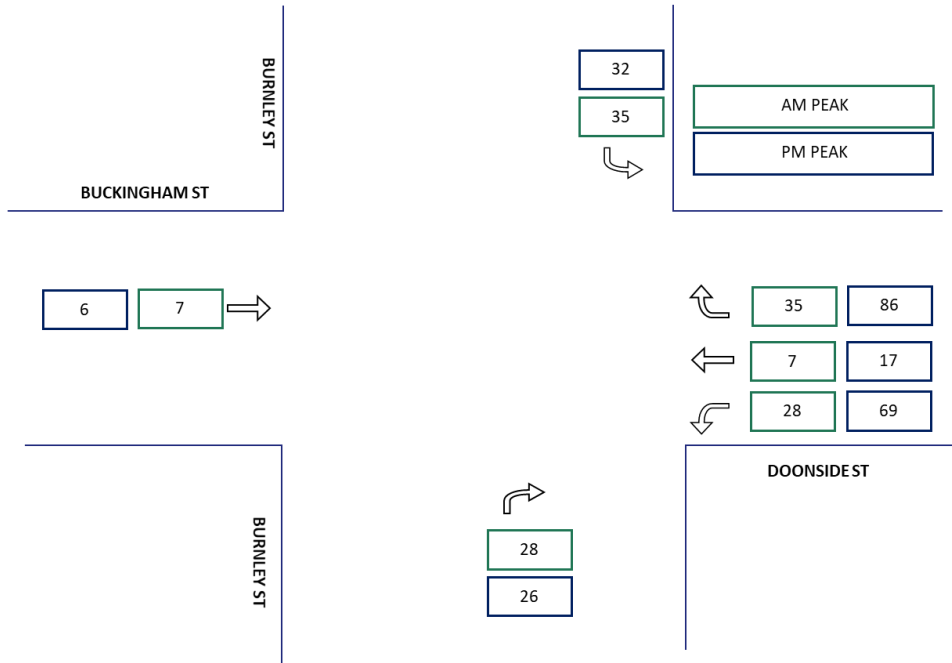


Figure 30: Development Plan Likely Traffic Generation – Additional Peak Hour Movements at Burnley/Doonside

Superimposing these volumes onto the existing “Base Case” provides the Post Development Traffic Volumes at Figure 31.

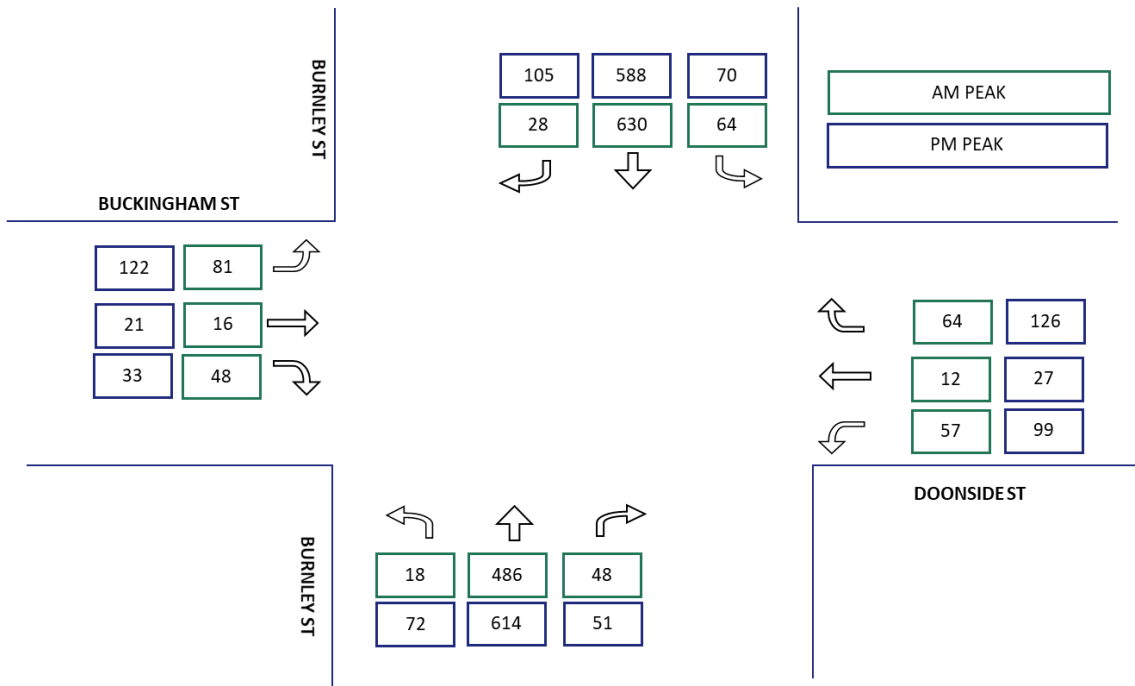


Figure 31: Post Development Traffic Volumes at Burnley Street/Doonside Street

5.3.3. Traffic Impact & Intersection Analysis

To assess the post development operation of the intersection of Burnley Street/Doonside Street a SIDRA model of the post development traffic volumes has been undertaken for the existing unsignalised T-intersection.

The SIDRA analysis identifies that the intersection of Burnley Street/Doonside Street is expected to operate under 'excellent' conditions during the AM peak hour and 'good' conditions during the PM peak hour.

A summary of the post development SIDRA results is provided at Table 16.

Table 16: Base Case vs Proposed Development SIDRA Analysis – Unsignalised Intersection

	Approach	Movement	Base Case			Proposed		
			DoS	Average Delay (s)	95% Queue (m)	DoS	Average Delay (s)	95% Queue (m)
AM Peak	Burnley Street (S)	T	0.37	1	7	0.46	3	22
		R	0.37	13	7	0.46	13	22
	Doonside Street (E)	L	0.07	14	2	0.13	14	4
		R	0.17	29	4	0.42	38	12
	Burnley Street (N)	L	0.02	6	0	0.04	6	0
		T	0.37	0	0	0.37	0	0
PM Peak	Burnley Street (S)	T	0.48	2	12	0.58	4	34
		R	0.48	17	12	0.58	16	34
	Doonside Street (E)	L	0.09	15	3	0.25	15	8
		R	0.36	47	9	1.18	258	139
	Burnley Street (N)	L	0.02	6	0	0.04	6	0
		T	0.39	0	0	0.39	0	0

Based on the preceding, the proposed majority of movements through the intersection of Burnley Street/Doonside Street will operate within capacity, with the exception of the right turn exit from Doonside Street in the PM peak hour.

In the AM peak hour, the intersection operates well within capacity and there is no trigger to provide any significant mitigating works at the intersection.

However, in the PM peak hour, the additional demands to vehicles exiting Doonside Street identifies that there will be capacity constraints for the right turn movement which operates over capacity.

It is important to acknowledge that the traffic network is fluid. That is, where there is constraints on capacity, drivers will choose another route to access to depart a site. However, whilst the left turn exit will still operate well within capacity, and this could assist in dissipating the demands, there will continue to be right turn demands and resultant lengthy delays to vehicles exiting Doonside.

5.3.4. Warrants for the Signalised Intersection & Staging

It is acknowledged that traffic signals can deliver significant improvements to road safety, particularly for pedestrians and cyclists in inner urban areas where future volumes of all modes are expected to increase.

The SIDRA analysis identifies that the intersection is reaching capacity primarily due to the right turn egress in the PM peak hour.

On balance, it is considered that there will be benefit to the immediate development and road network to signalise the intersection at the completion of the Development Plan.

This will also support the potential for any further development to the east that might further put strain on the intersection capacity and safety.

In relation to staging of the site, and triggers for the signals, the proposal is contemplated in 4 stages with varying levels of commercial and residential development.

A sensitivity analysis has been undertaken to analyse the development staging and identify at what point the signals at the intersection would be required. This analysis has identified that the development yields proposed by Stages 1, 2 and 3 could effectively be accommodated by the existing intersection whilst maintaining a Degree of Saturation of 0.9.

The levels of development tested (using the same trip generation rates identified in the preceding sections) are:

- The existing Harry the Hirer restricted retail use; plus
- Approximately 500 dwellings; plus
- Approximately 4,000 square metres of commercial/office; plus
- Approximately 3,000 square metres of shop/retail.

That is, essentially Stage 4 would trigger the need to deliver the signals from an intersection capacity perspective.

5.3.5. Consideration of Potential Future Development

We are advised that the south-east corner of the Victoria Gardens site (located at the intersection of Doonside Street and David Street) is proposed to be developed for the purposes of a mixed use development, including a substantial residential offering.

Following a meeting with the landowner and their traffic consultant, we understand that the proposed development is expected to include in the order of 700-800 residential dwellings and ground floor retail and podium commercial offerings. Access for the residential uses will be to Doonside Street whilst retail and commercial uses are understood to be an extension of

the existing Shopping Centre uses, with vehicular access and parking from the existing centre side.

We are advised that a car parking provision of around 0.5 spaces per apartment is targeted.

For the purposes of this assessment, we will assume 800 dwellings will generate traffic consistent with the subject site and will ignore any potential impacts due to the commercial uses.

Adopting a rate of 0.20 vehicle movements per dwelling with a car space, equates to a peak hour traffic generation of some 80 vehicle movements in a peak hour.

It should be noted that this is conservatively low (very) when compared with the traffic generation rates adopted for this Development Plan and is based on a significant residential parking reduction. Should parking be provided at higher than 0.5 spaces per apartment (or a total of 400 parking spaces) then traffic generated by that site would be substantially higher and the following analysis would need to be revised and reviewed.

On the basis of adopting significantly reduced parking rates (as advised), the expected traffic distributions at the intersection of Burnley Street/Doonside Street/Buckingham Street are illustrated at Figure 32.

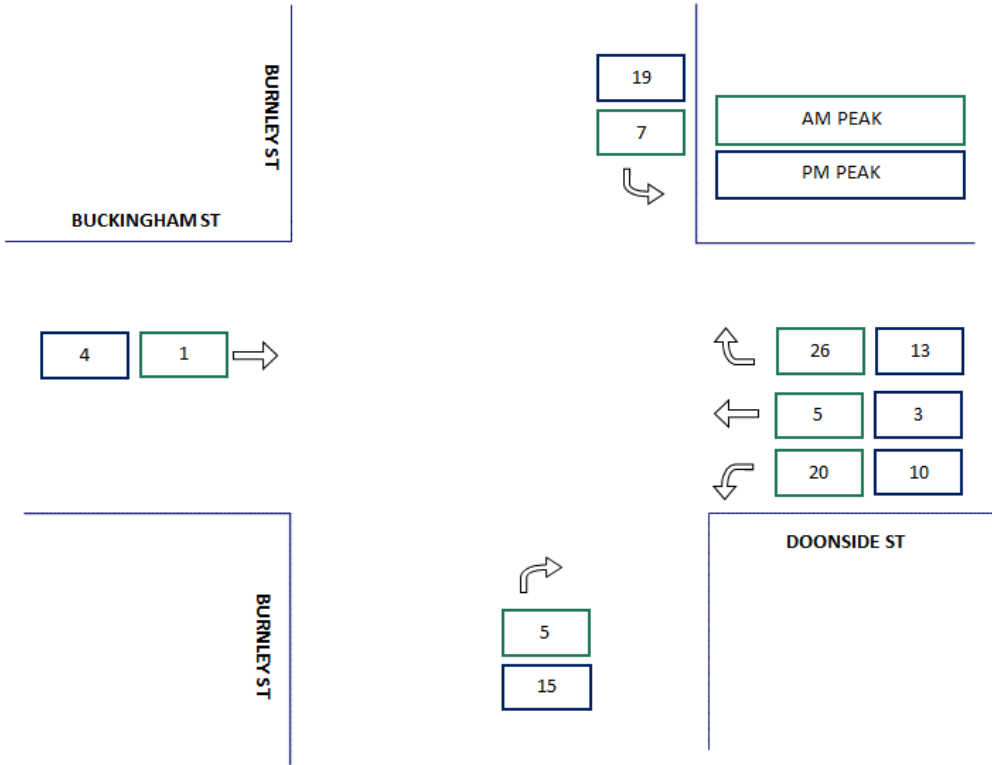


Figure 32: Projected Victoria Gardens Traffic Volumes

Notably, the level of traffic generated by the proposed Victoria Gardens development would be of a similar order (if not more) than that contemplated by the Stage 4 development yields. If higher parking rates are targeted, there would also be more traffic generated by the site.

On this basis, and depending on the timing of the subject development and the Victoria Gardens development, the need to signalise the intersection could be triggered should that development occur prior to the completion of this application.

5.3.6. Signalised Intersection Analysis

5.3.7. General

The Schedule to the Development Plan Overlay requires consideration of what form the signalised intersection should take and requires an assessment as to “whether a two way or a four way signalised intersection between Burnley Street/Doonside Street/Buckingham Street is required”.

