Clayton Business Park

Industrial Estate Development

Transport Impact Assessment

29/08/2023

Ref: 300303832

PREPARED FOR:

Goodman

PREPARED BY:

Stantec Australia

Stantec

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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Contents

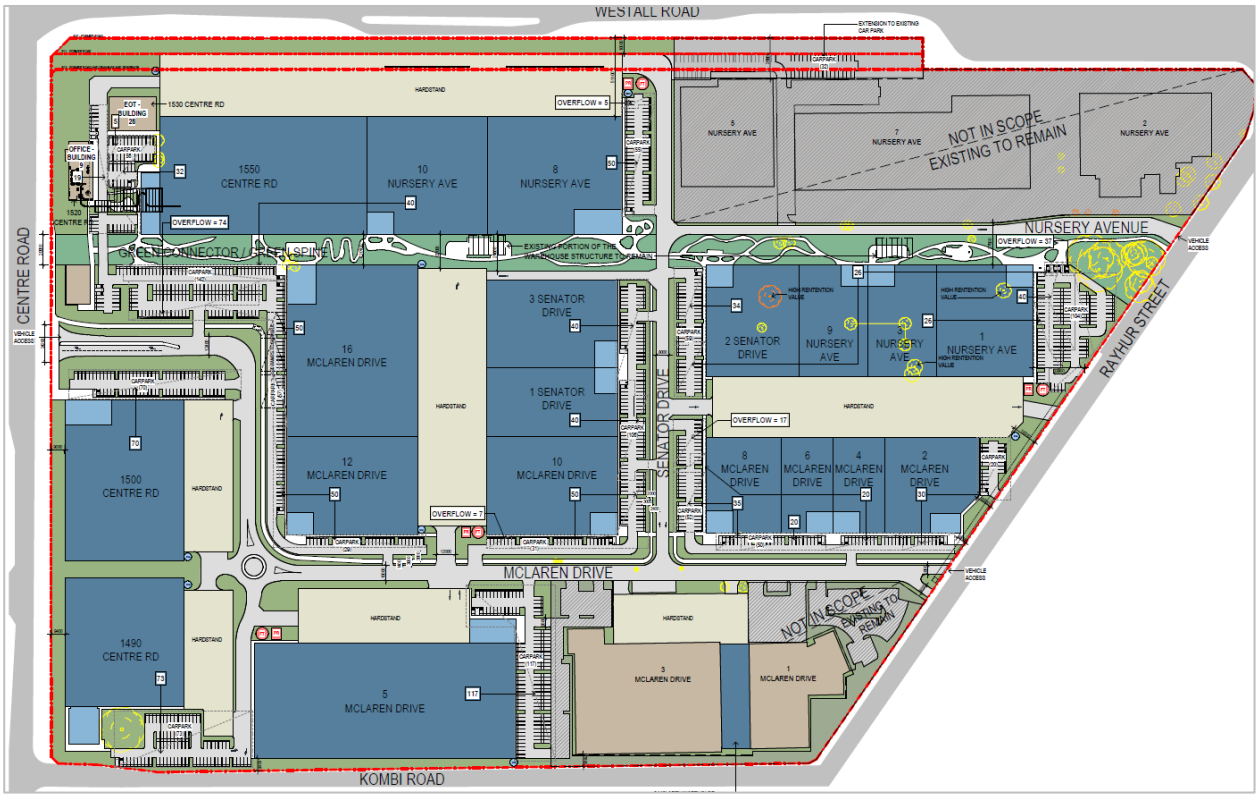
Contents

1. Introduction

1.1 Background & Proposal

A planning permit is being sought for an industrial estate on the Clayton Business Park site located at 1486-1550 Centre Road, Clayton South. The industrial estate with a site area of 252,882sqm comprises 19 tenancies of varying size which will deliver 116,437sqm building gross floor area (85,475sqm of building net floor area). The proposed industrial estate site plan is presented at Figure 1.1.

Figure 1.1: Proposed Industrial Estate Site Plan (North to the Left of the Plan)



The tenancies will be served by the existing internal road network within the Clayton Business Park comprising McLaren Drive and Nursery Avenue. McLaren Drive will be diverted to the east of its current location and will connect to Centre Road. The diverted McLaren Drive will form a signalised intersection with Centre Road and the central vehicle access to the Bosch site located on the north side of Centre Road. This intersection has been subject to correspondence with Department of Transport and Planning (DTP).

Senator Drive (an internal east-west road link) will provide a connection between McLaren Drive and Nursery Avenue.

Nursery Avenue presently permits two-way vehicle movements. As part of the development, it is proposed to alter this arrangement to limit vehicle movements to one-way northbound.

Stantec has been engaged by Goodman to undertake a Transport Impact Assessment of the proposed industrial estate.

1.2 Purpose & Structure of this Report

The report sets out an assessment of the transport impacts of the proposed development and how they are being addressed, including consideration of the following:

- The existing transport conditions in the vicinity of the subject site.
- Any transport or planning policy relevant to the subject site.

- The existing and planned public and active transport facilities and services in the vicinity of the subject site.
- The impacts of the proposed development traffic on the performance of the existing and planned road network.
- The vehicle access strategy for the proposed development.
- The adequacy of the car parking provision and layout.
- The adequacy of the proposed arrangements for loading and waste collection.

1.3 References

In preparing this report, reference has been made to the following:

- Kingston Planning Scheme.
- Site Plan for the industrial estate (plan no. A1001-G) prepared by Group GSA, dated 21 July 2023.
- Intersection Diagnostics Monitor (IDM) and traffic volume data for the Westall Road/Centre Road and Centre Road/McNaughton Road/Kombi Road signalised intersection obtained from the Department of Transport and Planning (DTP).
- Austroads Guide to Road Design Part 3 (Geometric Design), Part 4 (Intersections and Crossings: General) and Part 4A (Unsignalised and Signalised Intersections).
- Roads and Transit Authority New South Wales 'Guide to Traffic Generating Developments' dated October 2002.
- Roads and Maritime Services New South Wales 'Guide to Traffic Generating Developments – Updated Traffic Surveys' dated August 2013.
- Traffic surveys commissioned by Stantec at various locations in the vicinity of the subject site.
- Other documents as nominated.

2. Existing Conditions

2.1 Location

The subject site is the Clayton Business Park located at 1486-1550 Centre Road, in Clayton South. The subject site has northern frontage to Centre Road, an eastern frontage to Westall Road, a southern frontage to Rayhur Street and a western frontage to Kombi Road. The surrounding properties include a mix of residential and industrial land uses with the site itself being in an Industrial 1 Zone (IN1Z). The location of the subject site and the land use zoning are shown at Figure 2.1 and Figure 2.2.

Figure 2.1: Subject Site Location

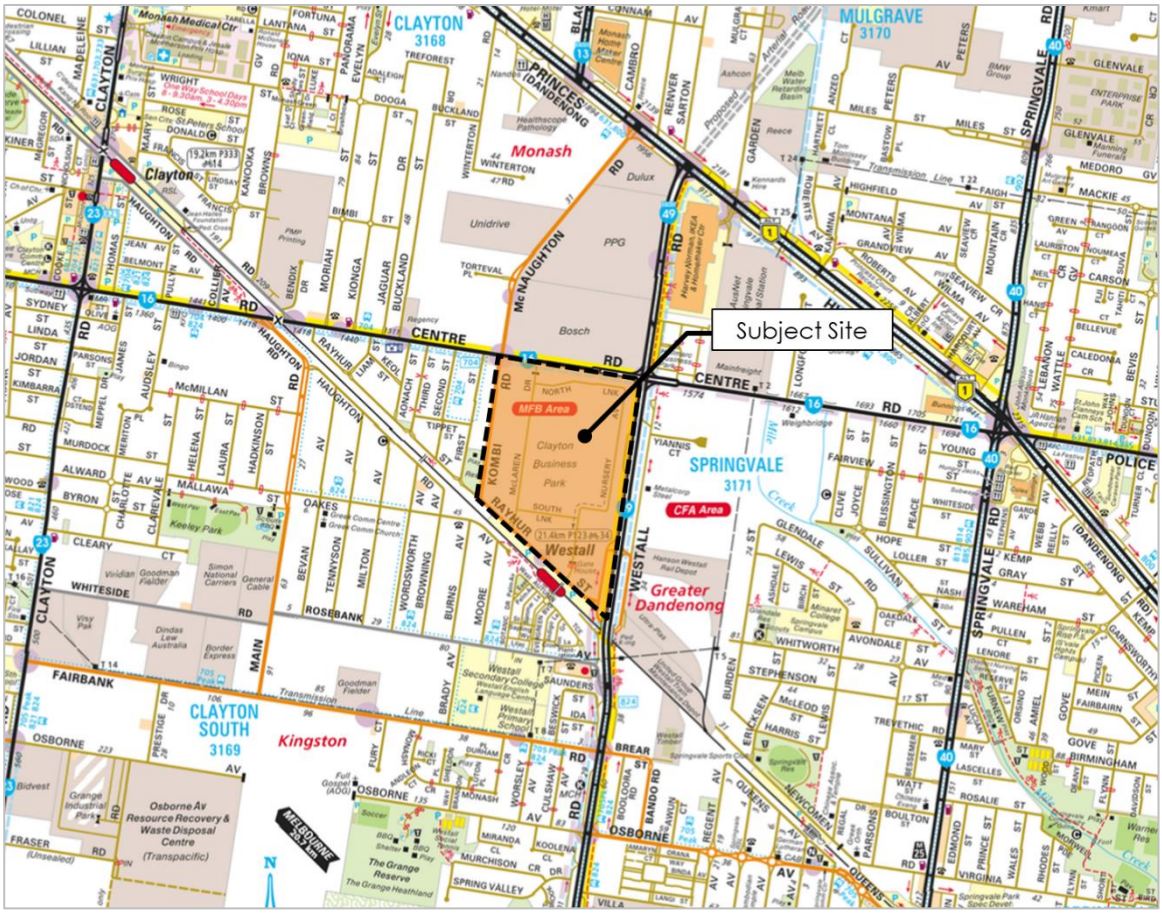
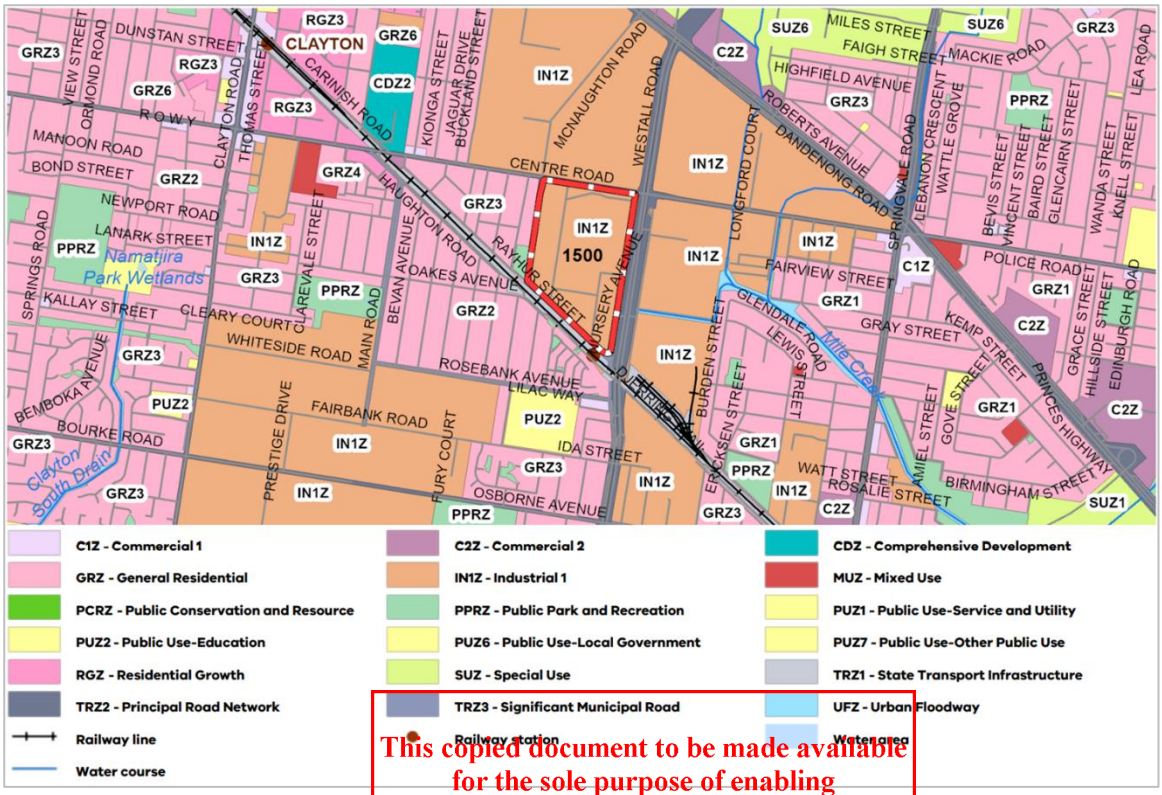


Figure 2.2: Land Use Zoning Map



2.2 Road Network

2.2.1 Centre Road

The section of Centre Road adjacent to the subject site is an arterial road managed by Department of Transport and Planning (DTP). It is a two-way road, typically with two-lanes in each direction, with an east-west alignment. The road is subject to a 60km/h speed limit. A view looking westbound along Centre Road adjacent to the subject site is presented at Figure 2.3.

Figure 2.3: Centre Road Looking West (Adjacent to Subject Site)

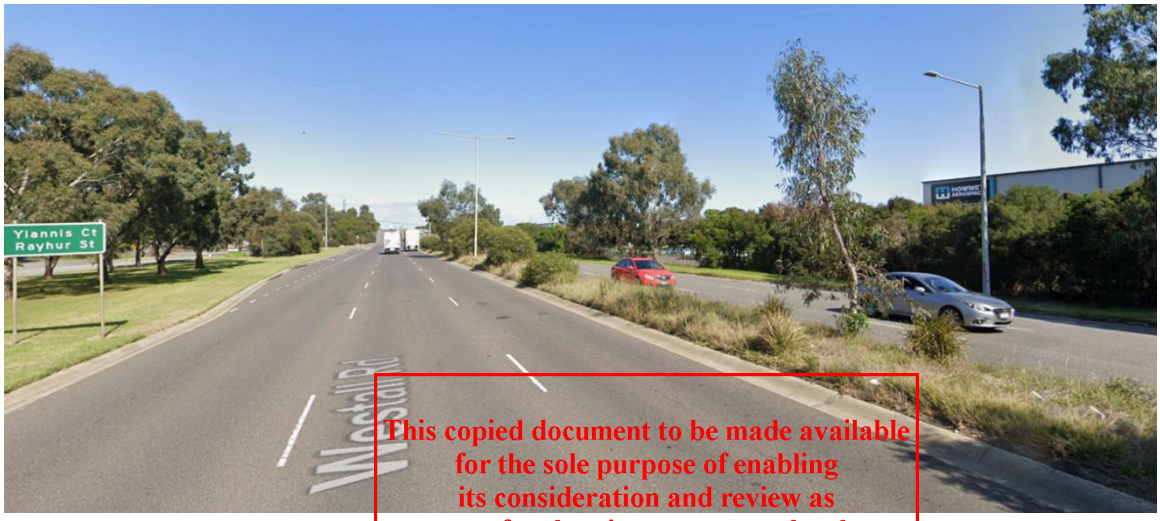
There is a footpath on the north side of the road.