Due to the close spacing of the intersections, any signalisation of Doonside Street would require either incorporation of Buckingham Street into the signals, or implementation of physical controls to make movements to/from Buckingham Street left-in/left-out – or even full closure of the eastern end of the road.

Our office has prepared a Concept Plan showing potential signalisation of the two intersections to form a 4-way intersection. This will deliver improved and appropriate pedestrian, cycle and vehicular movements and controls.

The concept plan is provided at Appendix A.

5.3.8. Future Traffic Volumes

To test the suitability of the proposed signalised intersection, we have identified ‘future’ traffic volumes for the combined intersection of Burnley Street/Doonside Street/Buckingham Street.

The traffic generation provided within the preceding sections of the report has been superimposed onto the existing traffic volumes surveyed at the intersection as shown in Figure 33.

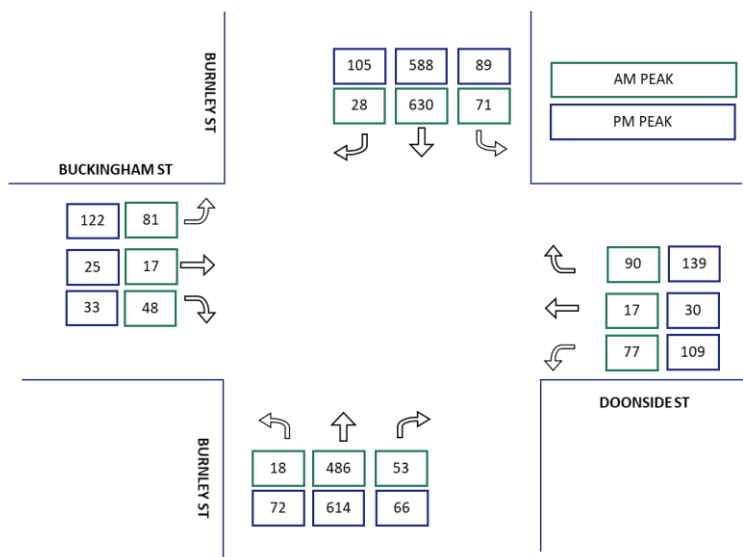


Figure 33: Post Development Traffic Volumes - Burnley Street/Doonside Street/Buckingham Street

5.3.9. Analysis of Intersection Operation

Due to the offsets of the Doonside and Buckingham Street legs of the intersection, there is a need to split phase the side roads and/or investigate turn bans and alternative phasing arrangements to address overlapping turns and movements.

An analysis of different phasing options is provided as follows.

Option 1 – Fully Directional Intersection Control

Option 1 proposes the new signalised intersection to operate with fully controlled movements on all approaches to the intersection (including the right turns on Burnley Street).

A SIDRA analysis of a fully controlled intersection has been undertaken based on the volumes provided in the preceding section. The results of the SIDRA analysis show that the intersection operates under ‘Good’ conditions during both the AM and PM peak hours.

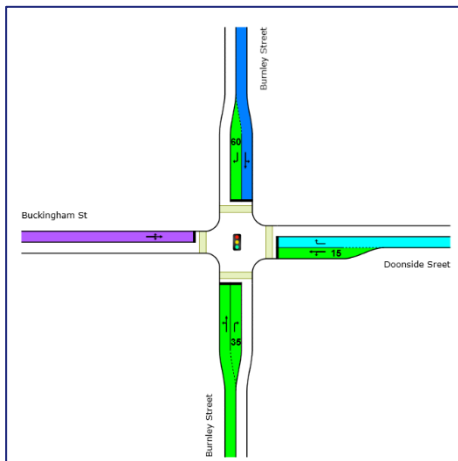


Figure 34: Option 1 - SIDRA DOS AM Peak

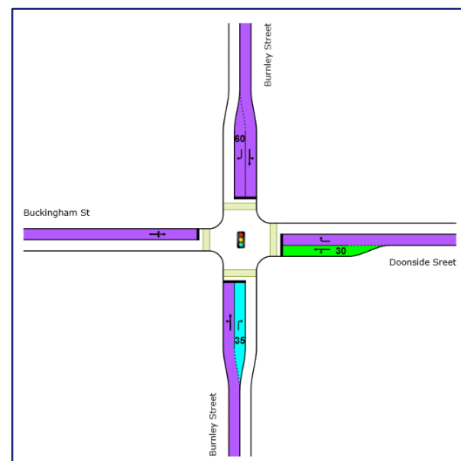
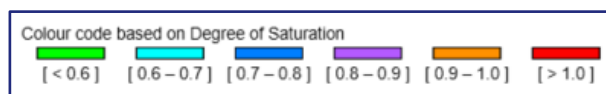


Figure 35: Option 1 - SIDRA DOS PM Peak



Option 2 – Continuation of Right Turn Ban

Under the existing conditions of the intersection a right turn ban applies for the northern approach of Burnley Street between 7am and 9am. Option 2 proposes to maintain this turn ban during the AM peak hour.

A SIDRA analysis of a right turn ban from the north during the AM peak hour has been undertaken based on the volumes provided in the preceding section. The results of the SIDRA analysis show that the intersection operates under ‘Good’ and ‘Acceptable’ conditions during the AM and PM peak hours, respectively.

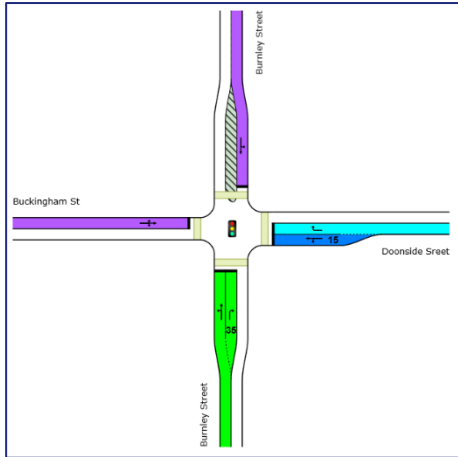


Figure 36: Option 2 - SIDRA DOS AM Peak

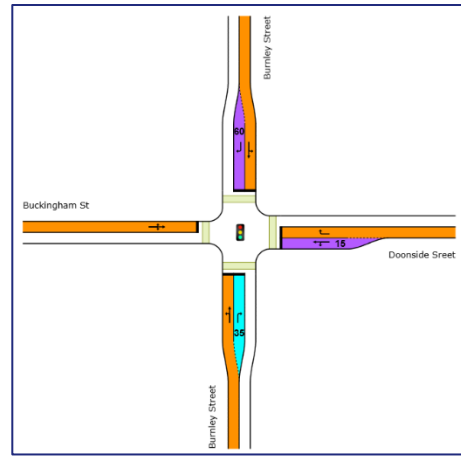
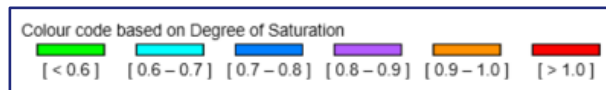


Figure 37: Option 2 - SIDRA DOS PM Peak



Option 3 – Filtered Right Turns from the South

Option 3 proposes a similar arrangement to Option 1, but also includes an allowance for filtered right turns for the south approach of Burnley Street to consider potentially increased capacity on this leg.

A SIDRA analysis of a filtered right turn from the south has been undertaken based on the volumes provided in the preceding section. The results of the SIDRA analysis show that the intersection operates under ‘Good’ conditions during the AM hour. During the PM peak hour, the analysis shows that the intersection operated under ‘poor’ conditions.

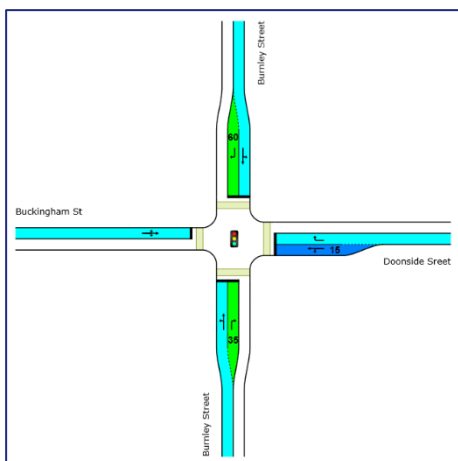


Figure 38: Option 3 - SIDRA DOS AM Peak

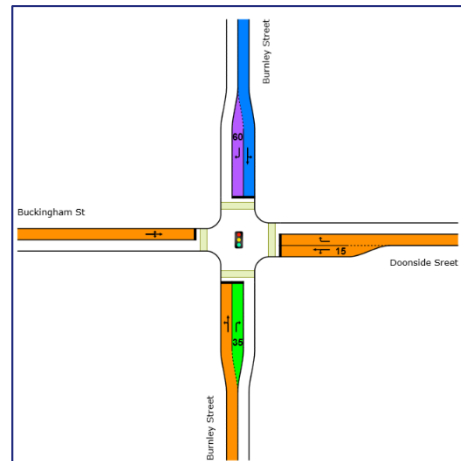
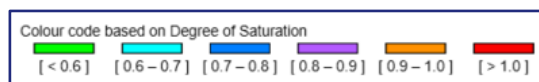


Figure 39: Option 3 - SIDRA DOS PM Peak



Option 4 – Filtered Right Turns from the North

Option 4 proposes a similar arrangement to Option 1, but also includes an allowance for filtered right turns for the south approach of Burnley Street to consider potentially increased capacity on this leg.

A SIDRA analysis of a filtered right turn from the north has been undertaken based on the volumes provided in the preceding section. The results of the SIDRA analysis show that the intersection operates under ‘Good’ conditions during the AM hour. During the PM peak hour, the analysis shows that the intersection operated under ‘acceptable’ conditions.

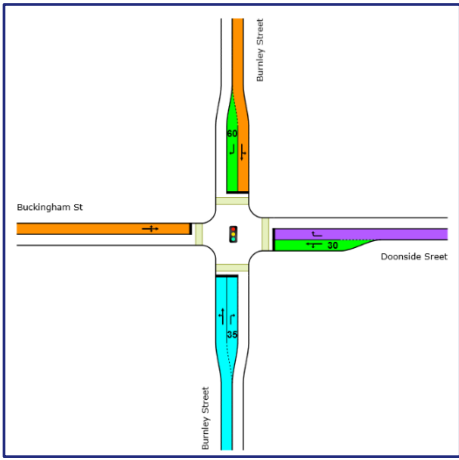
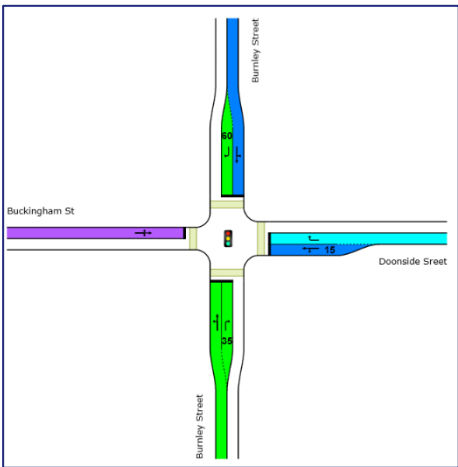


Figure 40: Fully Controlled Signals - SIDRA DOS AM Peak Figure 41: Fully Controlled Signals - SIDRA DOS PM Peak



5.3.10. Recommendations

Based on the preceding it can be seen that each of the signal phasing arrangements operate under comparable arrangements with filtered right turns during the PM peak hour resulting in the poorest signal operation.

As such a fully controlled signal arrangement could be adopted, resulting improved accessibility to both Doonside Street and Buckingham Street, safer operating conditions through the intersection and also providing for the best performance of the signalised intersection.

The detailed results of the intersection analysis arrangements are provided at Appendix B. The ultimate intersection layout will require discussions and approval with Council and DoT.

5.4. Summary of Conclusions

Based on the preceding, it is identified that:

- Signals are required at full completion of the Development Plan to not only address vehicular capacity, but provide a desirable pedestrian, cyclist and road safety response to access within the precinct.
- From a road network capacity perspective, Stages 1, 2 and 3 could be delivered without the signalised intersection.
- Signals would be required at the completion of Stage 4 of the Development Plan, or if the land to the north-east is developed before the Development Plan is completed.
- A Concept Plan for a 4-way intersection layout has been prepared and multiple operating arrangements analysed to determine the best operating conditions of the intersection.

Ultimately, the design, funding and timing of the delivery of the signals will be to the satisfaction of Council and Department of Transport, but should consider whether contributions are required by the future development of the neighbouring land.

6. Bicycle Considerations

Clause 52.34 of the Planning Scheme specifies the bicycle parking requirement for new developments.

The relevant rates under Clause 52.34 are summarised in Table 17.