Centre Road forms signalised intersections with Westall Road (at the northeast corner of the subject site) and McNaughton Road and Kombi Road (at the northwest corner of the subject site).

2.2.2 Westall Road

Westall Road is an arterial road managed by DTP. It is a two-way road, typically with three-lanes in each direction (median divided), with a north-south alignment. The road is subject to an 80km/h speed limit. A view looking southbound along Westall Road is presented Figure 2.4.

Figure 2.4: Westall Road Looking South



2.2.3 Rayhur Street

Rayhur Street is a local road managed by Kingston City Council. It is a two-way road, typically with one-lane in each direction, with an east-west alignment. The road is subject to a default 50km/h speed limit. A view looking westbound along Rayhur Street adjacent to the subject site is presented at Figure 2.5.

Figure 2.5: Rayhur Street Looking East (Adjacent to Subject Site)

2.3 Public Transport Network

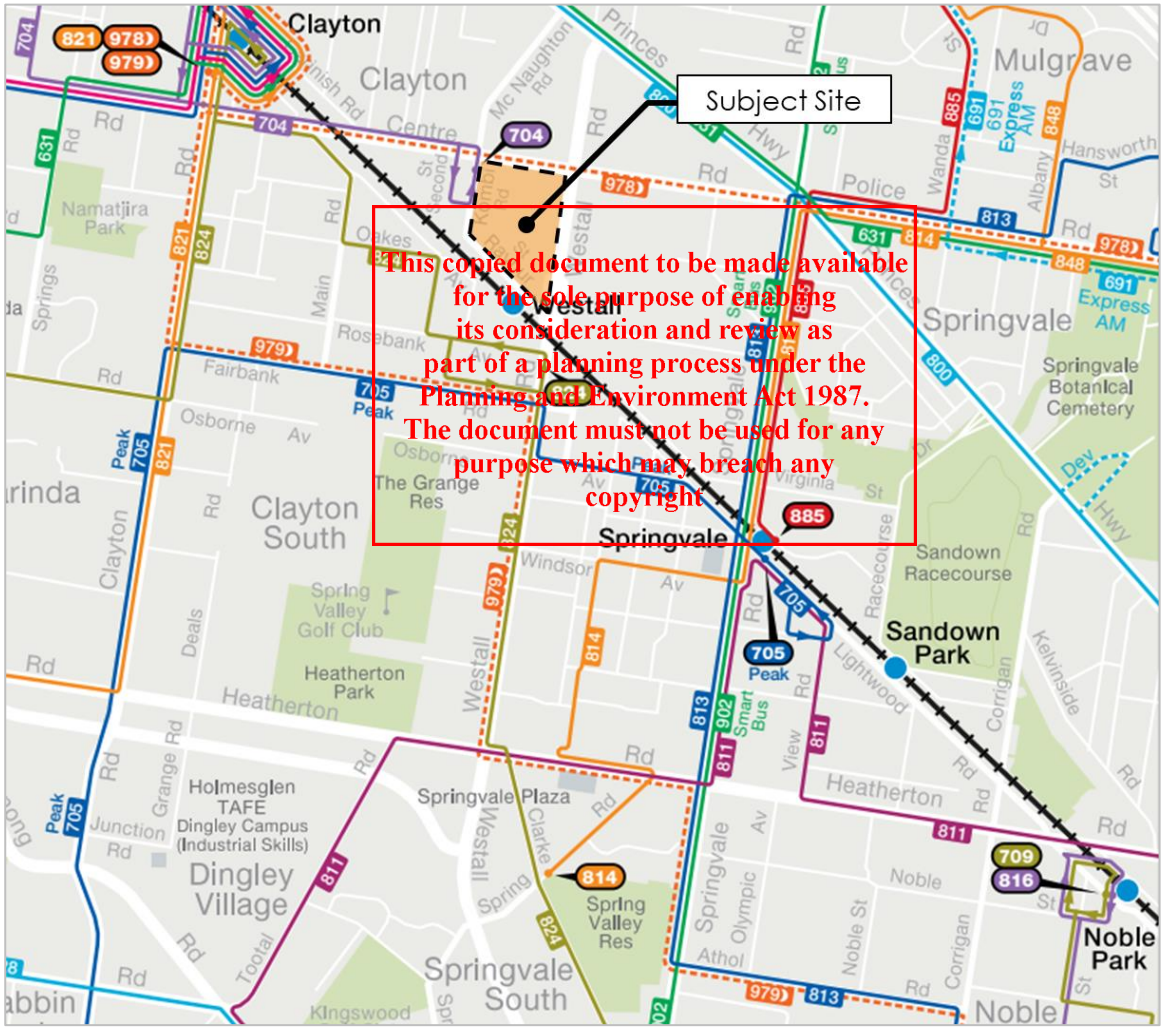
The closest public transport facilities to the subject site are the Westall train station (on the Cranbourne and Pakenham lines), which is immediately south of the subject site, bus route 704 (Oakleigh Station – Westall Station via Clayton) which has stops on Rayhur Street and Centre Road, and bus route 978 (Clayton Station – Dandenong Station via Mulgrave) which has stops on Centre Road.

Clayton train station is located approximately 2km to the northwest of the subject site and is also on the Cranbourne and Pakenham lines. It is served by bus routes 703, 704, 733, 824, 821, 978 and 979. The bus route 704 runs between the Westall and Clayton train stations.

The subject site has a Transit Score[1] of 64 (out of 100) which is indicative of 'good transit' where there are 'many nearby public transportation options'.

Figure 2.6 presents the public transport services most proximate to the subject site.

Figure 2.6: Public Transport Services in Vicinity of Subject Site



[1] Obtained from the Walk Score website. Transit Score is a *"…patented measure of how well a location is served by public transit. Transit Score is based on data released in a standard format by public transit agencies." A "usefulness" value is assigned to "…nearby transit routes based on the frequency, type of route (rail, bus, etc.), and distance to the nearest stop on the route. The "usefulness" of all nearby routes is summed and normalized to a score between 0 – 100."*

2.4 Active Transport

Active transport facilities in the vicinity of the subject site presently comprise the following:

- A footpath on the northern side of Centre Road.
- A footpath on the western side of the Westall Road Service Road.
- Controlled pedestrian crossing facilities at the Westall Road/Centre Road and Centre Road/McNaughton Road/Kombi Road signalised intersections.
- Pedestrian operated signals on Rayhur Street located to the west of Nursery Avenue.
- An on-street bicycle path located on the Westall Road Service Road southbound. Westall Road is recognised as a Strategic Cycling Corridor (SCC) Main Route (C2).
- The Djerring Trail is a shared path located on the south side of the Cranbourne and Pakenham train line. It is recognised as a SCC Primary Route (C1).

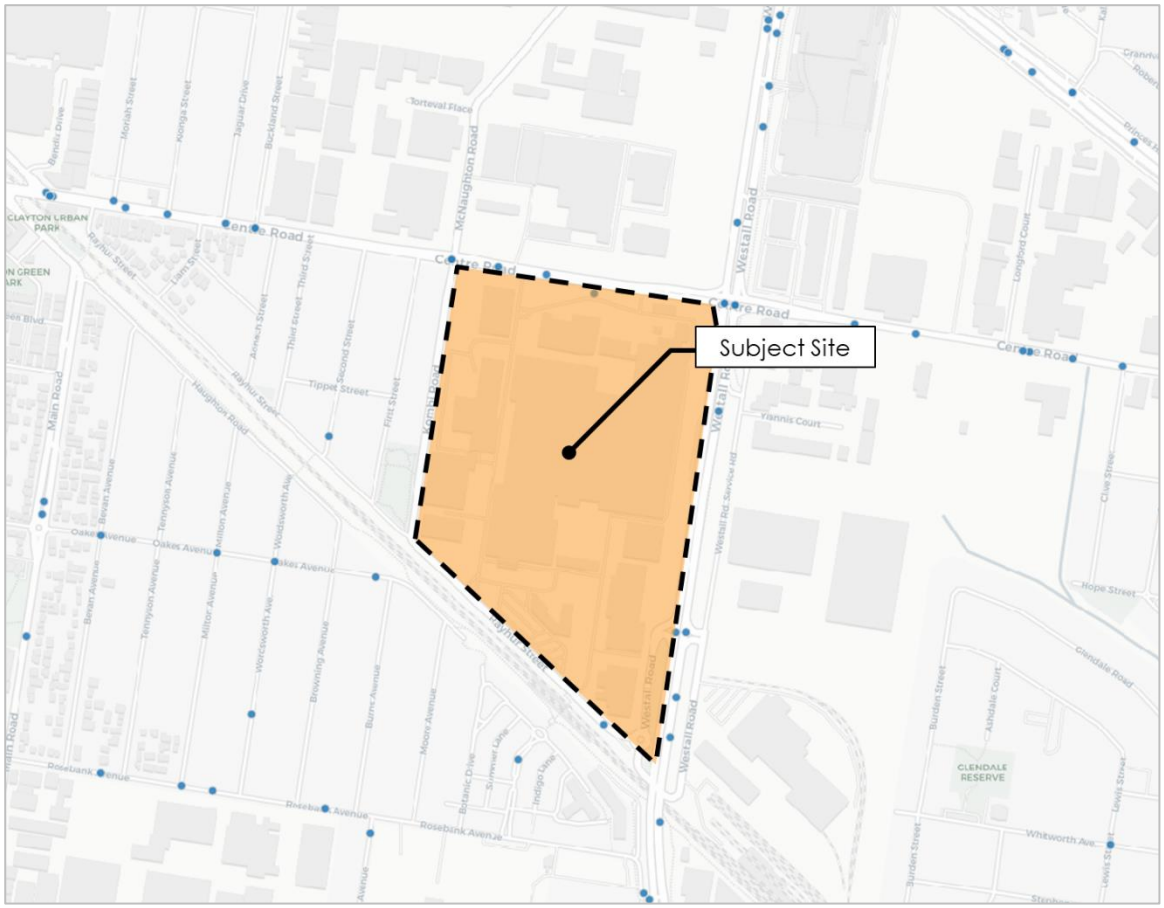
2.5 Road Accident Statistics

A review has been conducted of the DTP (formerly VicRoads) CrashStats database for the last five years of available data for the road network in the vicinity of the subject site. The data suggests the following accidents have occurred on the road network most proximate to the subject site:

- Two serious injury accidents on Centre Road.
- One serious injury accident at the Westall Road/Centre Road signalised intersection.
- Three serious injury accidents on Westall Road.
- One serious injury accident on Rayhur Street.

The road accident locations are presented in Figure 2.7.

Figure 2.7: Road Accident Locations



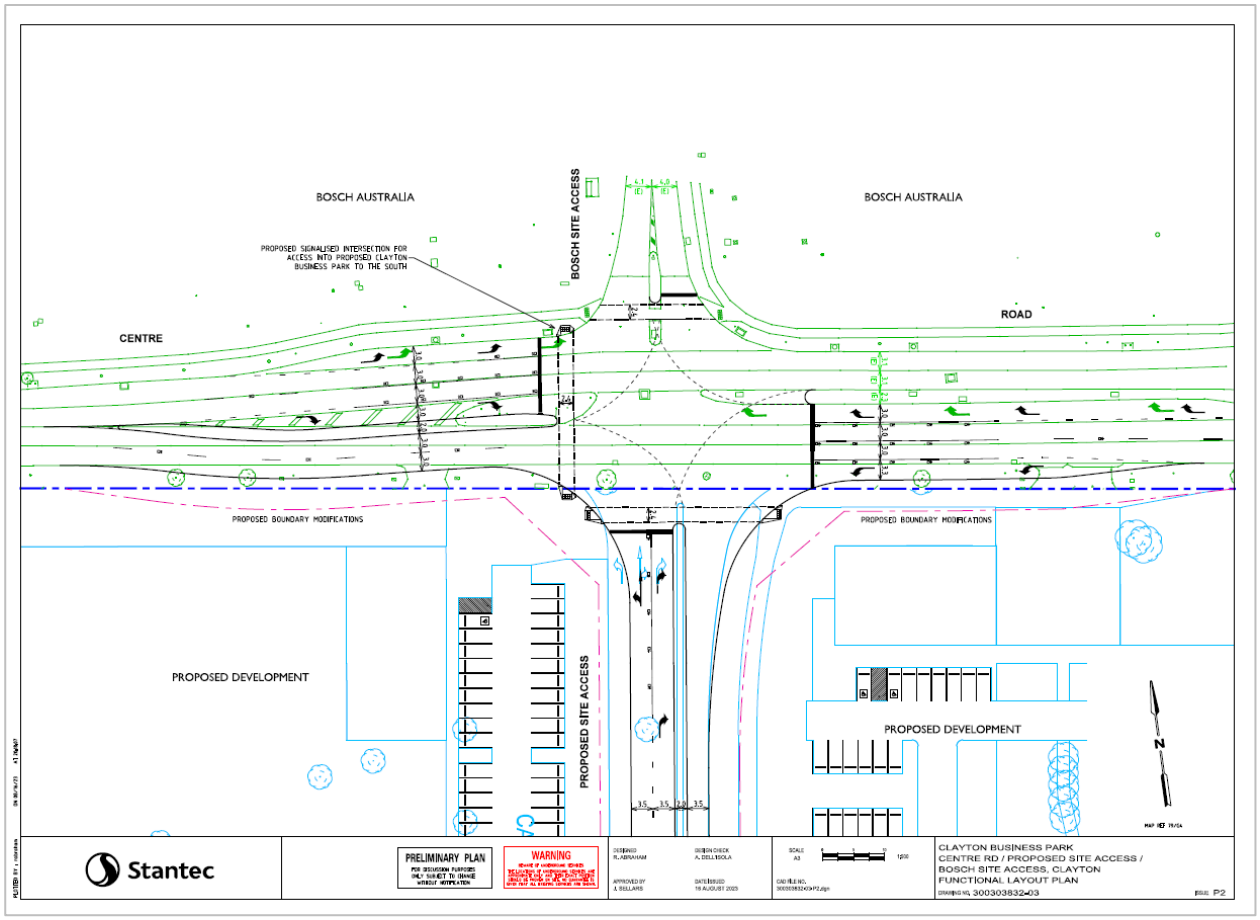
3. Design Considerations

3.1 Proposed Development Vehicle Access

The proposed development will be primarily accessed via a new signalised intersection on Centre Road which will also incorporate the central access to the Bosch site located on the north side of Centre Road. The intersection will be located approximately 190m to the west of the Westall Road/Centre Road signalised intersection and approximately 245m to the east of the Centre Road/McNaughton Road/Kombi Road signalised intersection.

A functional layout plan of the signalised intersection layout has been prepared. The signalised intersection is presented at Figure 3.1 and the detailed plan is contained in Appendix A. Pre-application discussions have been held with DTP regarding the signalised intersection.

Figure 3.1: Centre Road/Proposed Development Site Access Signalised Intersection



The signalised intersection delivers the following layout:

- Separate left and right turn lanes on both Centre Road approaches.
- Two through lanes in both directions on Centre Road.
- A right turn lane and a shared through and left turn lane on the development access road.
- A single lane permitting all movements on the Bosch site access road.