Table 17: Statutory Bicycle Parking Requirements

Use	Statutory Requirement
Dwellings	1 space per 5 dwellings for residents 1 space per 10 dwellings for visitors
Shop (inc. Restricted Retail)	1 space per 600 m ² for staff 1 space per 500 m ² for customers
Office	1 space per 300 m ² for staff 1 space per 1,000 m ² for visitors
Gymnasium (assumed 10 staff)	1 space per 4 employees for staff 1 space to each 200 m ² for visitors
End of Trip Facilities	1 shower/changeroom for the first 5 bicycle spaces and 1 space for each 10 bicycle spaces thereafter.

The Development Plan contemplates the following bicycle parking provisions/allocations:

- Staff parking will be provided at a typical rate of 1 space per 100 square metres (approximately 140-180 staff parking spaces)
- Resident parking will be provided at a minimum rate of 1 space per dwellings, provided within separate secure areas (approximately 545-645 spaces expected to be provided).
- Parking for visitors will primarily be provided at ground level (but can be within other levels) and will achieve minimum rates of 1 space per 10 dwellings, plus 1 space per 500 square metres of commercial floor area.

End of Trip facilities are proposed on-site for staff and will achieve a minimum rate of 1 shower/changeroom per 10 bikes. They will be conveniently located to encourage use by staff for all buildings.

These rates far exceed the minimum statutory requirements under Clause 52.34 and will appropriately foster sustainable transport behaviours and mode choices.

7. Loading Considerations

7.1. General Requirements

Clause 65.01 of the Planning Scheme states that the responsible authority must consider a number of matters as appropriate including:

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

7.2. Proposed Primary Loading Provisions

Primary loading will take place on-site via dedicated loading areas.

The Harry the Hirer Use will have a dedicated dock to cater for Hire Bump-ins/outs and will accommodate three 8.8 metre Medium Rigid Vehicles (MRVs).

The residential and other commercial uses will utilise shared loading areas. The primary loading area will accommodate an 8.8 metre MRV vehicle. Other loading spaces are likely to be provided for smaller vans and utes.

7.3. Expected Regular Loading Volumes

Based on the expected uses and information provided by the applicant, the following loading movements are contemplated per day:

- An average of 3-4 residential load ins/outs per day
- An average of 20 retail/shop deliveries per day
- In the order of 1-5 delivery movements per day on average – depending on the day and time of year.
- In the order of 2 waste collections per day for the site as a whole (a mixture of residential and retail).

In total, this equates to an average or around 28 delivery movements per day (inclusive of trucks, vans, utes and cars).

7.4. Temporary and Event Loading

A temporary loading area for display vehicles and event equipment is proposed at ground floor, within the north-south section of Harry's Lane.

Access to the loading area will be provided via a crossover to Doonside Street for vehicles up to an 8.8 metre MRV. Vehicles will reverse into Harry's Lane from Doonside Street and then exit the site in a forward direction.

A diagram illustrating the proposed arrangements is provided at Figure 42.

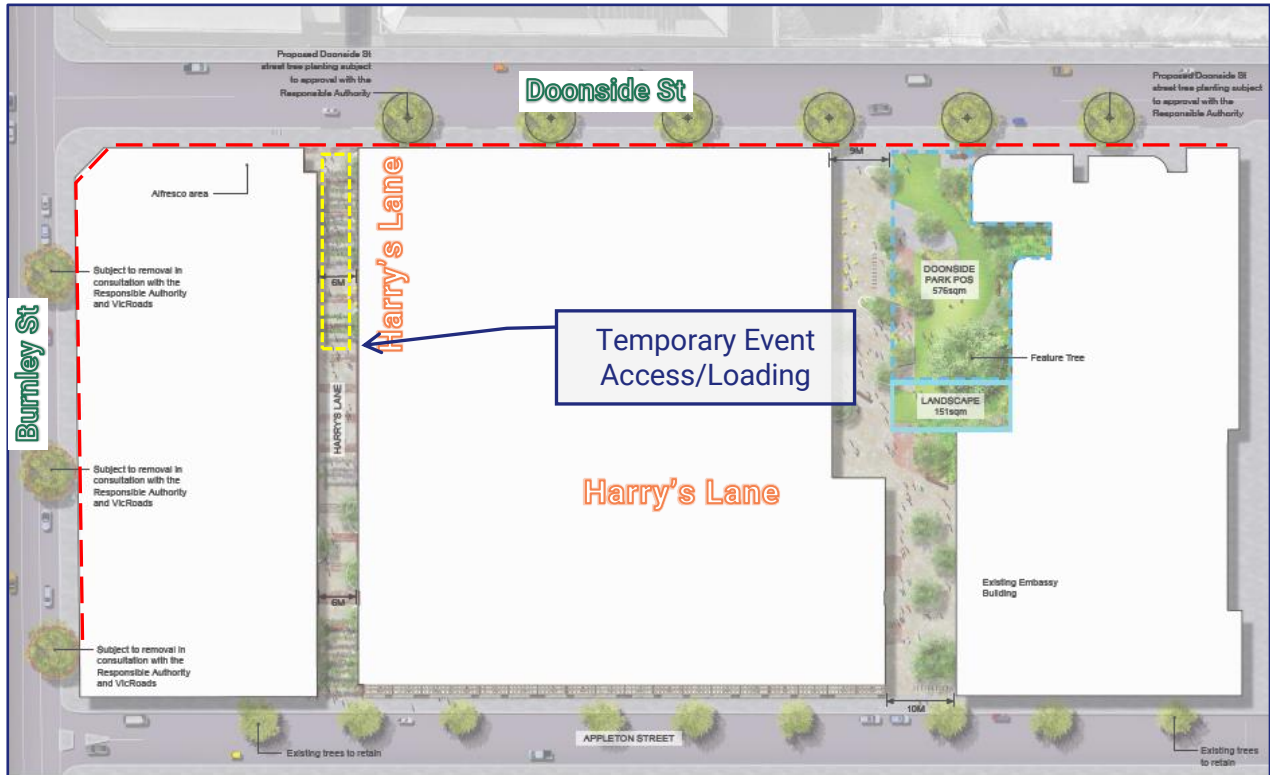


Figure 42: Temporary Loading Arrangement

Access to Harry's Lane will be controlled through traffic management. A Loading Management Plan could be provided as a Condition of Permit to ensure safe and convenient access is provided.

Bollards will be provided outside of loading periods to restrict vehicle accessibility into Harry's Lane.

Based on the preceding, we are satisfied that appropriate loading and waste provisions can be accommodated in accordance with the objectives of the Planning Scheme.

Loading activities associated with the temporary loading dock are expected to be infrequent and will not be a daily movement. As such the traffic associated with this component of the loading will be indiscernible to other motorists.

8. Design Considerations

8.1. Site Access Locations

The Development contemplates 2 key vehicular access locations to on-site parking and loading.

They are considered to be appropriately located to provide suitable separation from existing and future intersections to ensure that vehicle access will not disrupt the pedestrian, cyclist or vehicular operations on the network or on Doonside Street.

There is no vehicular access proposed to Appleton Street.

The accesses will be designed to appropriately cater for 2 way passing, and will appropriately address footpaths and manage pedestrian and vehicle conflicts.

All loading access is via Doonside Street.

The proposed internal laneways will be designs for primary pedestrian and cyclist access. The eastern laneway will not permit vehicular access.

8.2. Internal Laneway Cross-Sections

The internal laneways are contemplated to be predominantly pedestrianised with only the northern portion of Harry's Lane providing a temporary loading area. Vehicular access to the remaining laneways will be restricted to intermittent maintenance and/or emergency vehicle access.

Laneways will primarily be provided as pedestrian and cyclist laneways that provide direct access and active frontages to the ground floor uses and lobbies.

A cross-section for the eastern laneway is provided in Figure 43.

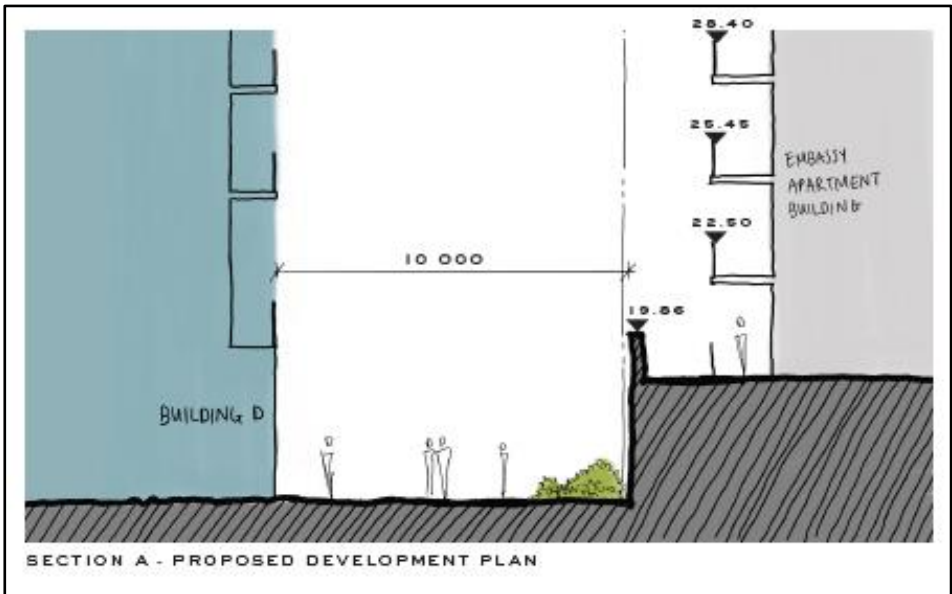


Figure 43: Cross-sections of Eastern North-South Laneway

9. Schedule to the Development Plan Overlay

An assessment/commentary in relation to each of the items required to be addressed within the Traffic Works Assessment listed at the Schedule to the Development Plan Overlay is provided in the table below.

Table 18: Responses to Schedule to the Development Plan Overlay

Item	Response
<i>An existing conditions assessment, including existing and approved vehicle and loading access arrangements associated with the Victoria Gardens Shopping Centre with capacity to interact with traffic from the development.</i>	The existing conditions assessment is provided at Section 2
<i>Details of any development staging.</i>	Development Staging is addressed at Section 3.1
<i>Consultation with the owner of the Victoria Gardens Shopping Centre</i>	There has consultation with the owner of Victoria Gardens SC, with commentary provided at Sections 2.2.2 and 5.3.5.
<i>A site layout plan showing convenient and safe primary vehicle access, including:</i>	This plan is addressed by the Development Plan, with further detail provided at Section 3.2
<i>primary vehicle access to and from Doonside Street;</i>	All vehicle access to via Doonside Street.
<i>any vehicle access to Appleton Street to be a secondary access point;</i>	There is no vehicular access to Appleton Street
<i>no direct vehicle access to or from the site via Burnley Street.</i>	There is no vehicular access via Burnley Street
<i>Details regarding the layout, cross section and function of any internal street or laneway network.</i>	All internal laneways will be predominantly pedestrian only, with the exception of the north-south section of Harry' Lane which will provide for a temporary loading area. This is detailed in 8.2.

<p><i>On site car parking and bicycle parking provisions and allocations.</i></p>	<p>Parking allocations are provided in Section 3.3 and assessed in Section 4 (Car Parking) and Section 6 (Bike Parking).</p>
<p><i>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.</i></p>	<p>The traffic impact assessment is detailed in Section 5.</p>
<p><i>The Transport Works Assessment must include consideration of any development stages and approved/current development applications within the immediate area surrounding the site.</i></p>	<p>The traffic impact assessment is detailed in Section 5 and considers surrounding approved development.</p>
<p><i>The assessment is to:</i></p>	
<p><i>identify mitigating works required for each development stage in the development plan</i></p>	<p>Signals at the intersection of Burnley Street/Doonside Street/Buckingham Street are identified as being required at Stage 4 of the development.</p>
<p><i>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</i></p>	<p>The traffic impact assessment is detailed in Section 5 and addresses the signalisation, which is expected to be best delivered by a 4-way intersection. Discussions with DoT and Council at in progress.</p>
<p><i>identify a new intersection layout and operation, if required, approved by VicRoads in consultation with the Responsible Authority.</i></p>	
<p><i>Details of any works or treatments proposed to Doonside Street or Appleton Street or the nearby road network.</i></p>	<p>The footpath along Doonside Street at the site frontage will be reconstructed. A streetscape improvement concept is being discuss with the owners of Victoria Gardens to address additional improvements. There is no access proposed to Appleton Street, and therefore limited improvements or modifications are necessary.</p>

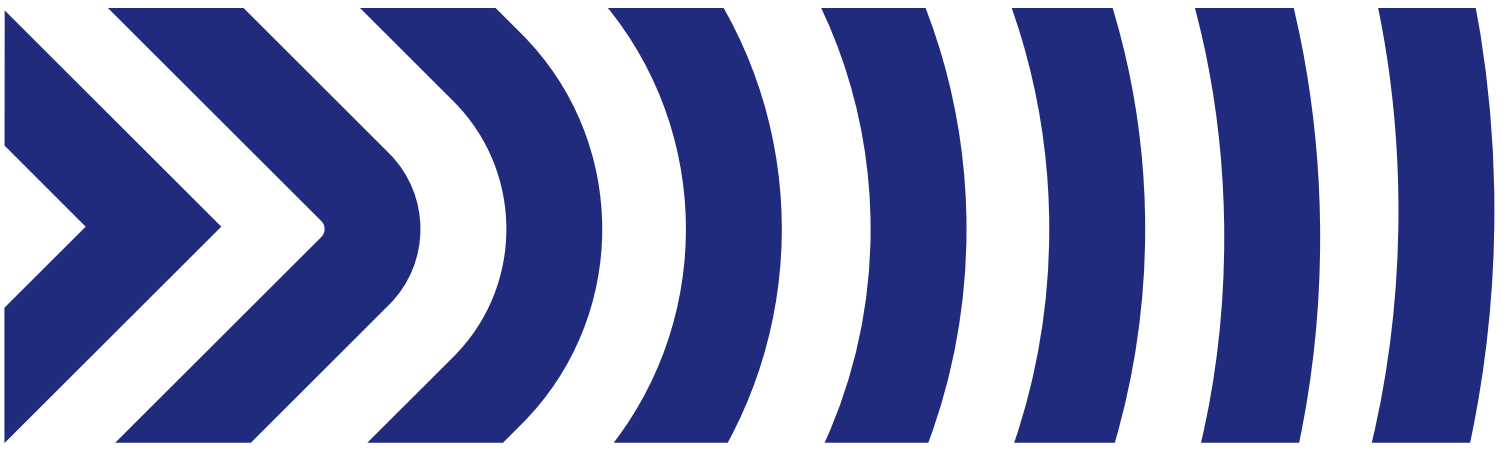
<p><i>Determine the likely increases to pedestrian and bicycle movements generated by the site and the likely distribution of those movements. Demonstrate how the subject site will prioritise those movements and provide convenient connections to existing infrastructure.</i></p>	<p>Pedestrian and cyclist accessibility is detailed within Section 3.2 and trip generation is estimated at Section 5.3.1.</p>
<p><i>Measures to reduce conflict and improve pedestrian and bicycle amenity (if applicable).</i></p>	<p>This is addressed in the Development Plan and at Section 3.2.</p>
<p><i>Indicative 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.</i></p>	<p>Loading and access is detailed at 3.4 and assessed at Section 7.</p>
<p><i>Estimate the type and number of loading/unloading activities associated with the development and provide information on appropriate loading/unloading facilities to service the various uses proposed.</i></p>	<p>Loading and access is detailed at 3.4 and assessed at Section 7.</p>
<p><i>Access to the site by trucks is to be via Doonside Street.</i></p>	<p>All vehicle access to the site is via Doonside Street.</p>
<p><i>Details regarding on-site waste collection, with waste vehicles accessing the site from Doonside Street</i></p>	<p>Loading and access is detailed at 3.4 and assessed at Section 7.</p>

10. Conclusions

Having undertaken a detailed traffic engineering assessment of the proposed development plan at 81-95 Burnley Street & 26-34 Doonside Street, Richmond, we are of the opinion that:

- a. the proposed development plan contemplates a dispensation of parking under Clause 52.06 as provisions of parking are expected to be lower than the minimum statutory rates;
- b. the required reduction in parking under Clause 52.06-6 is supported on the following grounds:
 - i) It is in line with Council's sustainable transport policies and objectives.
 - ii) The site has good access to public transport and local amenities and services, particularly via Victoria Gardens.
 - iii) It reduces the traffic impacts of the proposal and supports sustainable transport modes.
 - iv) Residents will not have access to parking permits and those without on-site car parking will not be able to maintain a car on-street given the prevailing parking restrictions.
 - v) for those staff who do not have an on-site parking space and do not wish to park on-street or within other publicly available (but priced) car parking, they have the opportunity to make a mode shift to more sustainable transport to access the site.
- c. The traffic works assessment has identified that:
 - i) Signals are required at full completion of the Development Plan to not only address vehicular capacity, but provide a desirable pedestrian, cyclist and road safety response to access within the precinct.
 - ii) From a road network capacity perspective, Stages 1, 2 and 3 could be delivered without the signalised intersection.
 - iii) Signals would be required at the completion of Stage 4 of the Development Plan, or if the land to the north-east is developed before the Development Plan is completed.
 - iv) A Concept Plan for a 4-way intersection layout has been prepared and multiple operating arrangements analysed to determine the best operating conditions of the intersection.
- d. bicycle parking rates are identified and proposed in excess of the requirements set out at Clause 52.34 of the Planning Scheme,
- e. On-site loading areas can be designed to meet the objectives of Clause 65.01 of the Planning Scheme and access is in accordance with the requirements of the Schedule to the Development Plan Overlay

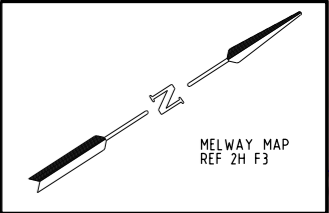
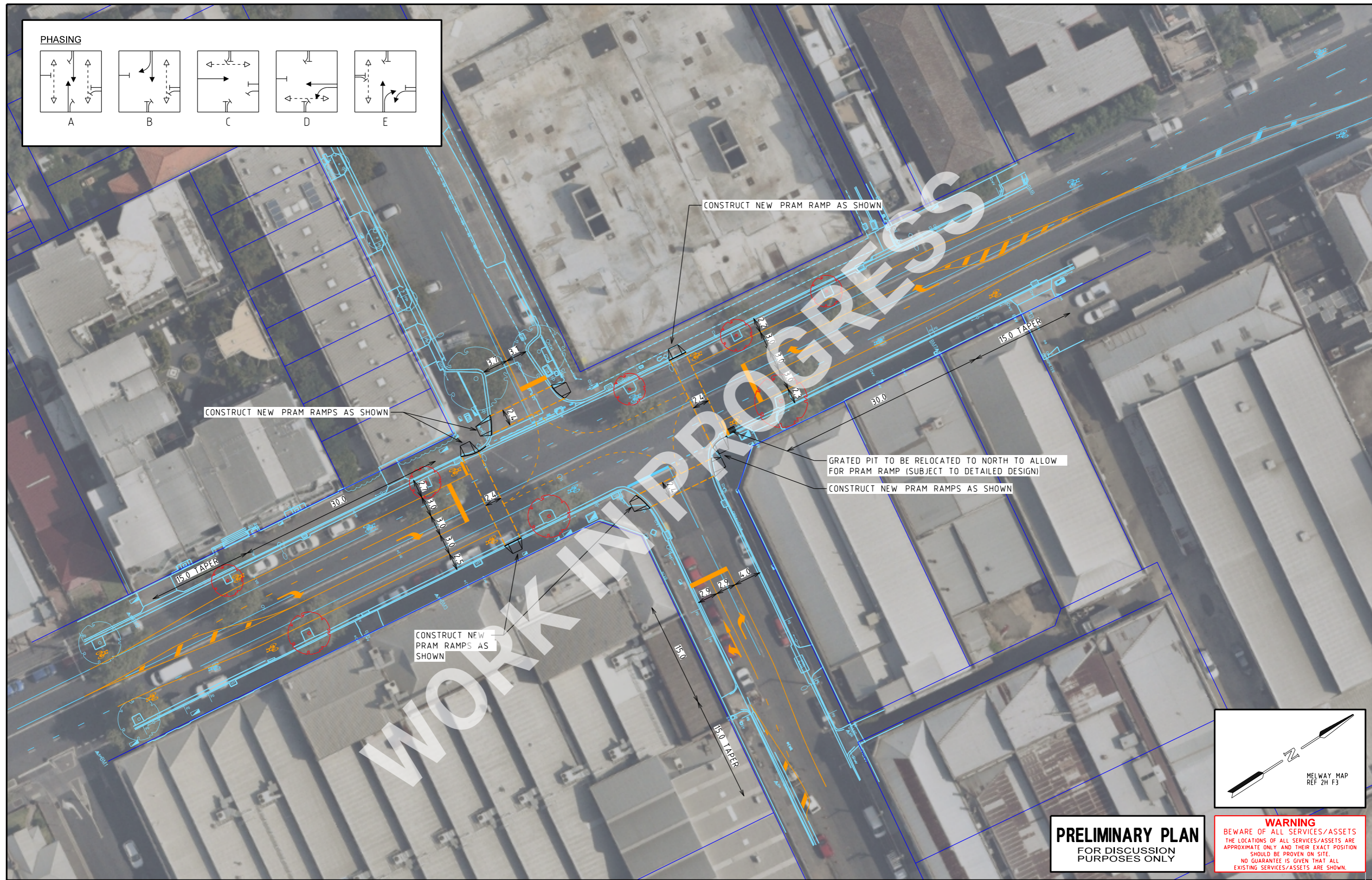
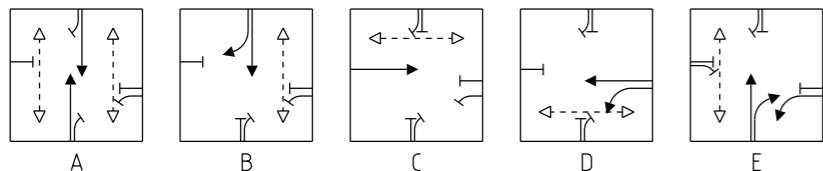
Ultimately, there are no traffic engineering reasons why the Development Plan should not be approved, subject to appropriate conditions relating to the outcomes identified above.



Appendix A

Intersection Concept Layout Plan

PHASING



PRELIMINARY PLAN
FOR DISCUSSION
PURPOSES ONLY

WARNING
BEWARE OF ALL SERVICES/ASSETS
THE LOCATIONS OF ALL SERVICES/ASSETS ARE
APPROXIMATE ONLY AND THEIR EXACT POSITION
SHOULD BE PROVEN ON SITE.
NO GUARANTEE IS GIVEN THAT ALL
EXISTING SERVICES/ASSETS ARE SHOWN.

ISSUE	ISSUE DESCRIPTION	ISSUE DATE
A	FUNCTIONAL LAYOUT PLAN - INITIAL ISSUE	30 SEP 2021

GENERAL NOTES

1. BASE INFORMATION FROM FEATURE SURVEY (BURNLEY ST DOONSIDE ST RICHMOND DWG) / AERIAL PHOTOGRAPH (SOURCE NEARMAP SEP 2021)
2. ALL DIMENSIONS ARE TO FACE OF KERB & CHANNEL
3. MAIN ROAD - BURNLEY STREET (SPEED ZONE 50km/h)
LOCAL ROADS - DOONSIDE STREET AND BUCKINGHAM STREET (SPEED ZONE 40km/h)
4. ALL PROPOSED FOOTPATHS AND PRAM CROSSINGS ARE TO BE CONSTRUCTED WITH TACTILE GROUND SURFACE INDICATORS TO DDA COMPLIANCE GUIDELINES REFER TO AS 1428.4-2009

TREE TO BE REMOVED

DESIGNED
S O'KEEFE 30 SEP 2021

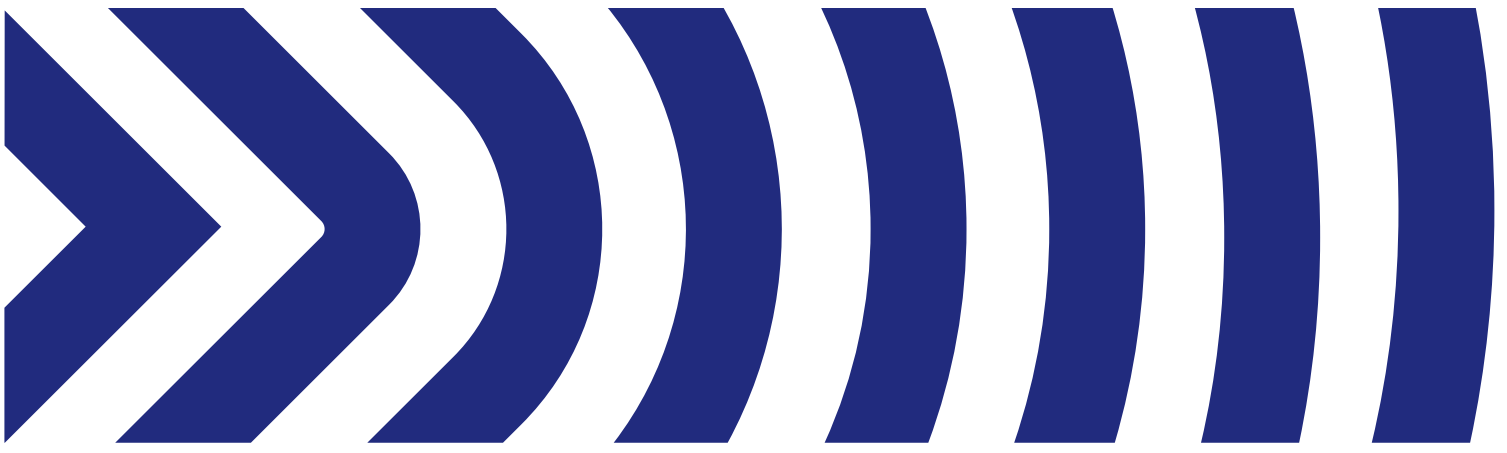
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W de WAARD 30 SEP 2021