The intersection has been designed to accommodate vehicles of a size up to and including 26m long B-doubles entering and exiting the site access road (McLaren Drive).

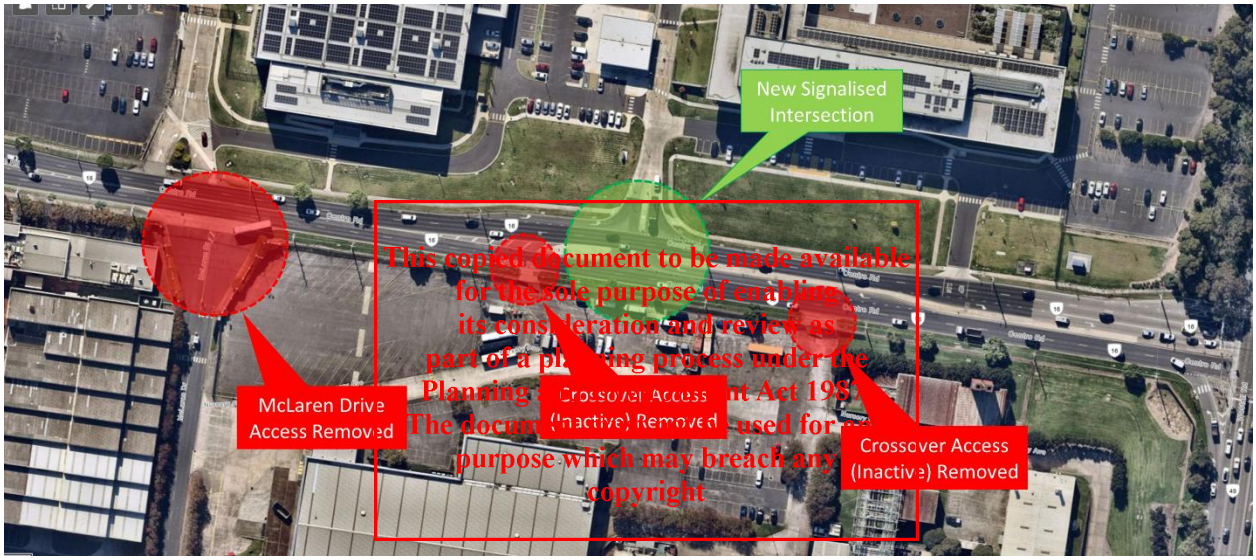
3.2 Vehicle Access Considerations

The primary vehicle access has been planned on Centre Road as it allows the creation of a signalised X-intersection with the Bosch site on the opposite side of the road. There are intersection performance and road safety benefits through the signal control of turning movements. A vehicle access to the proposed development on Centre Road is also consistent with the vehicle access strategy for the current Clayton Business Park that derives access through McLaren Drive.

The site access on Centre Road is preferred to a site access on Westall Road as it is a lower order road in the arterial road network hierarchy and carries materially lower traffic volumes. The site access on Centre Road is also preferred to a site access on Kombi Road on amenity grounds. Kombi Road is a major local road controlled by Kingston City Council that has a sensitive residential interface on its western side.

The proposed vehicle access strategy will result in the diversion of the McLaren Drive access onto Centre Road (to align with the Bosch central site access) and the removal of two other (inactive) crossovers from the Centre Road site frontage. The locations of the proposed signalised intersection and the three accesses to be removed is shown at Figure 3.2.

Figure 3.2: Centre Road Vehicle Access Locations



3.3 Internal Road Layout

The proposed internal road layout for the industrial estate has been planned to accommodate vehicles of a size up to and including 26m long B-doubles. The primary road link (McLaren Drive) will be provided with a minimum carriageway width of 10m within a road reserve width of 22.5m. Senator Drive (proposed east-west road) connecting McLaren Drive and Nursery Avenue will be provided with a carriageway width of 8m within a road reserve width of 21m.

The proposed internal roundabout will be capable of accommodating vehicles of a size up to and including 26m long B-doubles. A concept layout of the proposed roundabout is shown on the swept path plans presented at Appendix B.

The proposed crossovers on the internal road network providing access to the loading hardstand areas of the industrial lots will be capable of accommodating vehicles of a size up to and including 26m long B-doubles. The crossovers providing access to car parking areas will be capable of accommodating opposing car movements.

Footpaths will be provided on one side of the roads within the estate. A shared pedestrian and cyclist path will be provided on one side of McLaren Drive. A separate pedestrian path will be provided along the proposed green connector/green spine.

4. Traffic Considerations

4.1 Introduction

Information provided by the Applicant suggests that the industrial estate will be fully operational by 2027. On this basis, this year has been adopted as the immediate post development year for analysis purposes, with 2037 being the 10-year post development year for analysis purposes.

Consistent with transport modelling guidance contained in the contemporary VicRoads (now DTP) 'Guidelines for Transport Impact Assessment Reports', immediate post development analysis (year 2027) is required for existing and proposed road infrastructure, with a 10-year post development analysis (year 2037) required for the proposed road infrastructure.

The proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection has been assessed as a 'Network' with the Centre Road/Kombi Road/McNaughton Road signalised intersection and the Centre Road/Westall Road signalised intersection using the SIDRA Intersection computer program under year 2027 conditions.

The proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection has been assessed as an isolated intersection under year 2037 conditions.

SIDRA Intersection (version 9) is a computer-based modelling package used to calculate intersection performance. The commonly used measure of intersection performance is referred to as the Degree of Saturation (DOS). DOS's of around 0.95 are typically considered the 'ideal' limit of performance for signalised intersections.

4.2 Existing Traffic Conditions

Weekday AM (7:00am to 9:00am) and PM (4:00pm to 6:00pm) peak period traffic movement surveys were undertaken at the following locations on Thursday 17 November 2022:

- Centre Road/Kombi Road/McNaughton Road signalised intersection.
- Westall Road/Centre Road signalised intersection.
- Rayhur Street/Westall Road Service Road roundabout.

Weekday AM (7:00am to 9:00am) and PM (4:00pm to 6:00pm) peak period traffic movement surveys were undertaken at the following locations on Tuesday 7 June 2022:

- Centre Road/McLaren Drive/Bosch West Site Access intersection.
- Centre Road/Bosch Centre Site Access intersection.

4.3 Base Case Traffic Volumes

The base case for assessment purposes is year 2027. The existing (year 2022) traffic volumes on Centre Road (less the existing traffic generated by the subject site) have been increased using an annual compound growth rate of 1% to derive year 2027 (and year 2037) traffic volumes. The peak hour traffic volumes at the Westall Road/Centre Road signalised intersection for a typical Thursday in November for the years 2014 to 2022 are summarised in Table 4.1. The data suggests that the adopted growth rate of 1% per annum is conservative on the high side.

Table 4.1: Westall Road/Centre Road Signalised Intersection Peak Hour Volumes 2014-2022

Year [1]	AM Peak Hour		PM Peak Hour	
	Total Volume	Growth Rate	Total Volume	Growth Rate
2014	4,760vph	-	5,375vph	-
2015	4,828vph	1.4%	5,394vph	0.4%
2016	4,461vph	-8.2%	5,296vph	-1.9%
2017	4,748vph	6.0%	5,172vph	-2.4%
2018	4,776vph	0.6%	4,972vph	-4.0%
2019	4,799vph	0.5%	5,205vph	4.5%
2021	4,477vph	-7.2%	5,058vph	-2.9%
2022	4,537vph	1.3%	5,179vph	2.3%
2014-2022	**-**	**-4.7%**	**-**	**-3.6%**

[1] Year 2020 excluded due to COVID conditions.

The year 2027 base case traffic volumes at the Centre Road/Kombi Road/McNaughton Road signalised intersection, the Centre Road/Bosch Centre Site Access intersection, the Westall Road/Centre Road signalised intersection and the Rayhur Street/Westall Service Road roundabout are presented in Figure 4.1 and Figure 4.2. These volumes include existing traffic from the subject site that presently uses the McLaren Drive access on Centre Road.

Figure 4.1: Weekday AM Peak Hour – Year 2027 Base Case Traffic

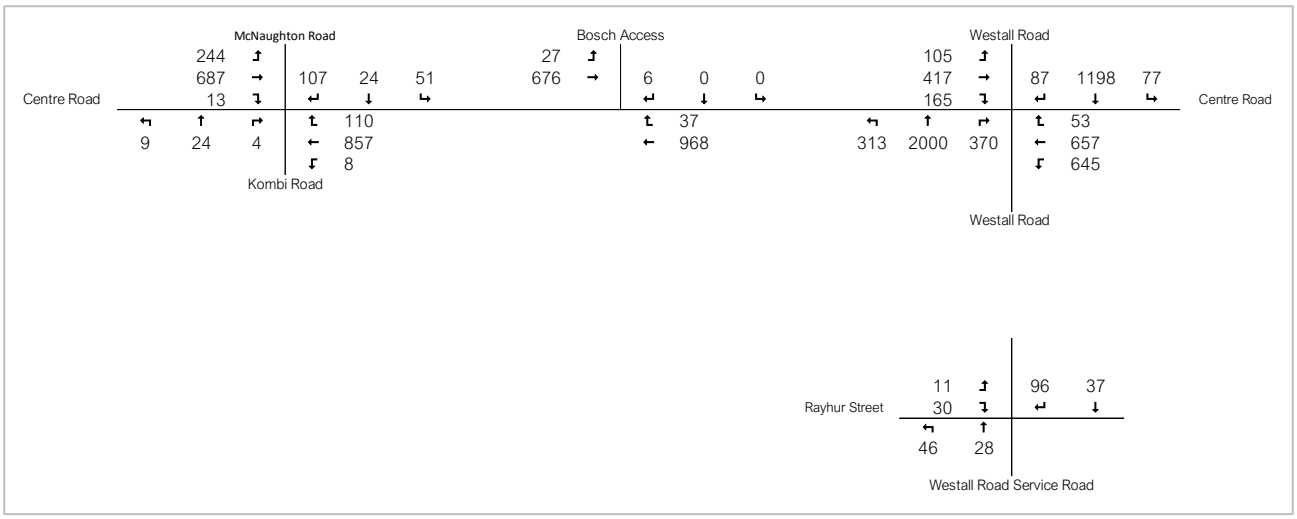
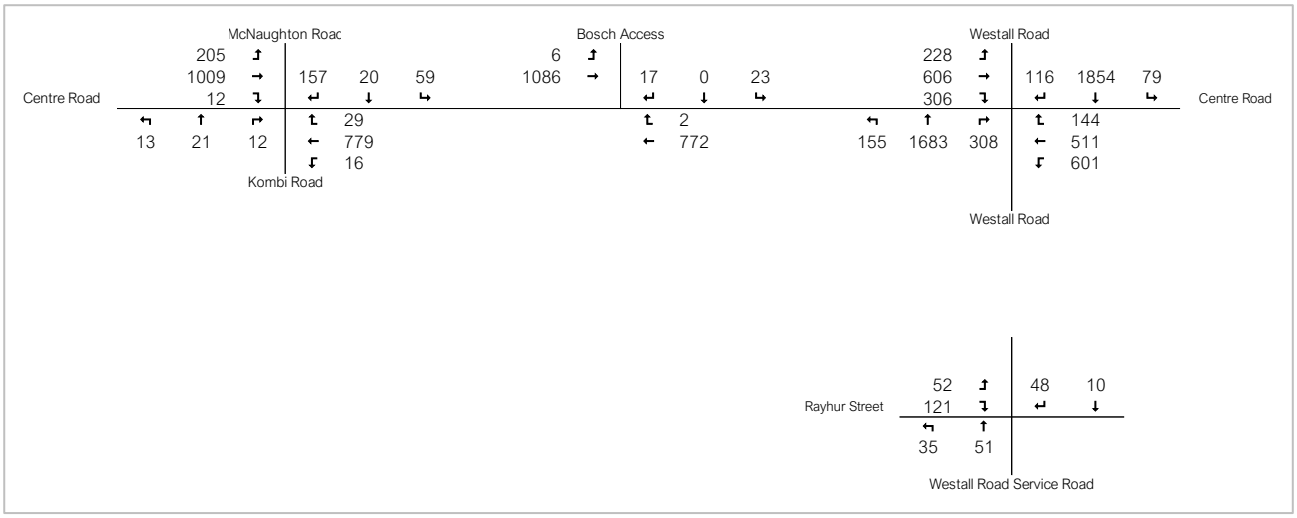


Figure 4.2: Weekday PM Peak Hour – Year 2027 Base Case Traffic



The year 2037 base case traffic volumes at the Centre Road/Bosch Centre Site Access intersection are presented in Figure 4.3 and Figure 4.4.

Figure 4.3: Weekday AM Peak Hour – Year 2037 Traffic

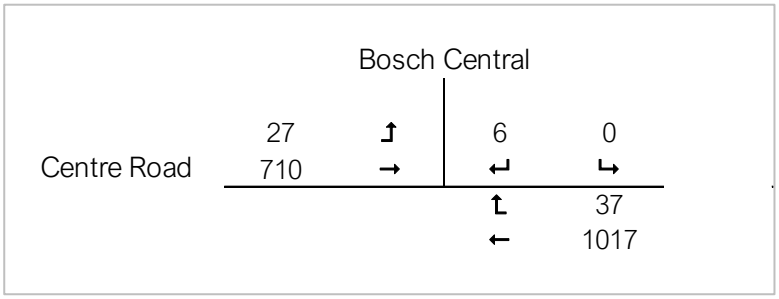
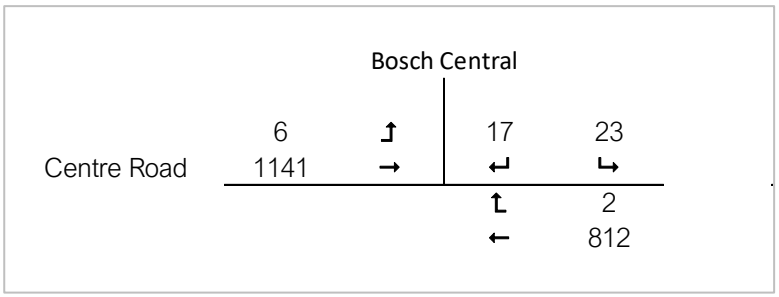


Figure 4.4: Weekday PM Peak Hour – Year 2037 Traffic



4.4 Proposed Development Traffic

The Roads and Traffic Authority New South Wales (RTANSW) 'Guide to Traffic Generating Developments' (an industry recognised document) nominates a peak hour traffic generation rate for industrial warehouse uses of 0.5 vehicle movements per 100sqm of gross floor area.

The RTANSW rates have been updated with the release of the Roads and Maritime Services New South Wales (RMSNSW formerly RTANSW) 'Guide to Traffic Generating Developments – Updated Traffic Surveys' (the RMS guide). This document provides a compilation of trip survey data at industrial/business park developments in Sydney and elsewhere in New South Wales. The RMS guide includes survey site details, including overall floor area and mix of business types. There are four surveys in the document for larger site areas ranging from approximately 89,000sqm to 695,000sqm gross floor area. These sites have an average peak hour trip rate of 0.28 vehicle movements per 100sqm of gross floor area.