FILE NAME
G26856-01-00.dgn

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Melbourne, Victoria 3000
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**BURNLEY STREET
RICHMOND**
YARRA CITY COUNCIL
FUNCTIONAL LAYOUT PLAN

SCALE 1:500 (A3) 0 2.5 5 7.5 10 SHEET No. DWG No. G26856-01-01



Appendix B

SIDRA Analysis Summaries

MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: FULLY CONTROLLED)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	18	2.0	19	2.0	0.599	19.1	LOS B	13.3	97.1	0.56	0.51	0.56	47.8
2	T1	486	5.0	512	5.0	0.599	13.6	LOS B	13.3	97.1	0.56	0.51	0.56	48.9
3	R2	53	2.0	56	2.0	* 0.508	58.5	LOS E	2.8	20.3	1.00	0.75	1.01	30.1
Approach		557	4.6	586	4.6	0.599	18.0	LOS B	13.3	97.1	0.60	0.53	0.60	46.1
East: Doonside Sreet														
4	L2	77	2.0	81	2.0	0.406	47.0	LOS D	4.4	31.5	0.93	0.77	0.93	33.6
5	T1	17	2.0	18	2.0	0.406	41.4	LOS D	4.4	31.5	0.93	0.77	0.93	34.2
6	R2	90	2.0	95	2.0	* 0.696	56.7	LOS E	4.8	34.2	1.00	0.84	1.16	30.5
Approach		184	2.0	194	2.0	0.696	51.2	LOS D	4.8	34.2	0.97	0.80	1.04	32.1
North: Burnley Street														
7	L2	71	2.0	75	2.0	0.790	22.8	LOS C	25.1	182.6	0.74	0.70	0.75	45.4
8	T1	630	5.0	663	5.0	* 0.790	17.2	LOS B	25.1	182.6	0.74	0.70	0.75	46.4
9	R2	28	2.0	29	2.0	0.268	57.2	LOS E	1.5	10.5	0.99	0.72	0.99	30.2
Approach		729	4.6	767	4.6	0.790	19.3	LOS B	25.1	182.6	0.75	0.70	0.76	45.4
West: Buckingham St														
10	L2	81	2.0	85	2.0	0.835	60.8	LOS E	8.3	59.2	1.00	0.95	1.33	29.7
11	T1	17	2.0	18	2.0	* 0.835	55.3	LOS E	8.3	59.2	1.00	0.95	1.33	30.2
12	R2	48	2.0	51	2.0	0.835	60.8	LOS E	8.3	59.2	1.00	0.95	1.33	29.7
Approach		146	2.0	154	2.0	0.835	60.2	LOS E	8.3	59.2	1.00	0.95	1.33	29.8
All Vehicles		1616	4.1	1701	4.1	0.835	26.2	LOS C	25.1	182.6	0.74	0.67	0.79	41.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												

P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Buckingham St											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP30102\07-Analysis\SIDRA\G30102-01-20211202.sip9

PHASING SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: FULLY CONTROLLED)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D, E

Output Phase Sequence: A, B, C, D, E

Phase Timing Summary

Phase	A	B	C	D	E
Phase Change Time (sec)	0	45	57	73	88
Green Time (sec)	39	6	10	9	6
Phase Time (sec)	45	12	16	15	12
Phase Split	45%	12%	16%	15%	12%













See the Timing Analysis 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, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

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

MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: FULLY CONTROLLED)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	72	2.0	76	2.0	0.862	31.0	LOS C	29.9	217.9	0.81	0.82	0.91	41.2
2	T1	614	5.0	646	5.0	*0.862	25.4	LOS C	29.9	217.9	0.81	0.82	0.91	42.0
3	R2	66	2.0	69	2.0	0.632	59.6	LOS E	3.6	25.8	1.00	0.80	1.11	29.8
Approach		752	4.4	792	4.4	0.862	28.9	LOS C	29.9	217.9	0.82	0.81	0.92	40.5
East: Doonside Sreet														
4	L2	109	2.0	115	2.0	0.547	49.4	LOS D	6.8	48.7	0.97	0.80	0.97	33.0
5	T1	30	2.0	32	2.0	0.547	43.8	LOS D	6.8	48.7	0.97	0.80	0.97	33.5
6	R2	139	2.0	146	2.0	*0.888	65.6	LOS E	8.3	59.1	1.00	0.98	1.48	28.4
Approach		278	2.0	293	2.0	0.888	56.9	LOS E	8.3	59.1	0.99	0.89	1.23	30.6
North: Burnley Street														
7	L2	89	2.0	94	2.0	0.853	29.2	LOS C	28.1	204.2	0.77	0.78	0.86	41.9
8	T1	588	5.0	619	5.0	0.853	23.7	LOS C	28.1	204.2	0.77	0.78	0.86	42.8
9	R2	105	2.0	111	2.0	*0.862	64.7	LOS E	6.2	43.8	1.00	0.94	1.46	28.5
Approach		782	4.3	823	4.3	0.862	29.8	LOS C	28.1	204.2	0.80	0.80	0.94	40.0
West: Buckingham St														
10	L2	122	2.0	128	2.0	0.856	61.0	LOS E	10.4	73.9	1.00	0.97	1.34	29.7
11	T1	25	2.0	26	2.0	*0.856	55.4	LOS E	10.4	73.9	1.00	0.97	1.34	30.2
12	R2	33	2.0	35	2.0	0.856	60.9	LOS E	10.4	73.9	1.00	0.97	1.34	29.7
Approach		180	2.0	189	2.0	0.856	60.2	LOS E	10.4	73.9	1.00	0.97	1.34	29.8
All Vehicles		1992	3.8	2097	3.8	0.888	36.0	LOS D	29.9	217.9	0.86	0.84	1.01	37.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												

P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Buckingham St											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP30102\07-Analysis\SIDRA\G30102-01-20211202.sip9

PHASING SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: FULLY CONTROLLED)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D, E

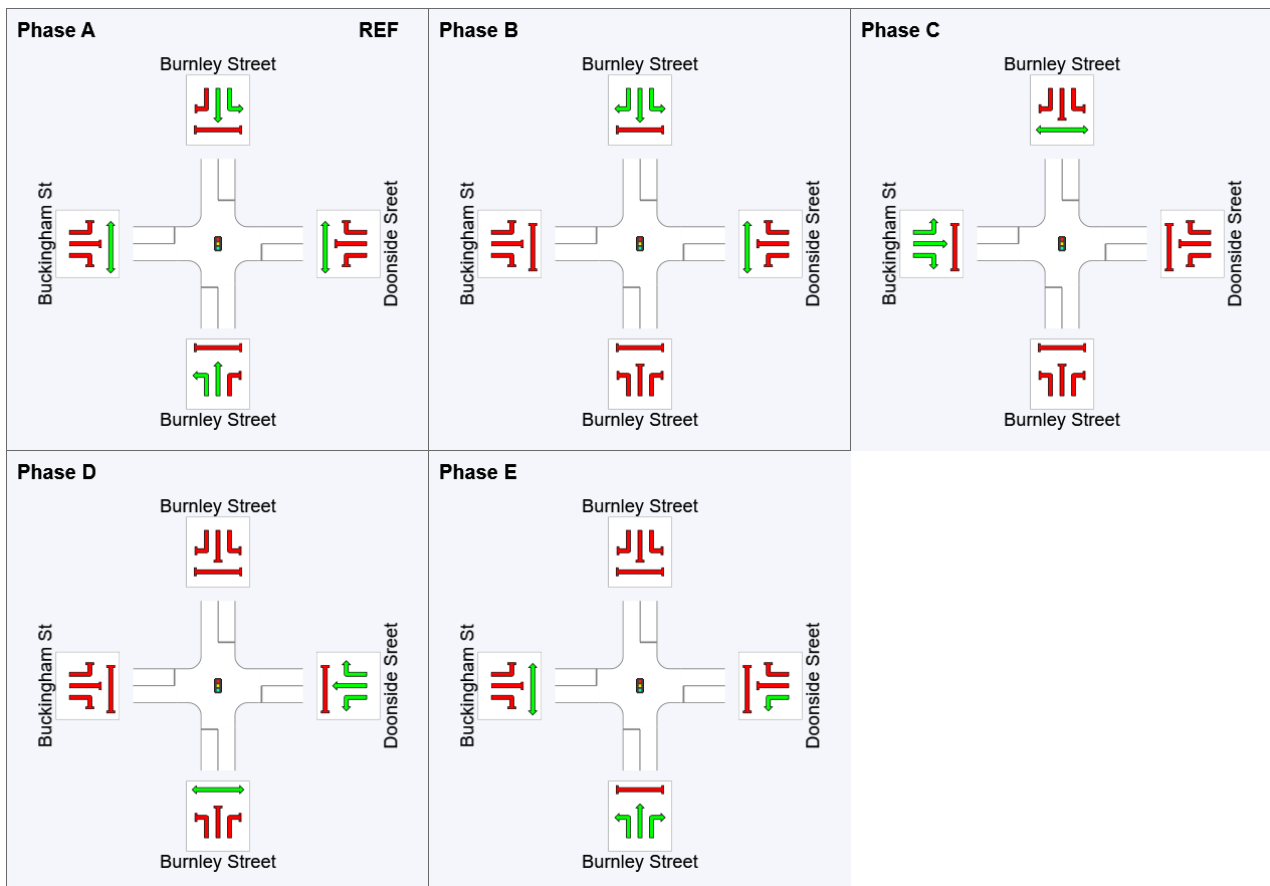
Output Phase Sequence: A, B, C, D, E

Phase Timing Summary

Phase	A	B	C	D	E
Phase Change Time (sec)	0	42	55	73	88
Green Time (sec)	36	7	12	9	6
Phase Time (sec)	42	13	18	15	12
Phase Split	42%	13%	18%	15%	12%













See the Timing Analysis 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, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

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

MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: AM TURN BAN)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Burnley Street														
1	L2	18	2.0	19	2.0	0.446	10.8	LOS B	6.8	49.4	0.29	0.27	0.29	53.6
2	T1	486	5.0	512	5.0	0.446	5.2	LOS A	6.8	49.4	0.29	0.27	0.29	55.1
3	R2	53	2.0	56	2.0	* 0.508	58.5	LOS E	2.8	20.3	1.00	0.75	1.01	30.1
Approach		557	4.6	586	4.6	0.508	10.5	LOS B	6.8	49.4	0.35	0.32	0.35	51.0
East: Doonside Sreet														
4	L2	77	2.0	81	2.0	0.717	57.1	LOS E	5.0	35.9	1.00	0.85	1.18	30.8
5	T1	17	2.0	18	2.0	* 0.717	51.5	LOS D	5.0	35.9	1.00	0.85	1.18	31.2
6	R2	90	2.0	95	2.0	0.678	56.3	LOS E	4.8	34.1	1.00	0.82	1.14	30.5
Approach		184	2.0	194	2.0	0.717	56.2	LOS E	5.0	35.9	1.00	0.84	1.16	30.7
North: Burnley Street														
7	L2	71	2.0	75	2.0	0.832	27.5	LOS C	30.7	223.6	0.83	0.80	0.88	42.9
8	T1	658	5.0	693	5.0	* 0.832	21.9	LOS C	30.7	223.6	0.83	0.80	0.88	43.8
Approach		729	4.7	767	4.7	0.832	22.4	LOS C	30.7	223.6	0.83	0.80	0.88	43.7
West: Buckingham St														
10	L2	81	2.0	85	2.0	0.835	60.8	LOS E	8.3	59.2	1.00	0.95	1.33	29.7
11	T1	17	2.0	18	2.0	* 0.835	55.3	LOS E	8.3	59.2	1.00	0.95	1.33	30.2
12	R2	48	2.0	51	2.0	0.835	60.8	LOS E	8.3	59.2	1.00	0.95	1.33	29.7
Approach		146	2.0	154	2.0	0.835	60.2	LOS E	8.3	59.2	1.00	0.95	1.33	29.8
All Vehicles		1616	4.1	1701	4.1	0.835	25.6	LOS C	30.7	223.6	0.70	0.65	0.77	42.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped Dist] ped m		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												
P3	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02