Empirical traffic generation rates collected by Stantec and other transport consultants for similar uses suggest the following peak hour traffic generation rates:

- 0.30 vehicle movements per 100sqm of gross floor area.
- 0.15 vehicle movements per 100sqm of site area.

The empirical traffic generation rates are presented in Table 4.2 and Table 4.3.

Table 4.2: Empirical Traffic Generation Rates of Similar Uses (per 100sqm Gross Floor Area)

Location	AM Peak Hour	PM Peak Hour
Global Business Park, Tullamarine	0.26 movements per 100sqm floor area	0.30 movements per 100sqm floor area
Northcorp Industry Park, Broadmeadows	0.30 movements per 100sqm floor area	0.30 movements per 100sqm floor area
Northpoint Enterprise Park, Epping	0.33 movements per 100sqm floor area	0.35 movements per 100sqm floor area
Average	**0.30 movements per 100sqm floor area**	**0.32 movements per 100sqm floor area**

Table 4.3: Empirical Traffic Generation Rates of Similar Uses (per 100sqm Site Area)

Location	AM Peak Hour	PM Peak Hour
Distribution Drive, Truganina	0.06 movements per 100sqm site area	0.03 movements per 100sqm site area
Drake Boulevard, Altona	0.08 movements per 100sqm site area	0.09 movements per 100sqm site area
Grassland Avenue, Craigieburn	0.22 movements per 100sqm site area	0.20 movements per 100sqm site area
Southlink, Dandenong South	0.21 movements per 100sqm site area	0.17 movements per 100sqm site area
Average	**0.14 movements per 100sqm site area**	**0.12 movements per 100sqm site area**

Applying a peak hour traffic generation rate of 0.3 vehicle movements per 100sqm gross floor area to the proposed development with a 116,437sqm gross floor area results in a traffic generation estimate of 349 vehicle movements per hour.

Applying a peak hour traffic generation rate of 0.14 vehicle movements per 100sqm site area to the proposed development with a 252,882sqm site area results in a traffic generation estimate of 354 vehicle movements per hour.

A traffic generation rate of 0.30 vehicle movements per 100sqm of floor area has been adopted by Stantec for other approved similar developments, including the Alliance Business Park in Epping, the Meridian Business Park in Thomastown and the industrial development located at 410-425 Cooper Street in Epping.

For the purposes of this assessment, a conservative on the high side traffic generation rate of 0.4 vehicle movements per 100sqm of gross floor area has been adopted for the weekday AM and PM peak hour periods. Application of this rate to the proposed industrial estate with a building gross floor area of 116,437sqm results in 466 peak hour vehicle movements.

Based on data obtained from the RMS guide, the following directional splits have been derived for industrial estates:

- Weekday AM Peak Hour – 70% arrivals/30% departures.
- Weekday PM Peak Hour – 30% arrivals/70% departures.

Application of the peak hour traffic generation rates and the directional splits to the proposed development results in the peak hour traffic volumes presented in Table 4.4.

Table 4.4: Proposed Development Traffic Generation and Directional Splits

Peak Hour	Arrivals	Departures	Total
AM Peak Hour	326vph	140vph	466vph
PM Peak Hour	140vph	326vph	466vph

vph denotes vehicle per hour.

4.5 Traffic Distribution

The estimated global distribution for the proposed development traffic has been based on weekday AM and PM peak hour traffic proportions at the Westall Road/Centre Road and Centre Road/McNaughton Road/Kombi Road signalised intersections. The adopted distribution is presented in Table 4.5.

Table 4.5: Proposed Development Global Traffic Distribution

North	South	East	West
32%	36%	17%	15%

It is estimated that 70% of the proposed development traffic will use the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection, with 30% of the development traffic using Rayhur Street and the Westall Road Service Road.

It is considered that there will be a bias towards development traffic travelling through the Westall Road/Centre Road signalised intersection, with Westall Road providing access to Princes Highway to the north and the Dingley Bypass to the south. For traffic using the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection it is estimated that 60% of the development traffic will travel through the Westall Road/Centre Road signalised intersection, with 40% travelling through the Centre Road/McNaughton Road/Kombi Road signalised intersection.

The proposed development traffic assignment on the road network is presented at Figure 4.5 and Figure 4.6.

Figure 4.5: Weekday AM Peak Hour – Proposed Development Traffic

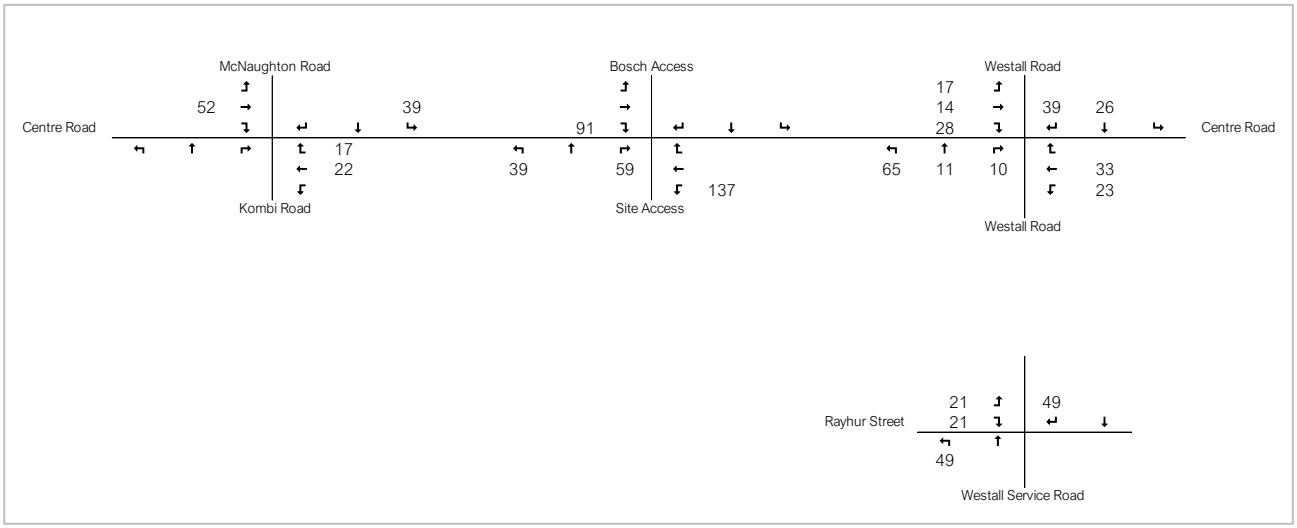
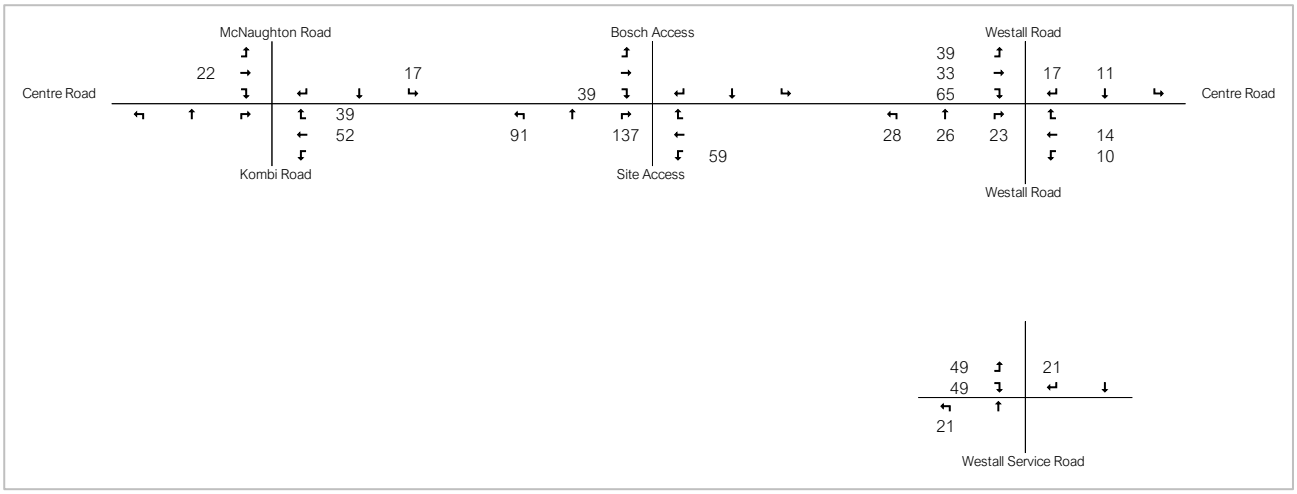


Figure 4.6: Weekday PM Peak Hour – Proposed Development Traffic



4.6 Post Development Traffic Volumes

Post development traffic volumes are derived by adding the proposed development traffic volumes to the base case traffic volumes and also accounting for the existing McLaren Drive traffic volumes. The year 2027 post development traffic volumes for the Centre Road/Kombi Road/McNaughton Road signalised intersection, the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection, the Centre Road/Westall Road signalised intersection and the Rayhur Street/Westall Road Service Road roundabout are presented in Figure 4.7 and Figure 4.8.

The year 2037 post development traffic volumes at the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection are presented in Figure 4.9 and Figure 4.10.

Figure 4.7: Weekday AM Peak Hour – Year 2027 Post Development Traffic

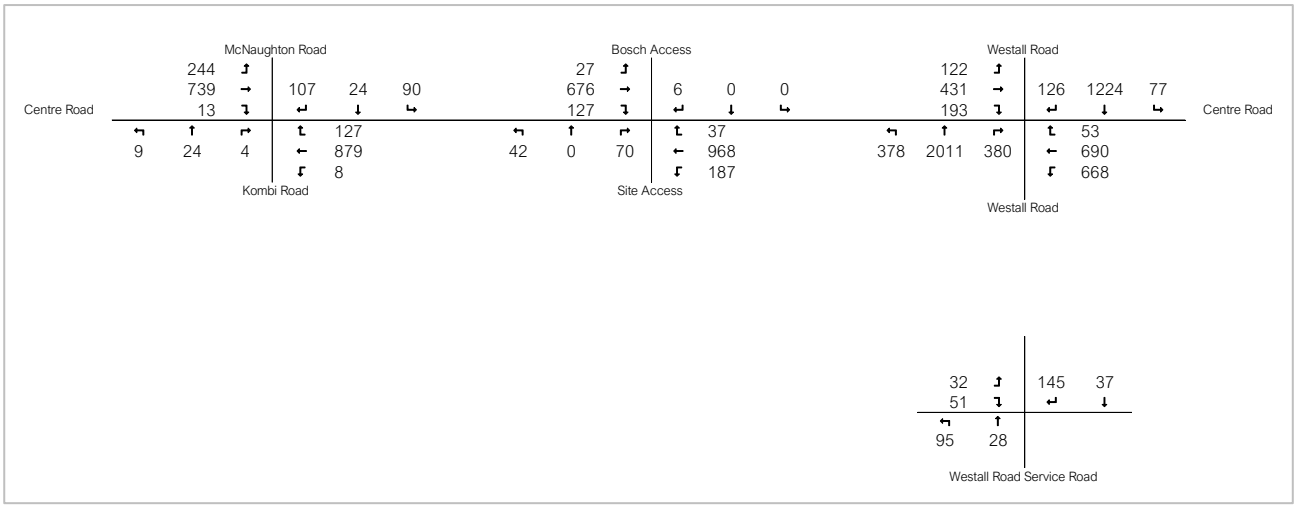


Figure 4.8: Weekday PM Peak Hour – Year 2027 Post Development Traffic

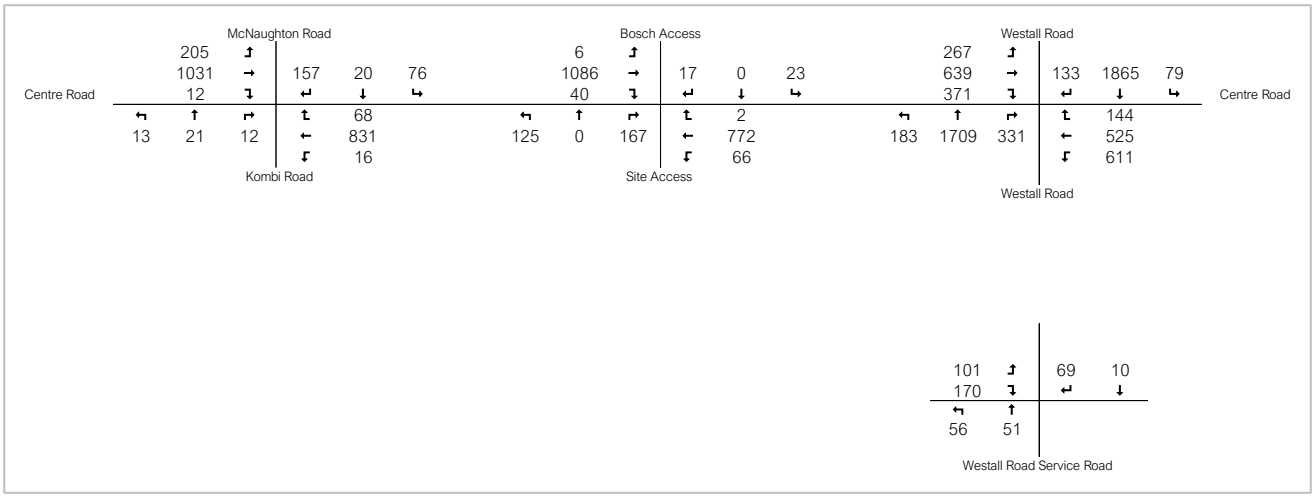


Figure 4.9: Weekday AM Peak Hour – Year 2037 Post Development Traffic

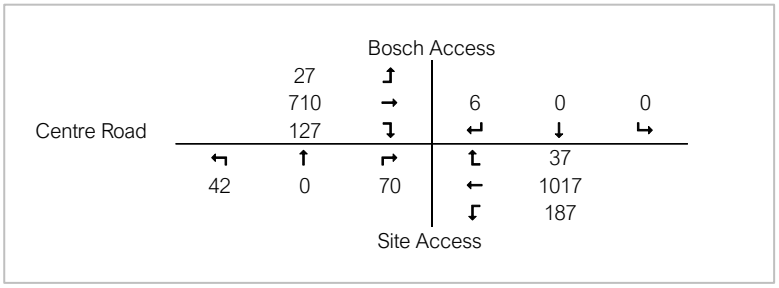
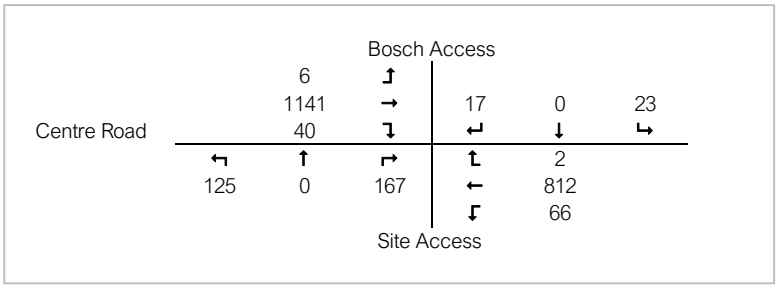


Figure 4.10: Weekday PM Peak Hour – Year 2037 Post Development Traffic



4.7 Traffic Impact Analysis

4.7.1 Introduction

Given its proximity to the Westall Road/Centre Road signalised intersection, the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection will operate in the shadow of this intersection. In this way, the cycle time of the proposed signalised intersection and the Westall Road/Centre Road signalised intersection will match. This has been factored into the SIDRA Intersection 'Network' model. The 'Network' has been run with a 140-second cycle time which matches the typical cycle time at the controlling Westall Road/Centre Road signalised intersection.