West: Buckingham St												
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02	
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

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PHASING SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: AM TURN BAN)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, C, D, E

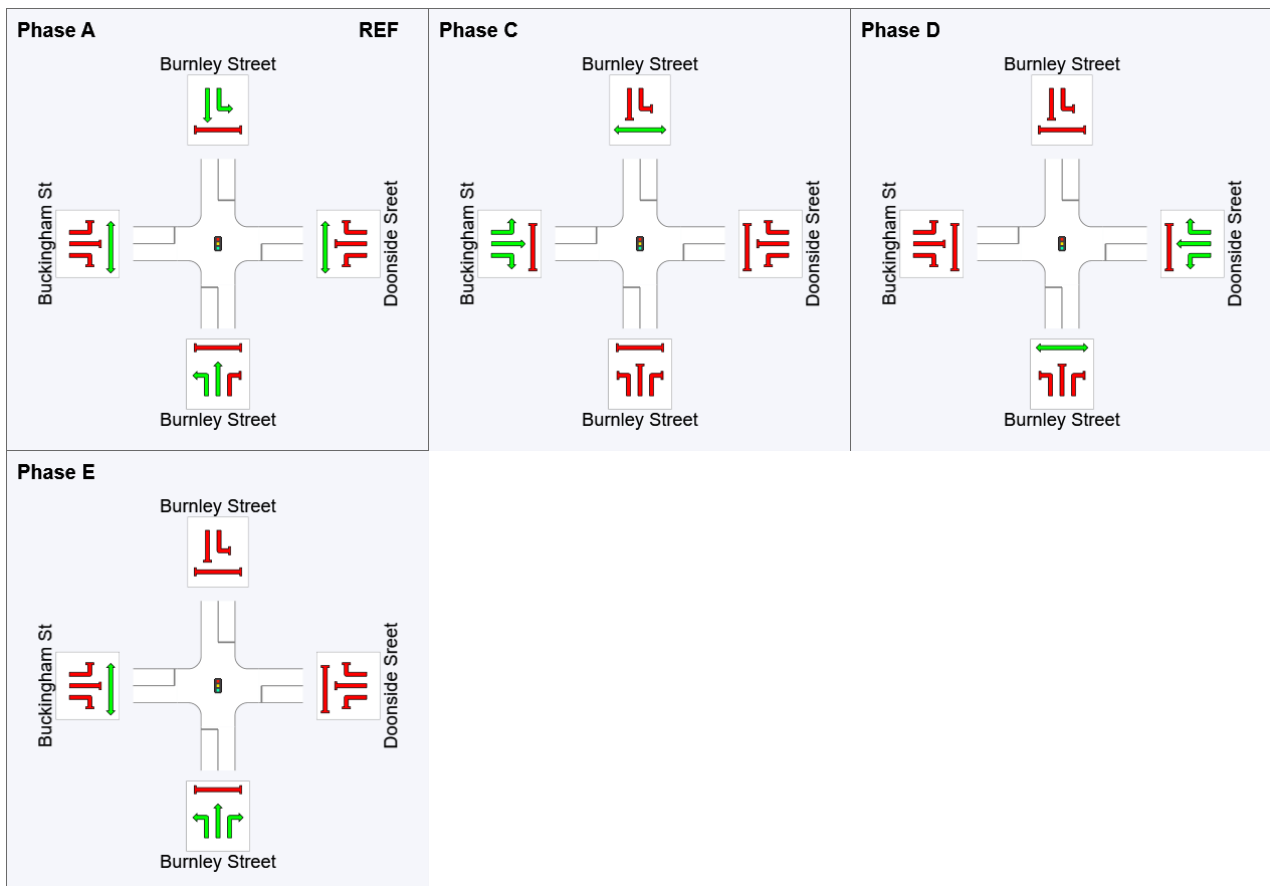
Output Phase Sequence: A, C, D, E

Phase Timing Summary

Phase	A	C	D	E
Phase Change Time (sec)	0	57	73	88
Green Time (sec)	49	10	9	6
Phase Time (sec)	55	16	15	14
Phase Split	55%	16%	15%	14%













See the Timing Analysis 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, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

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

MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: AM TURN BAN)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	72	2.0	76	2.0	0.918	42.8	LOS D	36.8	268.0	0.89	0.97	1.10	36.3
2	T1	614	5.0	646	5.0	*0.918	37.2	LOS D	36.8	268.0	0.89	0.97	1.10	37.0
3	R2	66	2.0	69	2.0	0.632	59.6	LOS E	3.6	25.8	1.00	0.80	1.11	29.8
Approach		752	4.4	792	4.4	0.918	39.7	LOS D	36.8	268.0	0.90	0.96	1.10	36.2
East: Doonside Sreet														
4	L2	109	2.0	115	2.0	0.899	65.3	LOS E	8.2	58.7	0.99	1.03	1.54	28.8
5	T1	30	2.0	32	2.0	0.899	59.7	LOS E	8.2	58.7	0.99	1.03	1.54	29.2
6	R2	139	2.0	146	2.0	*0.903	65.9	LOS E	8.3	59.1	0.99	1.01	1.56	28.3
Approach		278	2.0	293	2.0	0.903	65.0	LOS E	8.3	59.1	0.99	1.02	1.55	28.6
North: Burnley Street														
7	L2	89	2.0	94	2.0	0.905	39.5	LOS D	34.2	248.9	0.86	0.92	1.04	37.5
8	T1	588	5.0	619	5.0	0.905	33.9	LOS C	34.2	248.9	0.86	0.92	1.04	38.2
9	R2	105	2.0	111	2.0	*0.862	64.7	LOS E	6.2	43.8	1.00	0.94	1.46	28.5
Approach		782	4.3	823	4.3	0.905	38.7	LOS D	34.2	248.9	0.88	0.92	1.10	36.5
West: Buckingham St														
10	L2	122	2.0	128	2.0	0.934	71.8	LOS E	11.5	81.9	1.00	1.09	1.59	27.3
11	T1	25	2.0	26	2.0	*0.934	66.3	LOS E	11.5	81.9	1.00	1.09	1.59	27.7
12	R2	33	2.0	35	2.0	0.934	71.8	LOS E	11.5	81.9	1.00	1.09	1.59	27.3
Approach		180	2.0	189	2.0	0.934	71.0	LOS E	11.5	81.9	1.00	1.09	1.59	27.4
All Vehicles		1992	3.8	2097	3.8	0.934	45.7	LOS D	36.8	268.0	0.91	0.97	1.21	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												
P3	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02

West: Buckingham St												
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02	
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP30102\07-Analysis\SIDRA\G30102-01-20211202.sip9

PHASING SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: AM TURN BAN)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D, E

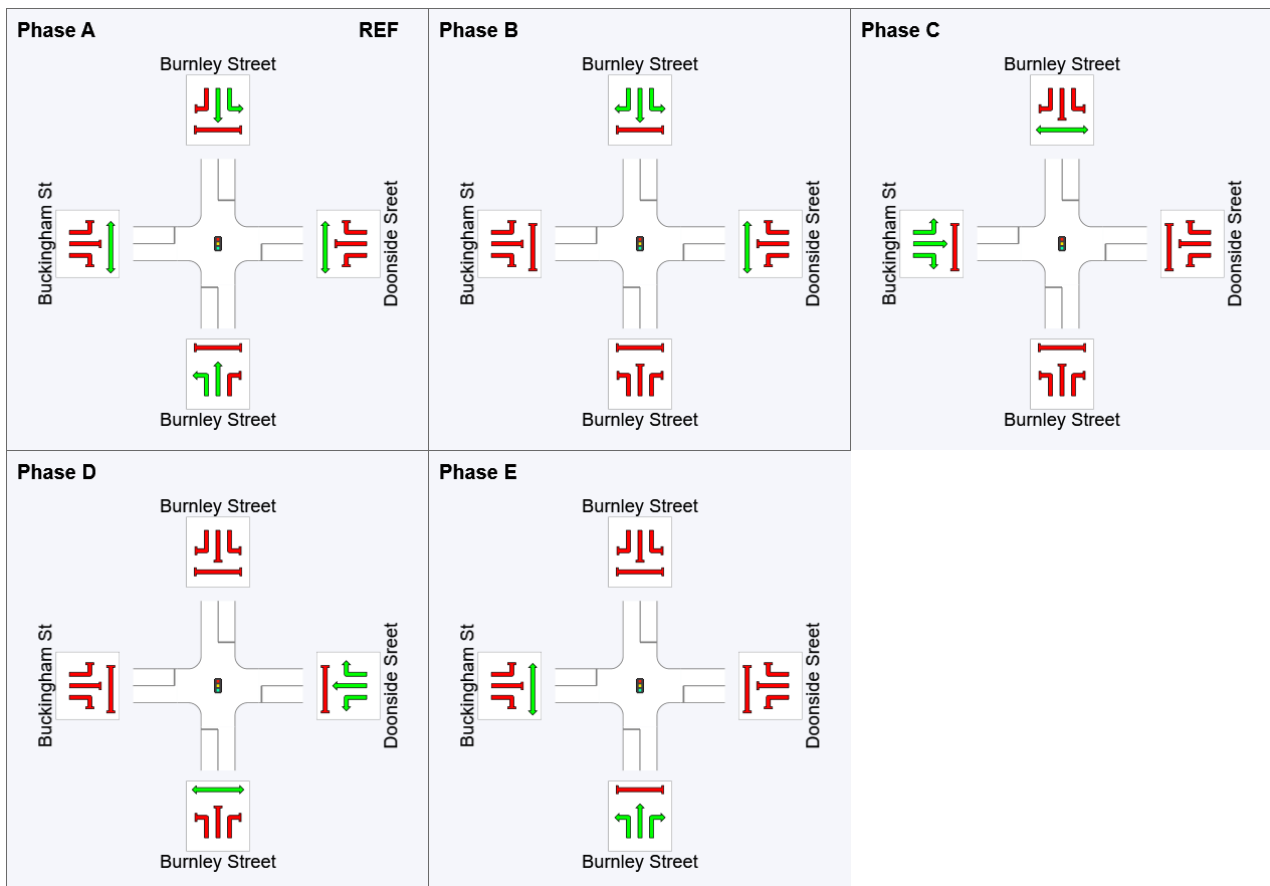
Output Phase Sequence: A, B, C, D, E

Phase Timing Summary

Phase	A	B	C	D	E
Phase Change Time (sec)	0	39	52	69	88
Green Time (sec)	33	7	11	13	6
Phase Time (sec)	39	13	17	19	12
Phase Split	39%	13%	17%	19%	12%













See the Timing Analysis 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, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

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

MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: FILTERED FROM THE SOUTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	18	2.0	19	2.0	0.678	20.8	LOS C	14.4	105.1	0.60	0.54	0.60	46.7
2	T1	486	5.0	512	5.0	*0.678	15.3	LOS B	14.4	105.1	0.60	0.54	0.60	47.8
3	R2	53	2.0	56	2.0	0.239	32.9	LOS C	2.1	14.7	0.76	0.75	0.76	38.1
Approach		557	4.6	586	4.6	0.678	17.1	LOS B	14.4	105.1	0.62	0.56	0.62	46.6
East: Doonside Sreet														
4	L2	77	2.0	81	2.0	0.717	57.1	LOS E	5.0	35.9	1.00	0.85	1.18	30.8
5	T1	17	2.0	18	2.0	*0.717	51.5	LOS D	5.0	35.9	1.00	0.85	1.18	31.2
6	R2	90	2.0	95	2.0	0.678	56.4	LOS E	4.8	34.1	1.00	0.83	1.14	30.6
Approach		184	2.0	194	2.0	0.717	56.3	LOS E	5.0	35.9	1.00	0.84	1.16	30.7
North: Burnley Street														
7	L2	71	2.0	75	2.0	0.661	13.5	LOS B	14.8	108.0	0.45	0.44	0.45	51.3
8	T1	630	5.0	663	5.0	0.661	7.9	LOS A	14.8	108.0	0.45	0.44	0.45	52.6
9	R2	28	2.0	29	2.0	*0.268	57.2	LOS E	1.5	10.5	0.99	0.72	0.99	30.2
Approach		729	4.6	767	4.6	0.661	10.4	LOS B	14.8	108.0	0.47	0.45	0.47	51.1
West: Buckingham St														
10	L2	81	2.0	85	2.0	0.695	54.3	LOS D	7.7	54.7	1.00	0.85	1.10	31.4
11	T1	17	2.0	18	2.0	*0.695	48.7	LOS D	7.7	54.7	1.00	0.85	1.10	31.9
12	R2	48	2.0	51	2.0	0.695	54.2	LOS D	7.7	54.7	1.00	0.85	1.10	31.3
Approach		146	2.0	154	2.0	0.695	53.6	LOS D	7.7	54.7	1.00	0.85	1.10	31.4
All Vehicles		1616	4.1	1701	4.1	0.717	21.8	LOS C	14.8	108.0	0.63	0.57	0.66	43.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												

P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Buckingham St											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
 Pedestrian movement LOS values are based on average delay per pedestrian movement.
 Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: FILTERED FROM THE SOUTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

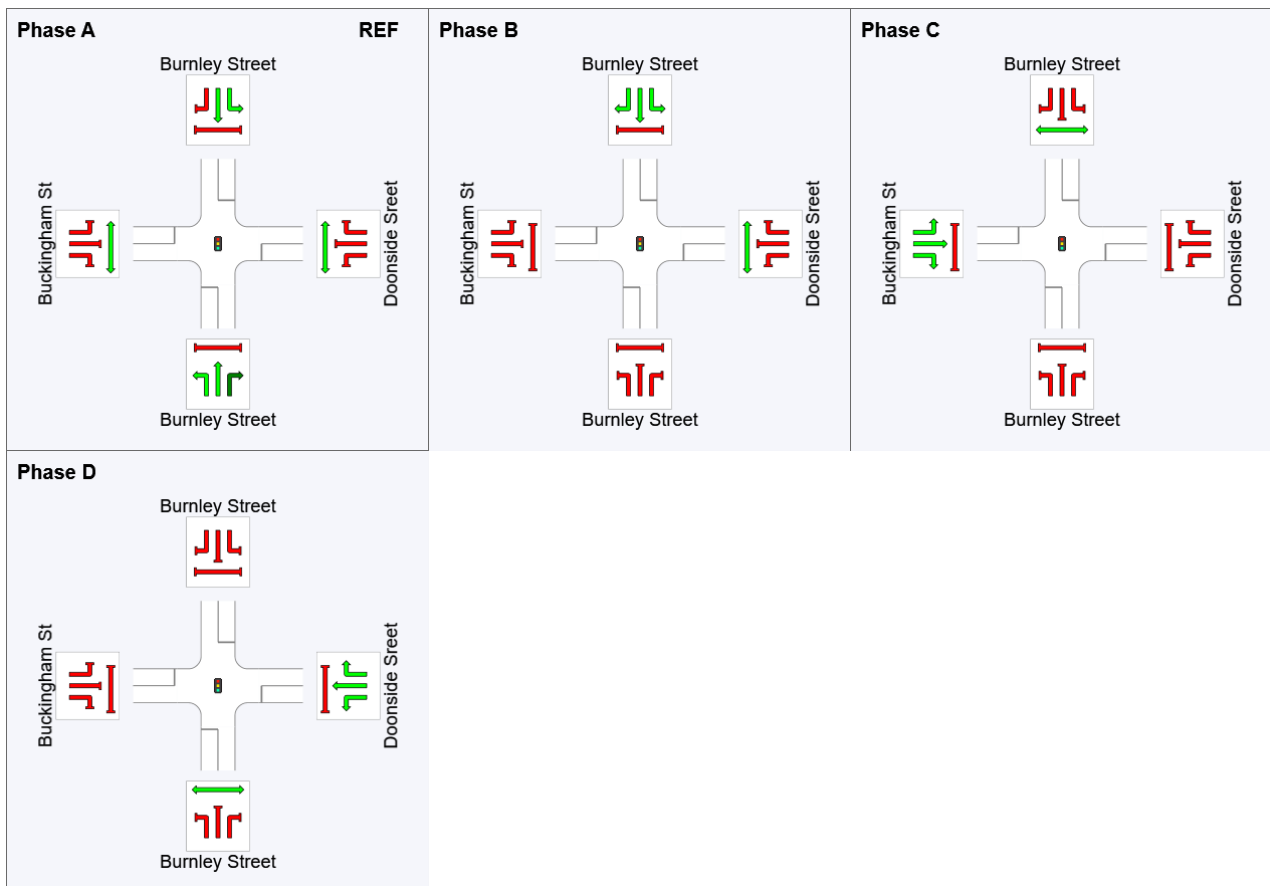
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	55	67	85
Green Time (sec)	49	6	12	9
Phase Time (sec)	55	12	18	15
Phase Split	55%	12%	18%	15%

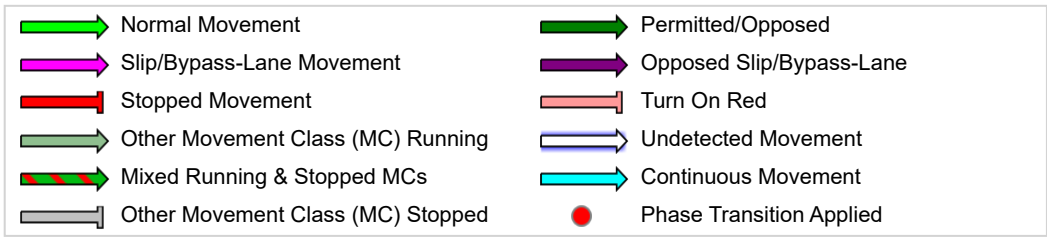
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: FILTERED FROM THE SOUTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	72	2.0	76	2.0	0.979	63.5	LOS E	44.1	321.2	0.86	1.12	1.30	30.1
2	T1	614	5.0	646	5.0	*0.979	58.0	LOS E	44.1	321.2	0.86	1.12	1.30	30.6
3	R2	66	2.0	69	2.0	0.302	36.6	LOS D	2.8	19.6	0.82	0.77	0.82	36.7
Approach		752	4.4	792	4.4	0.979	56.6	LOS E	44.1	321.2	0.86	1.09	1.26	31.0
East: Doonside Sreet														
4	L2	109	2.0	115	2.0	0.979	87.0	LOS F	9.8	69.5	1.00	1.16	1.87	24.6
5	T1	30	2.0	32	2.0	0.979	81.4	LOS F	9.8	69.5	1.00	1.16	1.87	24.9
6	R2	139	2.0	146	2.0	*0.982	88.7	LOS F	9.9	70.3	1.00	1.14	1.89	24.1
Approach		278	2.0	293	2.0	0.982	87.2	LOS F	9.9	70.3	1.00	1.15	1.88	24.4
North: Burnley Street														
7	L2	89	2.0	94	2.0	0.714	15.0	LOS B	15.9	115.6	0.50	0.49	0.50	50.1
8	T1	588	5.0	619	5.0	0.714	9.4	LOS A	15.9	115.6	0.50	0.49	0.50	51.4
9	R2	105	2.0	111	2.0	*0.862	64.7	LOS E	6.2	43.8	1.00	0.94	1.46	28.5
Approach		782	4.3	823	4.3	0.862	17.5	LOS B	15.9	115.6	0.57	0.55	0.63	46.3
West: Buckingham St														
10	L2	122	2.0	128	2.0	0.934	71.8	LOS E	11.5	81.9	1.00	1.09	1.59	27.3
11	T1	25	2.0	26	2.0	*0.934	66.3	LOS E	11.5	81.9	1.00	1.09	1.59	27.7
12	R2	33	2.0	35	2.0	0.934	71.8	LOS E	11.5	81.9	1.00	1.09	1.59	27.3
Approach		180	2.0	189	2.0	0.934	71.0	LOS E	11.5	81.9	1.00	1.09	1.59	27.4
All Vehicles		1992	3.8	2097	3.8	0.982	46.8	LOS D	44.1	321.2	0.78	0.89	1.13	33.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												

P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Buckingham St											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP30102\07-Analysis\SIDRA\G30102-01-20211202.sip9

PHASING SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: FILTERED FROM THE SOUTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

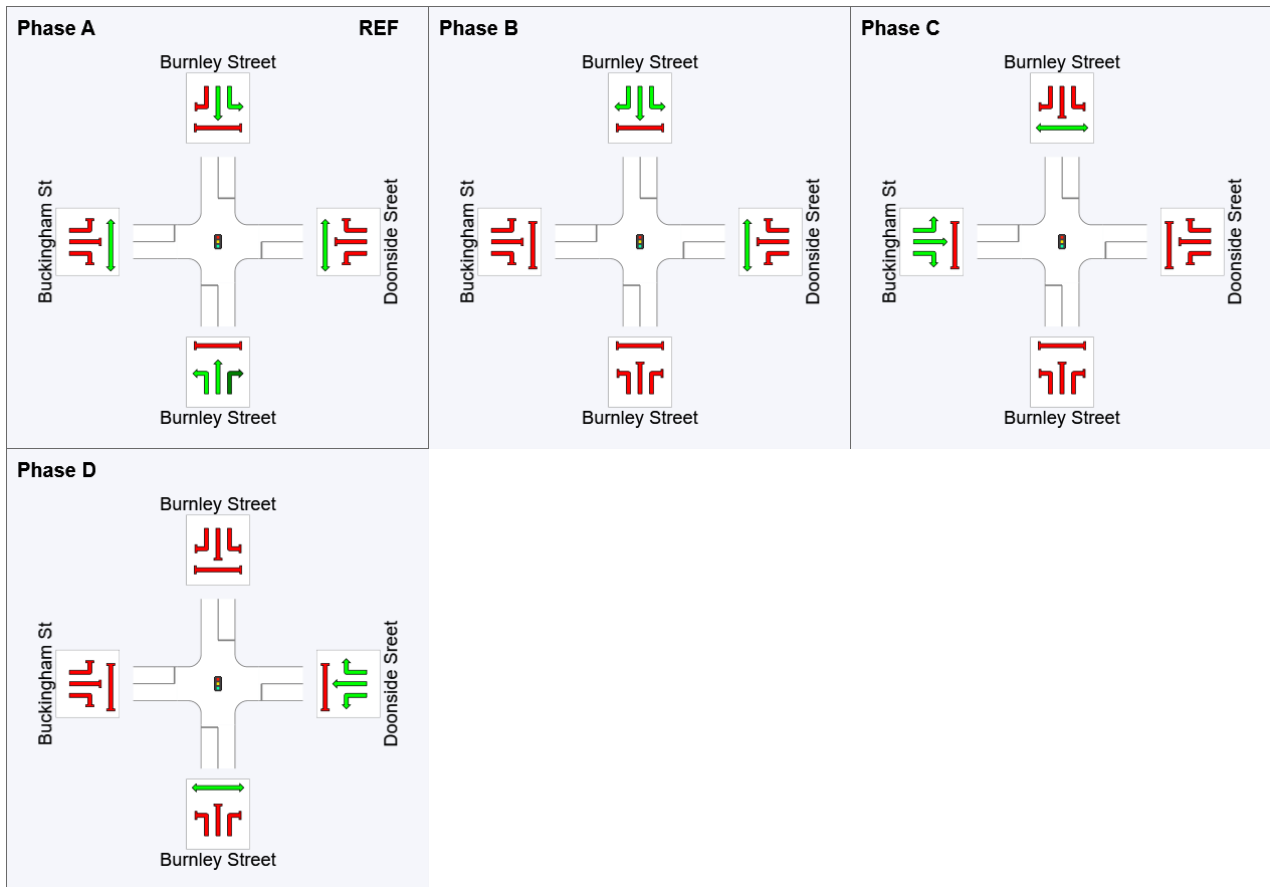
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	52	65	82
Green Time (sec)	46	7	11	12
Phase Time (sec)	52	13	17	18
Phase Split	52%	13%	17%	18%









See the Timing Analysis 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, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

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

MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: FILTERED FROM THE NORTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	18	2.0	19	2.0	0.446	10.8	LOS B	6.8	49.4	0.29	0.27	0.29	53.6
2	T1	486	5.0	512	5.0	0.446	5.2	LOS A	6.8	49.4	0.29	0.27	0.29	55.1
3	R2	53	2.0	56	2.0	* 0.508	58.5	LOS E	2.8	20.3	1.00	0.75	1.01	30.1
Approach		557	4.6	586	4.6	0.508	10.5	LOS B	6.8	49.4	0.35	0.32	0.35	51.0
East: Doonside Sreet														
4	L2	77	2.0	81	2.0	0.717	57.1	LOS E	5.0	35.9	1.00	0.85	1.18	30.8
5	T1	17	2.0	18	2.0	* 0.717	51.5	LOS D	5.0	35.9	1.00	0.85	1.18	31.2
6	R2	90	2.0	95	2.0	0.678	56.4	LOS E	4.8	34.1	1.00	0.83	1.14	30.6
Approach		184	2.0	194	2.0	0.717	56.3	LOS E	5.0	35.9	1.00	0.84	1.16	30.7
North: Burnley Street														
7	L2	71	2.0	75	2.0	0.798	23.2	LOS C	25.3	184.5	0.74	0.70	0.76	45.1
8	T1	630	5.0	663	5.0	* 0.798	17.6	LOS B	25.3	184.5	0.74	0.70	0.76	46.2
9	R2	28	2.0	29	2.0	0.068	18.9	LOS B	0.7	5.2	0.53	0.69	0.53	44.3
Approach		729	4.6	767	4.6	0.798	18.2	LOS B	25.3	184.5	0.73	0.70	0.75	46.0
West: Buckingham St														
10	L2	81	2.0	85	2.0	0.835	60.8	LOS E	8.3	59.2	1.00	0.95	1.33	29.7
11	T1	17	2.0	18	2.0	* 0.835	55.3	LOS E	8.3	59.2	1.00	0.95	1.33	30.2
12	R2	48	2.0	51	2.0	0.835	60.8	LOS E	8.3	59.2	1.00	0.95	1.33	29.7
Approach		146	2.0	154	2.0	0.835	60.2	LOS E	8.3	59.2	1.00	0.95	1.33	29.8
All Vehicles		1616	4.1	1701	4.1	0.835	23.7	LOS C	25.3	184.5	0.66	0.61	0.71	42.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												