The SIDRA Intersection models have been set-up using Intersection Diagnostics Monitor (IDM) data obtained from DTP for the Westall Road/Centre Road signalised intersection and the Centre Road/McNaughton Road/Kombi Road signalised intersection.

The low traffic volumes at the Rayhur Street/Westall Road Service Road roundabout do not warrant detailed analysis of the roundabout's performance.

The SIDRA Intersection outputs are presented at Appendix C to Appendix E.

4.7.2 Year 2027 Analysis

The weekday AM and PM peak hour intersection performance of the Centre Road/McNaughton Road/Kombi Road signalised intersection, the existing Centre Road/Bosch Centre Site Access unsignalised intersection (under base case conditions), the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection and the Westall Road/Centre Road signalised intersection as a 'Network' under year 2027 base case and post development traffic conditions is presented in Table 4.6.

The weekday AM and PM peak hour year performance of the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection as an isolated intersection under year 2027 conditions is presented in Table 4.7.

Table 4.6: Road Network – Year 2027 Base Case and Post Development (Intersection Values)

Intersection	Peak Hour	Base Case			Post Development		
		DOS	Average Delay	50th %ile Queue	DOS	Average Delay	50th %ile Queue
Centre Road/McNaughton Road/Kombi Road Signalised Intersection	AM Peak Hour	0.48	12s	51m	0.64	14s	70m
	PM Peak Hour	0.53	12s	60m	0.75	18s	98m
Centre Road/Site Access/Bosch Site Access Signalised Intersection [1]	AM Peak Hour	0.26	1s	1m	0.57	32s	153m
	PM Peak Hour	0.53	2s	5m	0.79	24s	135m
Westall Road/Centre Road Signalised Intersection	AM Peak Hour	1.00	72s	306m	1.03	88s	384m
	PM Peak Hour	1.01	84s	242m	1.17	119s	428m

[1] Unsignalised intersection with no development site access under the base case conditions.

Table 4.7: Centre Road/Development Site Access/Bosch Centre Site Access – Year 2027 Post Development

Approach	Peak Hour	DOS	Average Delay	95th Percentile Queue
Site Access (south)	AM Peak Hour	0.[illegible]	45s	28m
	PM Peak Hour	0.55	46s	69m
Centre Road (east)	AM Peak Hour	0.63	24s	166m
	PM Peak Hour	0.41	18s	104m
Bosch Site Access (north)	AM Peak Hour	0.09	67s	4m
	PM Peak Hour	0.47	70s	19m
Centre Road (west)	AM Peak Hour	0.58	23s	96m
	PM Peak Hour	0.57	22s	161m
Intersection	**AM Peak Hour**	**0.63**	**25s**	**166m**
	PM Peak Hour	**0.57**	**24s**	**161m**

The analysis results suggest the following:

- The Westall Road/Centre Road signalised intersection operates at its theoretical capacity during the weekday AM and PM peak hours under the base case conditions.
- The addition of development traffic at the Westall Road/Centre Road signalised intersection impacts on the overall performance of the intersection compared to the base case conditions, particularly during the weekday PM peak hour.

- The Centre Road/McNaughton Road/Kombi Road signalised intersection operates satisfactorily under base case conditions. This will continue under post development conditions.
- The proposed Centre Road/Development Site Access/ Bosch Centre Site Access signalised intersection will operate comfortably below its theoretical capacity during the weekday AM and PM peak periods. During the weekday PM peak hour, the 95th percentile vehicle queue in the Centre Road eastbound through lanes of 161m will extend back to the Bosch western site access. It is noted that this access is limited to left in/left out movements through the use of signage on the vehicle access as presented at Figure 4.11 and Figure 4.12.

Figure 4.11: No Right Turn Signage Restriction from Bosch Western Site Access

Figure 4.12: No Right Turn Signage Restriction to Bosch Western Site Access

Given that the proposed development traffic has a measurable impact on the performance of the Westall Road/Centre Road signalised intersection, particularly during the weekday PM peak hour where the intersection DOS increases from 1.01 to 1.17, consideration has been given to improvements that could be delivered to mitigate the impact of the proposed development traffic. There is limited scope for improvements within the available road reserves with the only reasonable

option being the delivery of second right turn lanes on the Westall Road north and south approaches. The performance of the intersection with a second right turn lane on the Westall Road north approach with a length of 80m has been assessed.

A comparison between the base case intersection performance and the post development performance with the additional right turn lane on the Westall Road north approach is presented in Table 4.8.

Table 4.8: Year 2027 Base Case and Post Development (North Approach Additional Right Turn Lane)

Intersection	Peak Hour	Base Case			Post Development		
		DOS	Average Delay	50th %ile Queue	DOS	Average Delay	50th %ile Queue
Westall Road (south)	AM Peak Hour	1.00	64s	306m	1.00	59s	306m
	PM Peak Hour	0.95	51s	193m	1.02	52s	189m
Centre Road (east)	AM Peak Hour	1.00	67s	148m	0.99	64s	152m
	PM Peak Hour	1.01	69s	115m	1.04	85s	141m
Westall Road (north)	AM Peak Hour	1.00	103s	194m	0.99	98s	193m
	PM Peak Hour	0.97	77s	242m	1.00	98s	288m
Centre Road (west)	AM Peak Hour	0.70	51s	63m	1.02	70s	89m
	PM Peak Hour	0.94	58s	112m	1.03	68s	162m
Intersection	**AM Peak Hour**	**1.00**	**72s**	**306m**	**1.02**	**70s**	**306m**
	PM Peak Hour	**1.01**	**64s**	**242m**	**1.04**	**75s**	**288m**

The analysis suggests that the additional right turn lane on the Westall Road north approach provides post development performance benefits and will result in an overall intersection performance that is comparable to the base case conditions.

The performance of the Westall Road/Centre Road signalised intersection with the delivery of additional right turn lanes on the Westall Road north (80m in length) and south approaches (85m in length) is presented in Table 4.9.

Table 4.9: Year 2027 Base Case and Post Development (North & South Approaches Additional Right Turn Lanes)

Intersection	Peak Hour	Base Case			Post Development		
		DOS	Average Delay	50th %ile Queue	DOS	Average Delay	50th %ile Queue
Westall Road (south)	AM Peak Hour	1.00	64s	306m	0.98	67s	329m
	PM Peak Hour	0.95	51s	193m	0.93	64s	224m
Centre Road (east)	AM Peak Hour	1.00	67s	148m	0.97	59s	145m
	PM Peak Hour	1.01	69s	115m	0.94	65s	135m
Westall Road (north)	AM Peak Hour	1.00	103s	194m	0.89	55s	139m
	PM Peak Hour	0.97	77s	242m	0.91	62s	220m
Centre Road (west)	AM Peak Hour	0.70	51s	63m	0.81	51s	69m
	PM Peak Hour	0.94	58s	112m	0.95	53s	137m
Intersection	**AM Peak Hour**	**1.00**	**72s**	**306m**	**0.98**	**61s**	**329m**
	PM Peak Hour	**1.01**	**64s**	**242m**	**0.95**	**61s**	**224m**

The analysis suggests that the delivery of the additional right turn lanes on the Westall Road north and south approaches will improve the intersection performance beyond the base case conditions performance.

4.7.3 Year 2037 Analysis

The weekday AM and PM peak hour year performance of the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection as an isolated intersection under year 2037 conditions is presented in Table 4.10.

Table 4.10: Centre Road/Development Site Access/Bosch Centre Site Access – Year 2037 Post Development

Approach	Peak Hour	DOS	Average Delay	95th Percentile Queue
Site Access (south)	AM Peak Hour	0.27	46s	29m
	PM Peak Hour	0.59	47s	71m
Centre Road (east)	AM Peak Hour	0.66	24s	182m
	PM Peak Hour	0.43	17s	110m
Bosch Site Access (north)	AM Peak Hour	0.09	67s	4m
	PM Peak Hour	0.48	70s	19m
Centre Road (west)	AM Peak Hour	0.64	23s	107m
	PM Peak Hour	0.61	22s	174m
Intersection	**AM Peak Hour**	**0.66**	**25s**	**182m**
	PM Peak Hour	**0.61**	**24s**	**174m**

The proposed signalised intersection is assessed to operate satisfactorily during both weekday AM and PM peak hour periods under year 2037 post development conditions.

4.8 Summary

It has been assessed that the traffic from the proposed industrial estate can be comfortably accommodated at the existing Centre Road/McNaughton Road/Kombi Road signalised intersection and at the proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection.

The Westall Road/Centre Road signalised intersection is assessed to operate at its theoretical capacity under year 2027 base case conditions. The addition of development traffic at the intersection will exacerbate the performance constraints. The delivery of an additional right turn lane on the Westall Road north approach will improve the intersection performance and will deliver a post development performance that is comparable to the base case performance.

The delivery of a second right lane on the Westall Road south approach, in addition to the second right turn lane on the Westall Road north approach, is estimated to improve the intersection post development performance beyond the base case performance.

5. Car Parking Considerations

5.1 Statutory Car Parking Requirement

Clause 52.06 of the Planning Scheme sets out the statutory car parking requirements for land uses. The Clayton Business Park sits partially within the Principal Public Transport Network (PPTN) area of Kingston and Column B rates of Table 1 to Clause 52.06-5 apply.

The proposed estate will deliver 19 warehouse (with ancillary office) tenancies with a gross floor area of 116,437sqm and a net floor area of 83,746sqm. Two smaller tenancies are proposed fronting Centre Road which will be occupied by a 408sqm leasable floor area food & drink premises (café) and a 634sqm net floor area office.

The statutory car parking requirements of the proposed development are presented in Table 5.1.

Table 5.1: Statutory Car Parking Requirements

Use	Size	Statutory Rate	Statutory Requirement
Warehouse	83,746sqm net floor area [1] (19 premises)	2 spaces per premises plus 1.0 spaces per 100sqm net floor area	875 car spaces
Office	634sqm net floor area	3.0 spaces per 100sqm net floor area	19 car spaces
Food & drink premises	408sqm leasable floor area	3.5 spaces per 100sqm leasable floor area	14 car spaces
Total			**908 car spaces**

[1] Gross floor area of each premises less the staging area floor area internal to the building used for loading/unloading of vehicles.

The estate site plan identifies a total car parking provision of 1,021 car spaces for the proposed warehouse, office and food & drink premises. This provision satisfies the statutory car parking requirement.

The small office tenancy will be allocated 19 car spaces and the food & drink premises will be allocated 14 car spaces. The remaining 988 car spaces will be allocated to the warehouse use.

5.2 Accessible Car Parking

The Building Code of Australia (BCA) specifies the DDA car parking requirements for a range of land uses. The requirement for the warehouse use is presented in Table 5.2.

Table 5.2: DDA Car Parking Requirement

Use	User Class	Car Parking Rate	Car Parking Requirement
Warehouse	Class 7b	1 space for every 100 car parking spaces or part thereof	10 car spaces
Office	Class 5	1 space for every 100 car parking spaces or part thereof	1 car space
Food & drink premises	Class 6	1 space for every 50 car parking spaces or part thereof	1 car space
Total			**12 car spaces**

There is a BCA requirement to provide 12 DDA compliant car parking spaces for the proposed development. This requirement is comfortably being exceeded with the provision of 26 DDA car spaces.

5.3 Car Parking Layout

The car parking layout is required to satisfy the Planning Scheme, or the relevant Australian Standard requirements (where accepted by the Responsible Authority.

The standard car parking spaces will be 5.4m long and 2.4m wide, accessed via a 6.2m wide aisle. These dimensions satisfy the relevant Australian Standard for employee car parking spaces.

The accessible car spaces will be 5.4m long and 2.4m wide, with a shared area adjacent of the same dimensions, accessed via a minimum 6.2m wide aisle. These dimensions satisfy the relevant Australian Standard.

Access to the car parking areas will be via two-way crossovers with a typical width of 6.5m (one access is 6.2m wide and three are wider than 6.5m). This provision satisfies the Planning Scheme and the relevant Australian Standard.

Pedestrian visibility splays measuring 2.5m along the accessway and 2.0m along the property line, that are at least 50% clear of visual obstructions, are achievable on the exit sides of all crossovers. This provision satisfies the Planning Scheme.

6. Other Considerations

6.1 Bicycle Facilities

The small office use of 634sqm net floor area does not generate a statutory bicycle parking requirement.

The food & drink premises with a 408sqm leasable floor area generates a statutory requirement (assessed as a retail premises use) for one staff bike space and one customer bike space.

There is no statutory requirement to deliver bicycle facilities for the warehouse use.

Bicycle parking will be provided for the warehouse tenancies close to the entrances to the ancillary offices. Showers and change room facilities will be provided for employee use within the ancillary office uses.

It is recommended that the food & drink premises be provided with two bike spaces, one for staff use and the other for customers. This recommendation can be delivered by way of an appropriately worded permit condition.

6.2 Loading Facilities

Each tenancy will be provided with access to an on-site loading area. The loading areas presented on the site plan have been designed to accommodate vehicles of a size up to and including 26m long B-doubles.

Waste is expected to be collected from the on-site loading areas. Structures above the loading areas will have a height clearance of 7m and will not present an obstruction to waste collection arrangements.

The internal road layout will be capable of accommodating vehicles of a size up to and including 26m long B-doubles. Some movements at internal intersections will require this size of vehicle to encroach into the opposing traffic lane. This is considered a satisfactory design response given the anticipated infrequency that a large vehicle will be turning through an intersection at the same time as an opposing vehicle movement.