P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Buckingham St											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP30102\07-Analysis\SIDRA\G30102-01-20211202.sip9

PHASING SUMMARY

Site: 101 [Burnley/Doonside - AM (Site Folder: FILTERED FROM THE NORTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, C, D, E

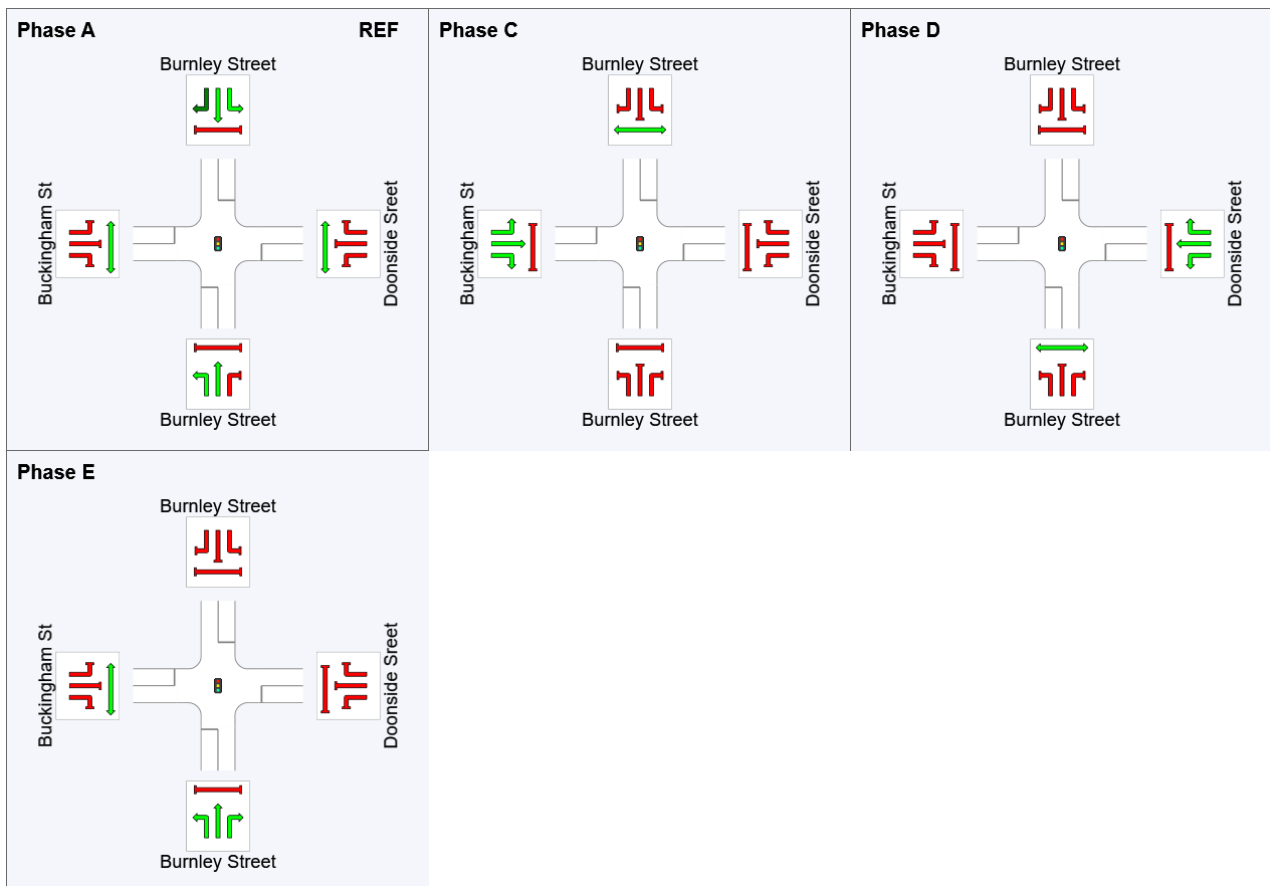
Output Phase Sequence: A, C, D, E

Phase Timing Summary

Phase	A	C	D	E
Phase Change Time (sec)	0	57	73	88
Green Time (sec)	51	10	9	6
Phase Time (sec)	57	16	15	12
Phase Split	57%	16%	15%	12%

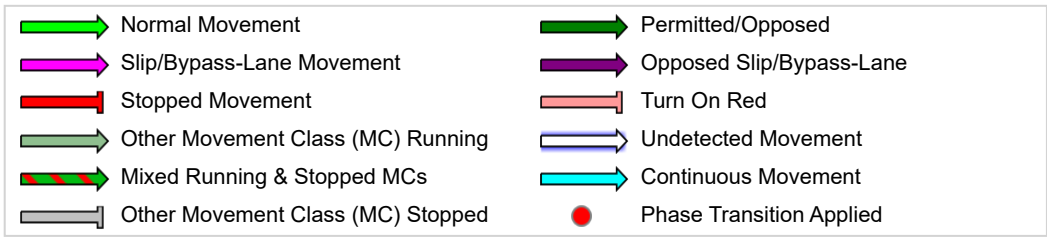
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: FILTERED FROM THE NORTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] m				
South: Burnley Street														
1	L2	72	2.0	76	2.0	0.670	12.7	LOS B	13.3	97.0	0.41	0.41	0.41	51.8
2	T1	614	5.0	646	5.0	0.670	7.2	LOS A	13.3	97.0	0.41	0.41	0.41	53.2
3	R2	66	2.0	69	2.0	* 0.632	59.6	LOS E	3.6	25.8	1.00	0.80	1.11	29.8
Approach		752	4.4	792	4.4	0.670	12.3	LOS B	13.3	97.0	0.47	0.45	0.48	49.7
East: Doonside Sreet														
4	L2	109	2.0	115	2.0	0.547	49.4	LOS D	6.8	48.7	0.97	0.80	0.97	33.0
5	T1	30	2.0	32	2.0	0.547	43.8	LOS D	6.8	48.7	0.97	0.80	0.97	33.5
6	R2	139	2.0	146	2.0	* 0.888	65.6	LOS E	8.3	59.1	1.00	0.98	1.48	28.4
Approach		278	2.0	293	2.0	0.888	56.9	LOS E	8.3	59.1	0.99	0.89	1.23	30.6
North: Burnley Street														
7	L2	89	2.0	94	2.0	0.939	45.1	LOS D	34.8	253.0	0.75	0.91	1.03	35.4
8	T1	588	5.0	619	5.0	* 0.939	39.6	LOS D	34.8	253.0	0.75	0.91	1.03	36.1
9	R2	105	2.0	111	2.0	0.349	23.5	LOS C	3.5	24.8	0.66	0.76	0.66	42.0
Approach		782	4.3	823	4.3	0.939	38.0	LOS D	34.8	253.0	0.74	0.89	0.98	36.7
West: Buckingham St														
10	L2	122	2.0	128	2.0	0.934	71.8	LOS E	11.5	81.9	1.00	1.09	1.59	27.3
11	T1	25	2.0	26	2.0	* 0.934	66.3	LOS E	11.5	81.9	1.00	1.09	1.59	27.7
12	R2	33	2.0	35	2.0	0.934	71.8	LOS E	11.5	81.9	1.00	1.09	1.59	27.3
Approach		180	2.0	189	2.0	0.934	71.0	LOS E	11.5	81.9	1.00	1.09	1.59	27.4
All Vehicles		1992	3.8	2097	3.8	0.939	33.9	LOS C	34.8	253.0	0.69	0.74	0.88	38.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[Ped ped	Dist] m					
South: Burnley Street												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
East: Doonside Sreet												
P2	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
North: Burnley Street												

P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Buckingham St											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	204.7	208.6	1.02
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	206.6	211.1	1.02

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP30102\07-Analysis\SIDRA\G30102-01-20211202.sip9

PHASING SUMMARY

Site: 101 [Burnley/Doonside - PM (Site Folder: FILTERED FROM THE NORTH)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

Input Phase Sequence: A, C, D, E

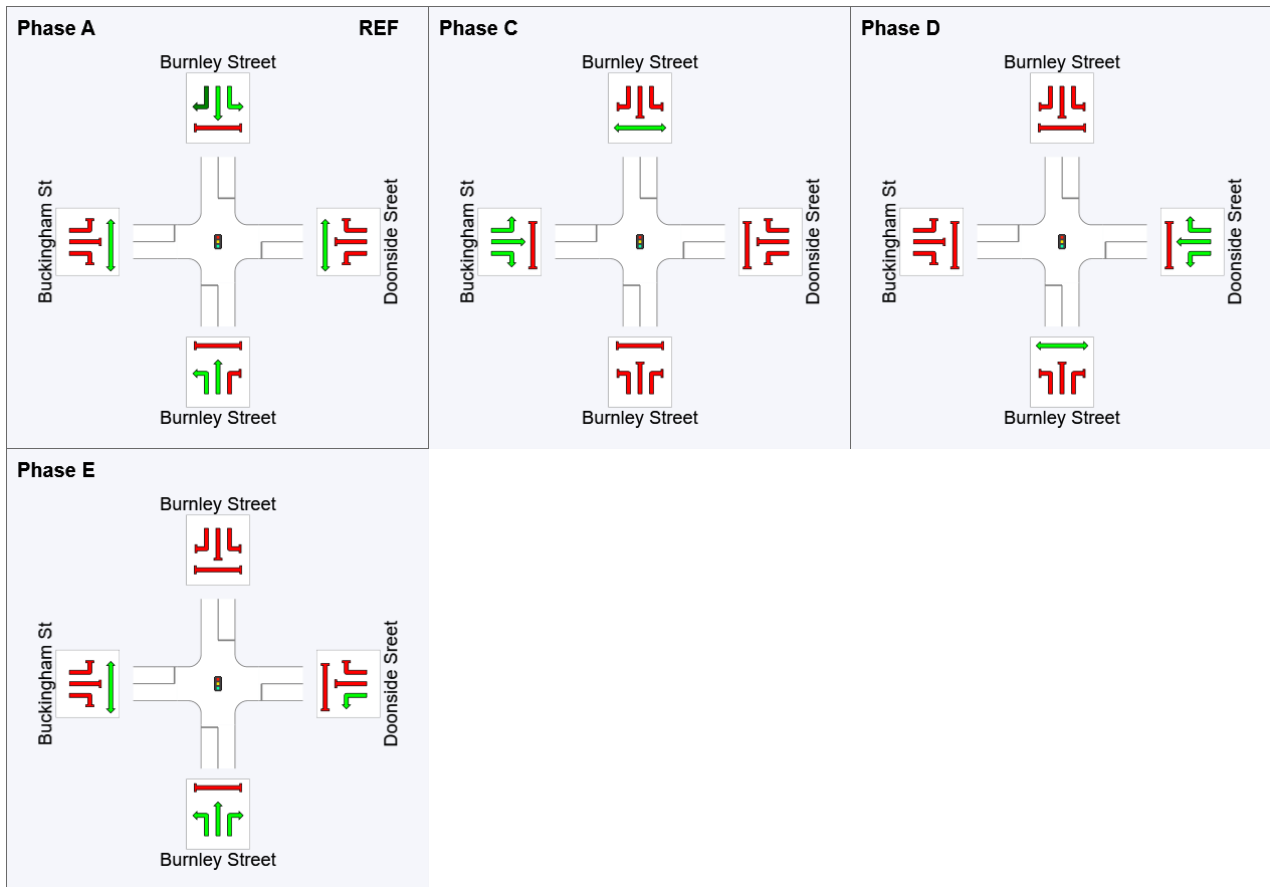
Output Phase Sequence: A, C, D, E

Phase Timing Summary

Phase	A	C	D	E
Phase Change Time (sec)	0	56	73	88
Green Time (sec)	50	11	9	6
Phase Time (sec)	56	17	15	12
Phase Split	56%	17%	15%	12%









See the Timing Analysis 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, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

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