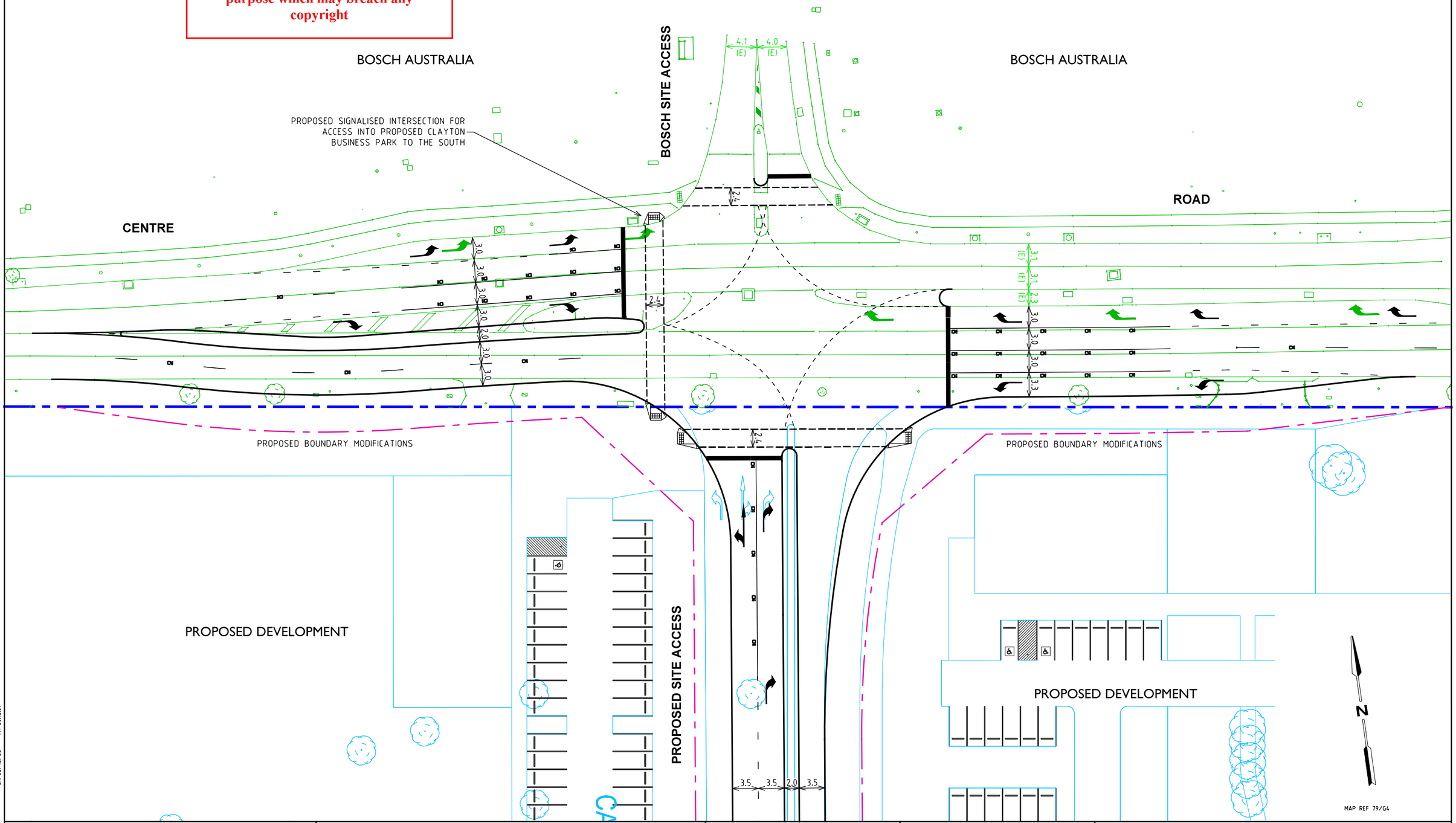
7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- The proposed estate will deliver multiple tenancies with a combined building gross floor area of 116,437sqm. The estate is expected to be at full occupancy by year 2027.
- Vehicle access to the estate is planned via a new signalised intersection on Centre Road, with the Bosch central vehicle access forming the northern approach of the intersection. Pre-application discussions have been held with DTP regarding this intersection.
- The internal road network will be delivered with cross-sections satisfying typical industrial estate standards. The primary road link (McLaren Drive) will be provided with a minimum carriageway width of 10m within a road reserve width of 22.5m. The proposed east-west road (Senator Drive) connecting McLaren Drive and Nursery Avenue will be provided with a carriageway width of 8m within a road reserve width of 21m.
- The proposed internal road layout will be capable of accommodating vehicles of a size up to and including 26m long B-doubles.
- Footpaths will be provided on one side of the roads within the estate. A shared pedestrian and cyclist path will be provided on one side of McLaren Drive. A separate pedestrian path will be provided along the proposed green connector/green spine.
- The estate is estimated to generate 466 peak hour vehicle movements and 4,658 daily vehicle movements.
- The proposed Centre Road/Development Site Access/Bosch Centre Site Access signalised intersection is assessed to perform satisfactorily under year 2027 and year 2037 post development conditions. The signalised intersection will also provide road safety benefits with the signal control of turning vehicle movements to/from Centre Road.
- The existing Centre Road/McNaughton Road/Kombi Road signalised intersection is assessed to operate satisfactorily under year 2027 post development conditions.
- There are existing capacity constraints at the Westall Road/Centre Road signalised intersection. This will be exacerbated by the proposed development traffic. An improvement that could be delivered at the signalised intersection that has a nexus to the proposed development is the provision of a second right turn lane (80m long) on the Westall Road north approach. The provision of this second right turn lane improves the intersection performance. Further improvement to the intersection performance is achieved with the provision of a second right turn lane (85m long) on the Westall Road south approach. This is assessed to deliver a post development intersection performance that is an improvement on the base case performance.
- The small office tenancy and the food & drink premises fronting Centre Road will be provided with car parking satisfying the statutory requirements. The warehouse tenancies will be provided with car parking satisfying the statutory requirement.
- The car parking areas for the proposed development will be provided with dimensions satisfying the relevant Australian Standard. This is considered a satisfactory design response.
- Whilst there is no statutory requirement to provide bicycle facilities for the proposed warehouse development, bicycle parking and shower/change rooms for staff use will be provided. Two bicycle parking spaces are recommended for the food & drink premises fronting Centre Road. This recommendation can be delivered by way of an appropriately worded permit condition. There is no statutory requirement to provide bicycle facilities for the small office tenancy.
- On-site loading areas will be capable of accommodating vehicles of a size up to and including 26m long B-doubles.

Appendix A

Centre Road/Development Site Access/Bosch Centre Site Access Functional Layout Plan



PLOTTED BY : rabraham ON 08/16/23 AT 20:18:07

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DESIGNED
R. ABRAHAM

DESIGN CHECK
A. DELL'ISOLA

APPROVED BY
J. SELLARS

DATE ISSUED
16 AUGUST 2023

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CAD FILE NO.
300303832-03-P2.dgn

CLAYTON BUSINESS PARK
CENTRE RD / PROPOSED SITE ACCESS / BOSCH SITE ACCESS, CLAYTON
FUNCTIONAL LAYOUT PLAN

DRAWING NO. 300303832-03

ISSUE P2

BOSCH AUSTRALIA

BOSCH SITE ACCESS

BOSCH AUSTRALIA

PROPOSED SIGNALISED INTERSECTION FOR
ACCESS INTO PROPOSED CLAYTON
BUSINESS PARK TO THE SOUTH

CENTRE

ROAD

PROPOSED BOUNDARY MODIFICATIONS

PROPOSED BOUNDARY MODIFICATIONS

PROPOSED DEVELOPMENT

PROPOSED SITE ACCESS

PROPOSED DEVELOPMENT

N

MAP REF 79/G4

ON 08/16/23 AT 20:19:24

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APPROVED BY J. SELLARS	DATE ISSUED 16 AUGUST 2023

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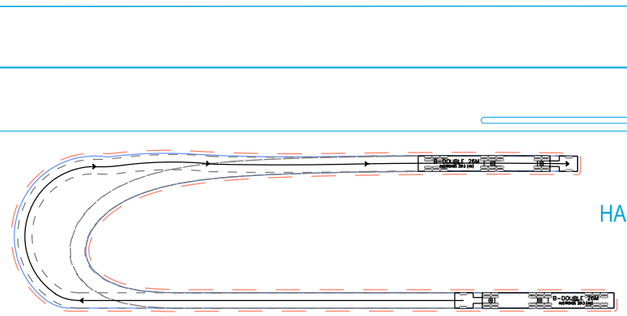
CLAYTON BUSINESS PARK
CENTRE RD / PROPOSED SITE ACCESS /
BOSCH SITE ACCESS, CLAYTON
FUNCTIONAL LAYOUT PLAN

DRAWING NO. 300303832-03 ISSUE P2

Appendix B

Swept Path Assessment Plans



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Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

ADVERTISED PLAN

HARDSTAND

OVERFLOW = 5

PR

FT

50KL

CARPARK (32)

CARPARK (55)

5 NURSERY AVE

50 RE RD

10 NURSERY AVE

8 NURSERY AVE

40

50

GREEN SPINE

EXISTING PORTION OF THE WAREHOUSE STRUCTURE TO REMAIN

3 SENATOR DRIVE

40

1 SENATOR DRIVE

40

HARDSTAND

CARPARK

CARPARK (59)

8000

OR DRIVE

34

HIGH RENTENTION VALUE

2 SENATOR DRIVE

9 NURSER AVE

OVERFLOW = 17

10000

51100

26890

20100

22000

20100

ON 29/08/2023 AT 9:48:33 AM

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APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023

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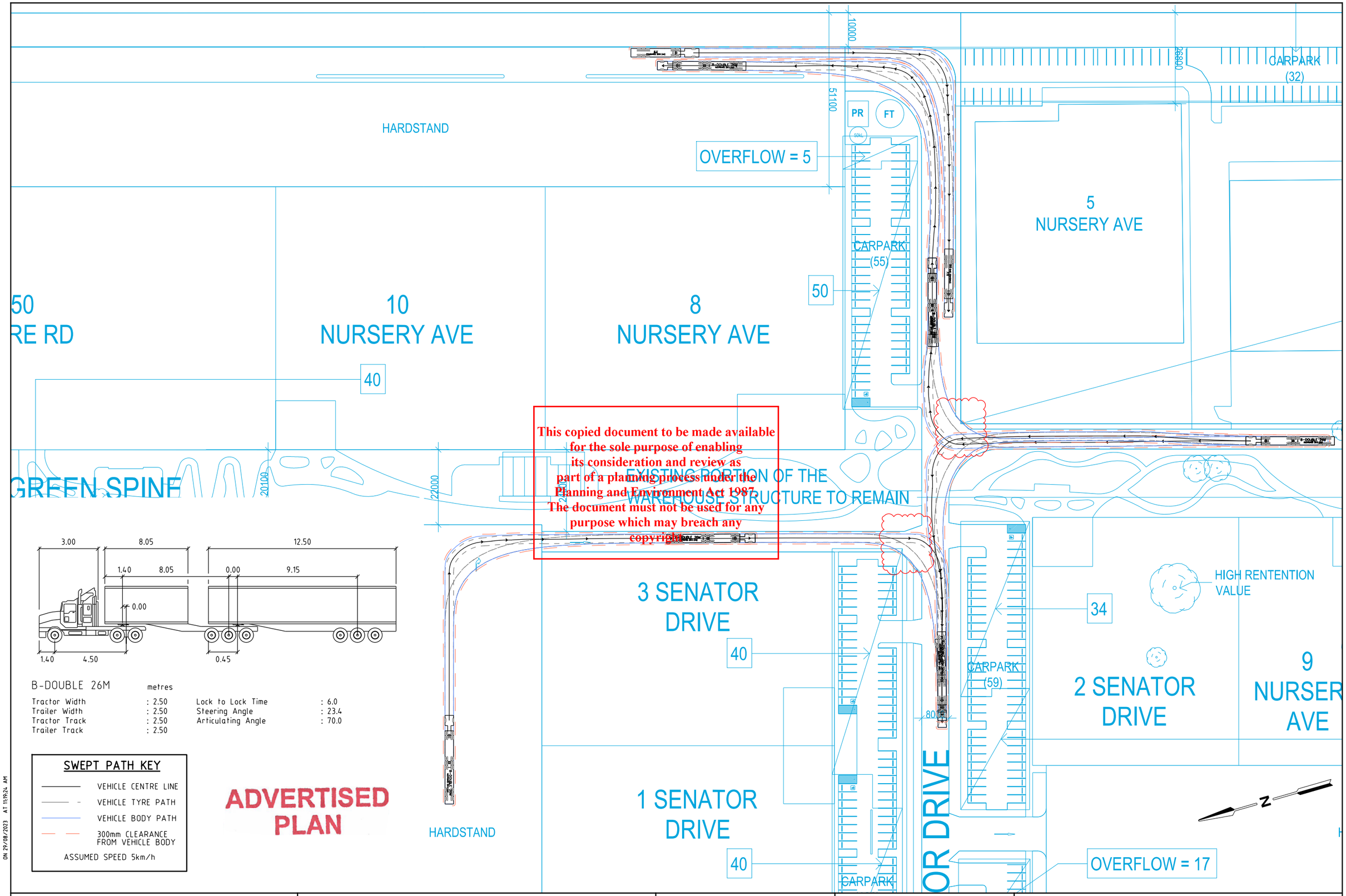
CLAYTON BUSINESS PARK

B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-01 SHEET 01 OF 15 ISSUE P4



B-DOUBLE 26M metres

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Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

ADVERTISED PLAN

ON 29/08/2023 AT 11:9:24 AM

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CLAYTON BUSINESS PARK

B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

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SWEPT PATH KEY

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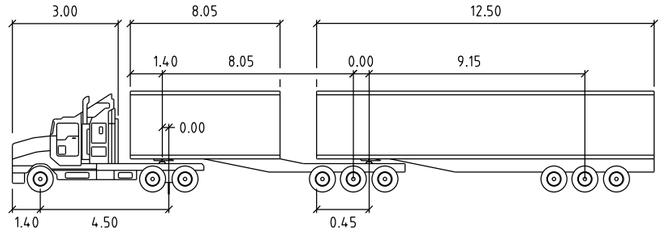
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B-DOUBLE 26M

	metres		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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PLOTTED BY : juscheng

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CLAYTON BUSINESS PARK

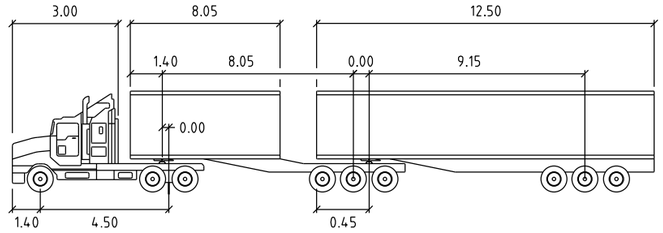
B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-03 SHEET 03 OF 15 ISSUE P4

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B-DOUBLE 26M

	metres		
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Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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34
CARPARK (59)
2 SENATOR DRIVE
9 NURSER AVE
SENATOR DRIVE
OVERFLOW = 17
CARPARK (106)
12 MCLAREN DRIVE
50
10 MCLAREN DRIVE
50
8 MCLAREN DRIVE
6 MCLAREN DRIVE
35
20
OVERFLOW = 7
CARPARK (29)
CARPARK (31)
CARPARK (52)
CARPARK (50)
MCLAREN DRIVE
HARDSTAND
HARDSTAND
CARPARK (117)
5
117
3 MCLAREN DRIVE
MCLAREN DRIVE
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APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023

SCALE A3 0 5 10 1:500

CAD FILE NO. 300303832-AT01-P4.dgn

CLAYTON BUSINESS PARK

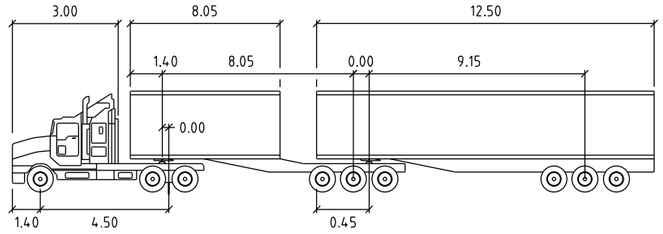
B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-04 SHEET 04 OF 15 ISSUE P4

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B-DOUBLE 26M

	metres		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

IVE

ATOR IVE

40

40

34

CARPARK (59)

2 SENATOR DRIVE

9 NURSER AVE

8000

SENATOR DRIVE

OVERFLOW = 17

CARPARK (106)

12 MCLAREN DRIVE

50

10 MCLAREN DRIVE

50

8 MCLAREN DRIVE

6 MCLAREN DRIVE

MC

OVERFLOW = 7

2000

3000

2400

35

CARPARK (52)

20

CARPARK (50)

50kL

PR

FT

CARPARK (29)

CARPARK (31)

12000

3000

3000

1400

MCLAREN DRIVE

HARDSTAND

HARDSTAND

FT

PR

5500

NOT IN SC

ADVERTISED PLAN

CARPARK (117)

3 MCLAREN DRIVE

MCLAREN DRIVE

5

117

N

ON 29/08/2023 AT 10:06:19 AM

PLOTTED BY : jscheng

Stantec

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

WARNING
BEWARE OF UNDERGROUND SERVICES
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DESIGNED J. CHENG	DESIGN CHECK -
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023

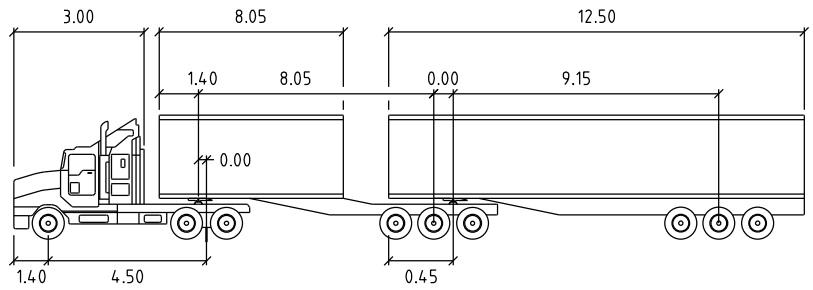
SCALE A3 0 5 10 1:500

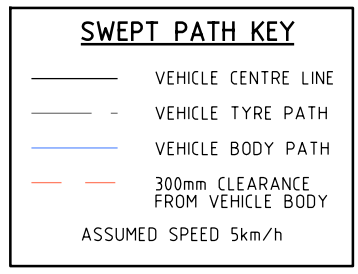
CAD FILE NO. 300303832-AT01-P4.dgn

CLAYTON BUSINESS PARK

B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-05 SHEET 05 OF 15 ISSUE P4





B-DOUBLE 26M — metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

CENTRE ROAD

CENTRE RD

GREEN

HICLE
CESS

20000

24200

24200

CARPARK
(70)

70

9000

1500
CENTRE RD

16
MCLAREN DRIVE

50

1:20 RAMPS TO CARPARK

CARPARK
(57)

ADVERTISED
PLAN

12
MCLAREN DRIVE

50

HARDSTAND

50kL

CARPARK
(29)

1400
3000
3000

10000

50kL

FT

PR

HARDSTAND

9400

1490
CENTRE RD

73

CARPARK
(73)

8200

5
MCLAREN DRIVE

N

PRELIMINARY PLAN
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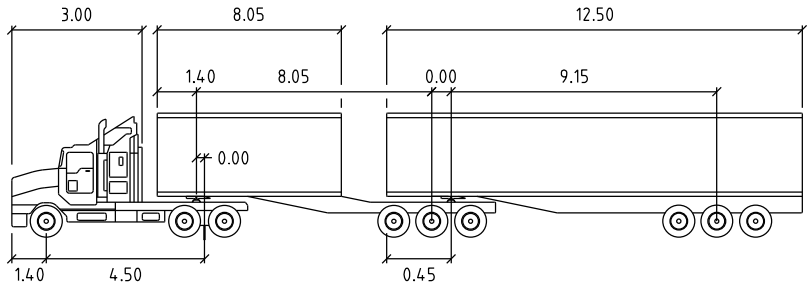
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-06 SHEET 06 OF 15 ISSUE P4

PLOTTED BY : juscheng ON 29/08/2023 AT 10:24:31 AM



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

B-DOUBLE 26M

metres			
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

CENTRE ROAD

HICLE
CESS

CENTRE RD

GREEN

20000

24200

9000

9400

2400

CARPARK
(70)

70

1:20 RAMPS TO CARPARK

CARPARK
(57)

50

16
MCLAREN DRIVE

ADVERTISED
PLAN

1500
CENTRE RD

HARDSTAND

12
MCLAREN DRIVE

50

CARPARK
(29)

50kL

3000

1400

10000

1490
CENTRE RD

HARDSTAND

FT

PR

HARDSTAND

73

CARPARK
(73)

8200

5
MCLAREN DRIVE

N

PRELIMINARY PLAN
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PLOTTED BY : juscheng ON 29/08/2023 AT 10:24:17 AM

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DESIGNED J. CHENG	DESIGN CHECK -	SCALE A3	0 5 10 1:500
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

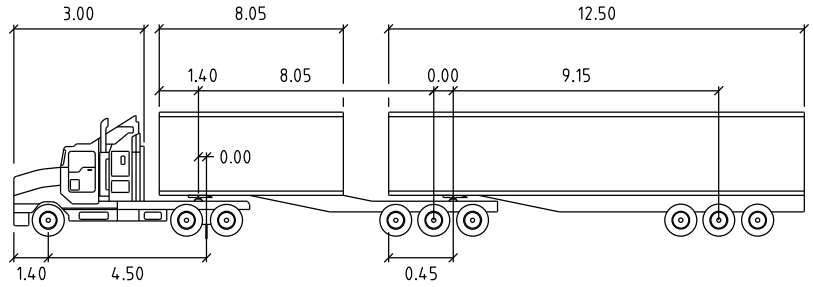
B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-07 SHEET 07 OF 15 ISSUE P4

CENTRE ROAD

CENTRE RD

GREEN



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

B-DOUBLE 26M — metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

20000

24200

9000

9400

2400

CARPARK (70)

70

1:20 RAMPS TO CARPARK

CARPARK (57)

50

16
MCLAREN DRIVE

ADVERTISED PLAN

1500
CENTRE RD

HARDSTAND

12
MCLAREN DRIVE

50

CARPARK (29)

50kL

3000

1400

10000

HARDSTAND

FT

PR

1490
CENTRE RD

HARDSTAND

73

CARPARK (73)

5
MCLAREN DRIVE

8200

N

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DESIGNED J. CHENG	DESIGN CHECK -	SCALE A3	0 5 10 1:500
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

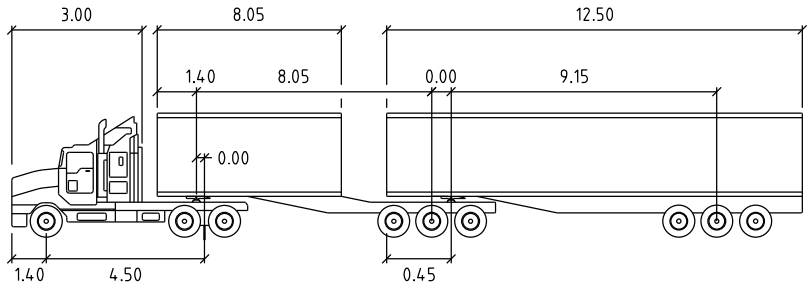
B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-08 SHEET 08 OF 15 ISSUE P4

CENTRE ROAD

CENTRE RD

GREEN



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

B-DOUBLE 26M — metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

20000

HICLE
CESS

24200

12400

CARPARK
(70)

70

1:20 RAMPS TO CARPARK

CARPARK
(57)

50

16
MCLAREN DRIVE

ADVERTISED
PLAN

9000

1500
CENTRE RD

HARDSTAND

12
MCLAREN DRIVE

50

CARPARK
(29)

50kL

1400
3000
3000

9400

1490
CENTRE RD

73

HARDSTAND

FT
PR

HARDSTAND

CARPARK
(73)

8200

5
MCLAREN DRIVE

N

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PLOTTED BY : juscheng ON 08/29/23 AT 12:27:41

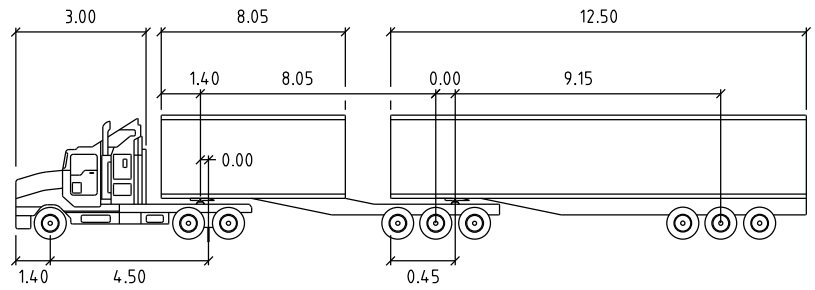
Stantec

DESIGNED J. CHENG	DESIGN CHECK -	SCALE A3	0 5 10 1:500
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-09 SHEET 09 OF 15 ISSUE P4



B-DOUBLE 26M

	metres		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

CENTRE ROAD

HICLE
CESS

CENTRE RD

GREEN

20000

24200

12400

CARPARK
(70)

70

9000

1500
CENTRE RD

50

1:20 RAMPS TO CARPARK

CARPARK
(57)

16
MCLAREN DRIVE

ADVERTISED
PLAN

HARDSTAND

12
MCLAREN DRIVE

50

CARPARK
(29)

50kL

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1400

10000

HARDSTAND

FT

PR

9400

1490
CENTRE RD

HARDSTAND

73

CARPARK
(73)

8200

5
MCLAREN DRIVE

N

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PLOTTED BY : juscheng ON 29/08/2023 AT 10:30:17 AM

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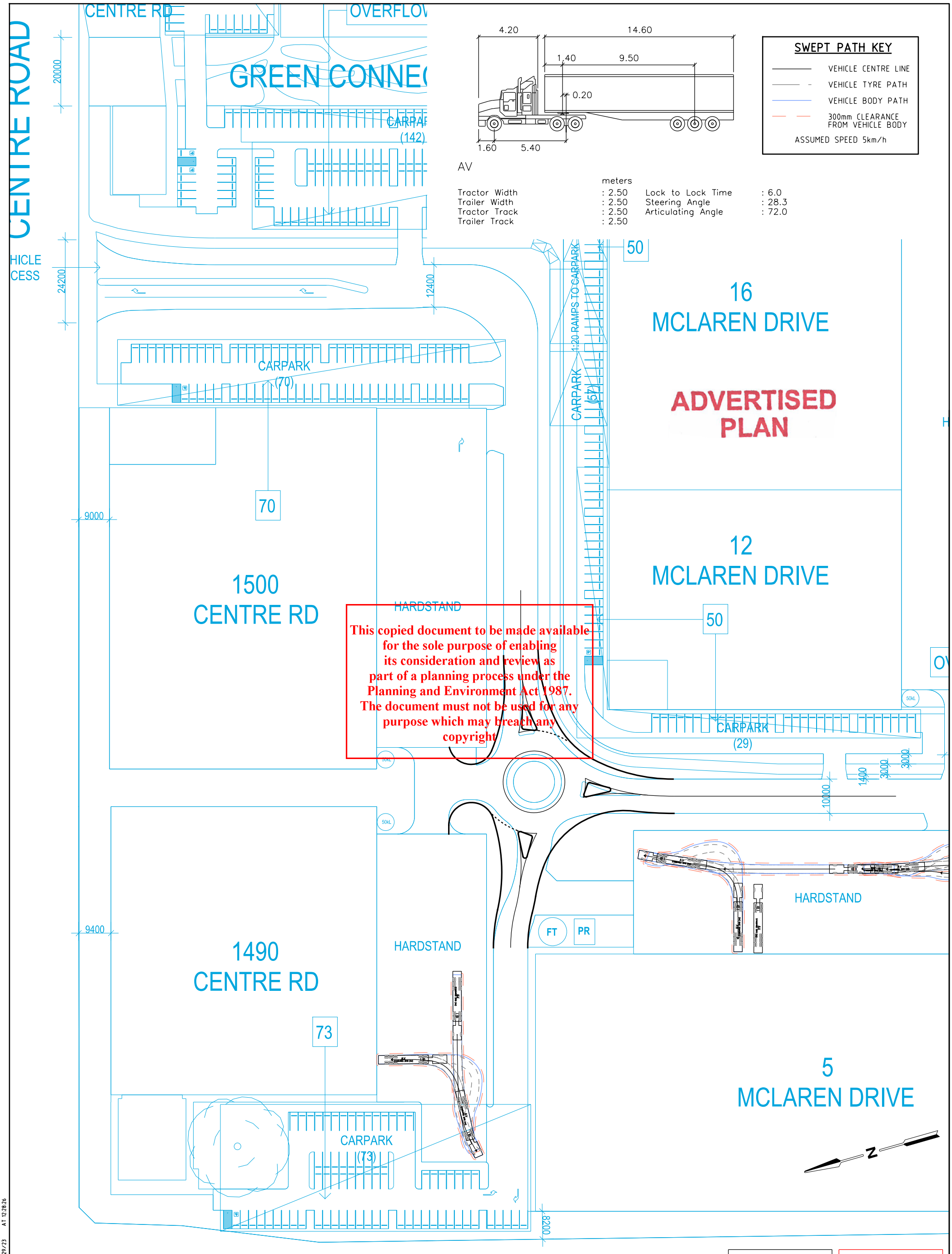
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

B-DOUBLE 26M
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-10 SHEET 10 OF 15 ISSUE P4



PRELIMINARY PLAN
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DESIGNED J. CHENG	DESIGN CHECK -	SCALE A3 0 5 10 1:500	CLAYTON BUSINESS PARK
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	AV SWEPT PATHS ASSESSMENT
			DRAWING NO. 300303832-AT01-11 SHEET 11 OF 15 ISSUE P4

PLOTTED BY : juscheng ON 08/29/23 AT 12:28:26

CENTRE ROAD

HICLE
CESS

CENTRE RD

OVERFLOW

GREEN CONNE

CARPAR
(142)

20000

24200

12400

CARPARK
(70)

70

9000

1500
CENTRE RD

1490
CENTRE RD

9400

73

CARPARK
(73)

8200

HARDSTAND

HARDSTAND

50

1:20 RAMPS TO CARPARK

CARPARK
(57)

16
MCLAREN DRIVE

12
MCLAREN DRIVE

50

CARPARK
(29)

50kL

3000

1400

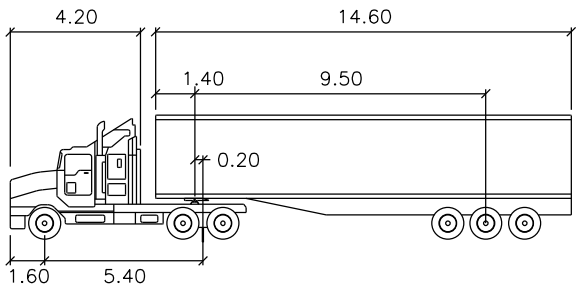
HARDSTAND

FT

PR

5
MCLAREN DRIVE

N



AV

	meters		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 72.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

PRELIMINARY PLAN
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Stantec

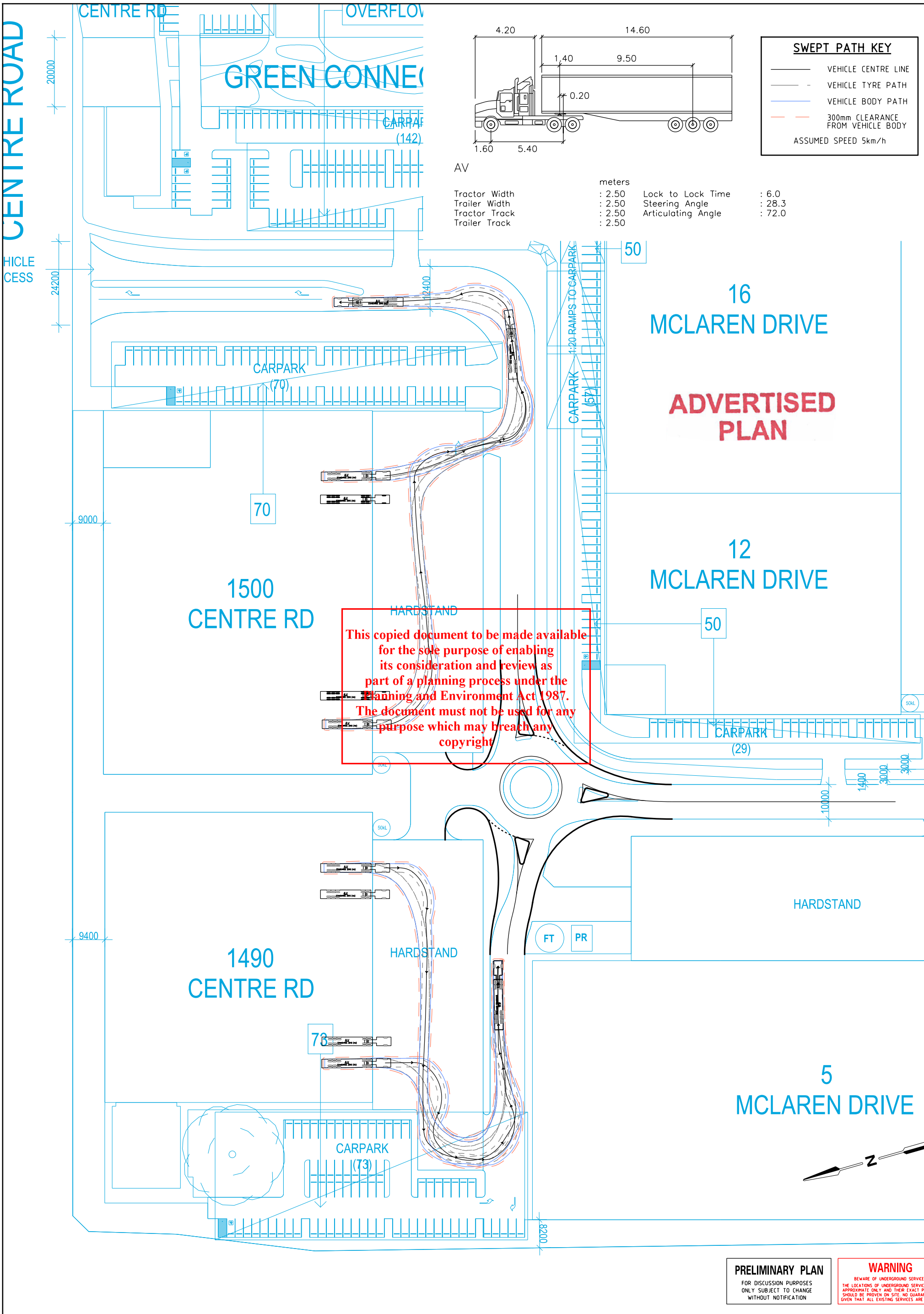
DESIGNED J. CHENG	DESIGN CHECK -	SCALE A3	0 5 10 1:500
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

AV
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-12 SHEET 12 OF 15 ISSUE P4

PLOTTED BY : juscheng ON 08/29/23 AT 12:28:59



Stantec

DESIGNED J. CHENG	DESIGN CHECK -	SCALE A3	0 5 10 1:500
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023	CAD FILE NO. 300303832-AT01-P4.dgn	

CLAYTON BUSINESS PARK

AV
SWEPT PATHS ASSESSMENT

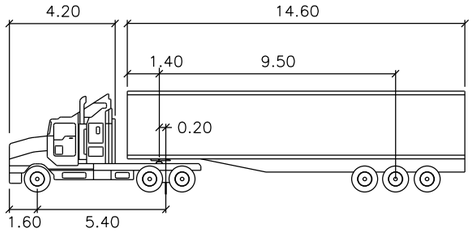
DRAWING NO. 300303832-AT01-13 SHEET 13 OF 15 ISSUE P4

PLOTTED BY : juscheng ON 29/08/2023 AT 11:16:01 AM

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



AV

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 72.0
Trailer Track	: 2.50		

IVE
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34
CARPARK (59)
2 SENATOR DRIVE
9 NURSER AVE
8000
SENATOR DRIVE
OVERFLOW = 17
CARPARK (106)
12 MCLAREN DRIVE
50
10 MCLAREN DRIVE
50
OVERFLOW = 7
50kL
PR
FT
CARPARK (29)
CARPARK (31)
12000
3000
1400
3000
3000
10000
2000
3000
2400
8 MCLAREN DRIVE
6 MCLAREN DRIVE
35
CARPARK (52)
20
CARPARK (50)
MCLAREN DRIVE
HARDSTAND
HARDSTAND
FT
PR
5500
CARPARK (117)
NOT IN SC
5
117
3 MCLAREN DRIVE
MCLAREN DRIVE
N

ON 08/29/23 AT 12:29:21

PLOTTED BY : jscheng

Stantec

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

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DESIGNED J. CHENG	DESIGN CHECK -
APPROVED BY J. SELLARS	DATE ISSUED 28 AUGUST 2023

SCALE A3 0 5 10 1:500

CAD FILE NO. 300303832-AT01-P4.dgn

CLAYTON BUSINESS PARK

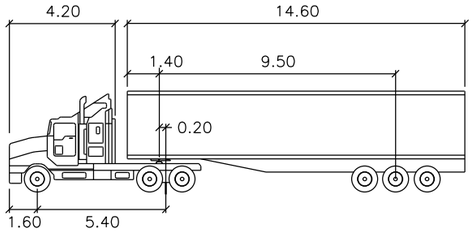
AV
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-14 SHEET 14 OF 15 ISSUE P4

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



AV

	meters		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 72.0
Trailer Track	: 2.50		

IVE
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ATOR
IVE
40
34
CARPARK (59)
2 SENATOR DRIVE
9 NURSER AVE
8000
SENATOR DRIVE
OVERFLOW = 17
CARPARK (106)
12 MCLAREN DRIVE
50
10 MCLAREN DRIVE
50
8 MCLAREN DRIVE
6 MCLAREN DRIVE
MC
OVERFLOW = 7
2000
3000
2400
35
CARPARK (52)
20
CARPARK (50)
50KL
PR
FT
CARPARK (29)
CARPARK (31)
12000
1400
3000
3000
MCLAREN DRIVE
HARDSTAND
HARDSTAND
FT
PR
5500
NOT IN SC
CARPARK (117)
5
117
3 MCLAREN DRIVE
MCLAREN DRIVE
N

ON 29/08/2023 AT 11:11:29 AM

PLOTTED BY : jscheng

Stantec

PRELIMINARY PLAN
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DESIGNED J. CHENG
DESIGN CHECK -
APPROVED BY J. SELLARS
DATE ISSUED 28 AUGUST 2023

SCALE A3 0 5 10 1:500
CAD FILE NO. 300303832-AT01-P4.dgn

CLAYTON BUSINESS PARK

AV
SWEPT PATHS ASSESSMENT

DRAWING NO. 300303832-AT01-15 SHEET 15 OF 15 ISSUE P4

Appendix C

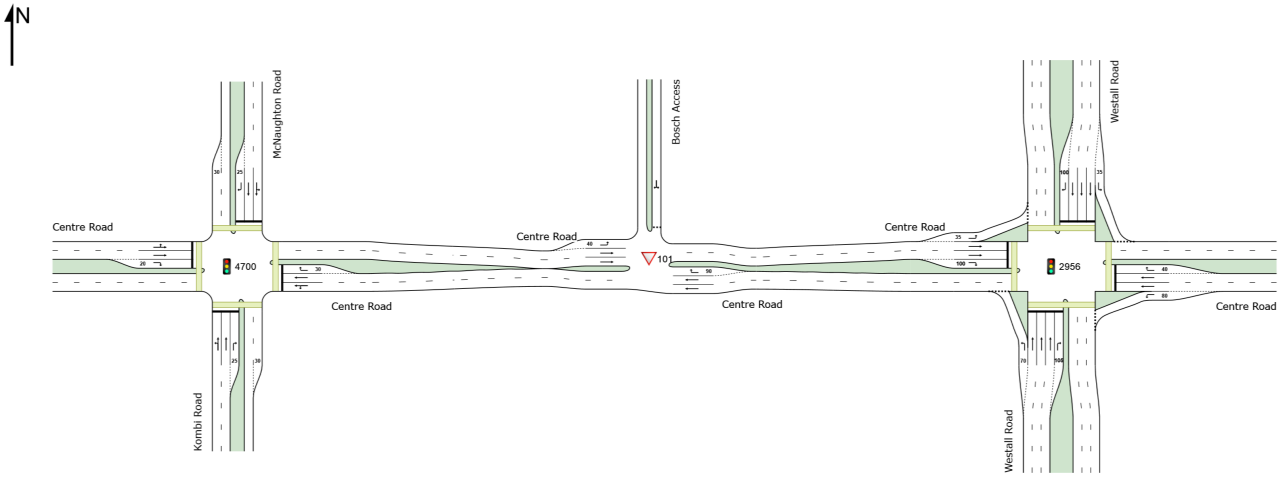
SIDRA Intersection Outputs – Base Case

NETWORK LAYOUT

Network: N101 [AM (Network Folder: Base Condition - 2027)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
4700	NA	1 CENTRE ROAD / MCNAUGHTON ROAD / KOMBI ROAD - AM Peak
101	NA	3 CENTRE ROAD / BOSCH ACCESS - AM Peak
2956	NA	4 CENTRE ROAD / WESTALL ROAD - AM Peak

Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise | Created: 11 August, 2023 12:00:51 PM
Project: U:\300303832\technical\modelling\230810-Final-Report\230809-sid-clayton_business_parkV2_DTP-Update.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 4700 [1 CENTRE ROAD / MCNAUGHTON ROAD / KOMBI ROAD - AM Peak (Site Folder: Base - 2027)]

Network: 14 [AM (Network Folder: Base Condition - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Cycle Time)

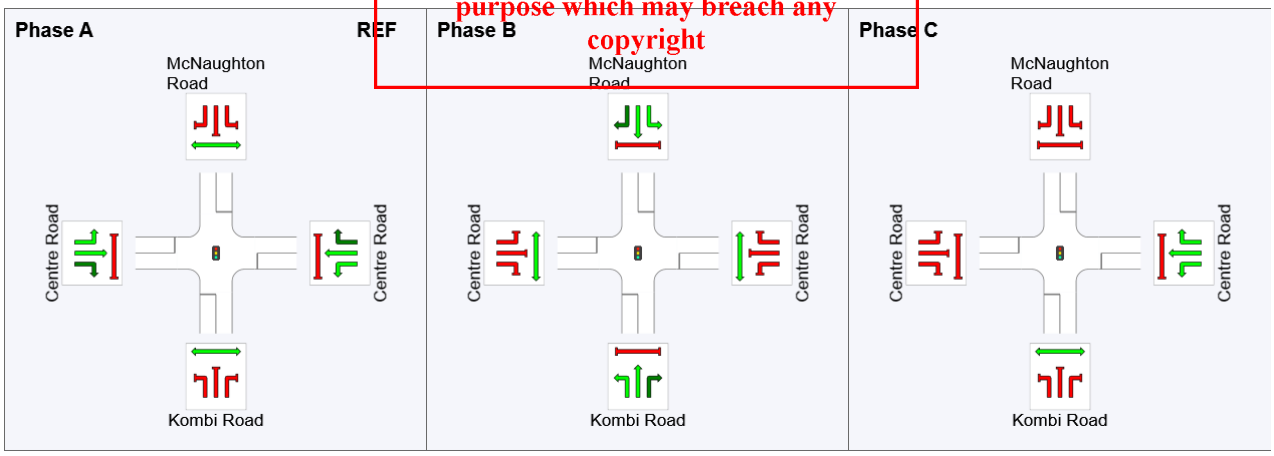
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

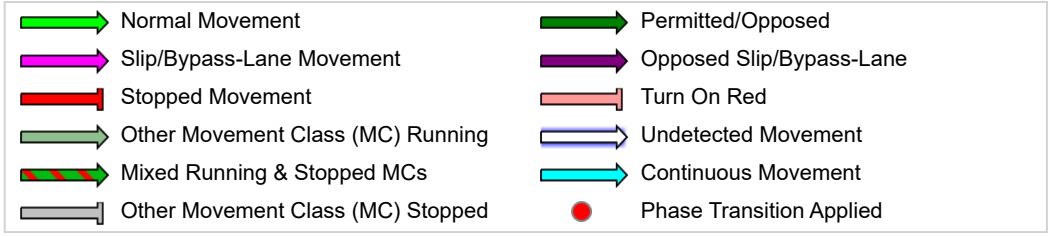
Phase	A	B	C
Phase Change Time (sec)	0	50	68
Green Time (sec)	45	12	6
Phase Time (sec)	51	18	11
Phase Split	64%	23%	14%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Kombi Road															
Lane 1	9	33.0	9	33.0	226	0.041	47[5]	38.1	LOS D	0.2	1.8	Full	500	0.0	0.0
Lane 2	25	4.0	25	4.0	285	0.087	100	32.3	LOS C	0.5	3.8	Full	500	0.0	0.0
Lane 3	4	0.0	4	0.0	208	0.020	100	39.4	LOS D	0.1	0.6	Short	25	0.0	NA
Approach	38	10.6	38	10.6		0.087		34.5	LOS C	0.5	3.8				
East: Centre Road															
Lane 1	446	3.9	445	3.9	1330	0.335	100	5.1	LOS A	4.1	29.8	Full	245	0.0	0.0
Lane 2	446	4.0	445	4.0	1330	0.335	100	5.0	LOS A	4.1	29.8	Full	245	0.0	0.0
Lane 3	113	5.0	113	5.0	513	0.221	100	10.6	LOS B	0.8	5.9	Short	30	0.0	NA
Approach	1005	4.1	1003[N1]	4.1		0.335		5.7	LOS A	4.1	29.8				
North: McNaughton Road															
Lane 1	53	16.0	53	16.0	250	0.210	100	39.2	LOS D	1.1	9.1	Full	500	0.0	0.0
Lane 2	25	0.0	25	0.0	293	0.085	40[5]	32.2	LOS C	0.5	3.6	Full	500	0.0	0.0
Lane 3	110	9.0	110	9.0	233	0.473	100	41.0	LOS D	2.5	19.2	Short	25	0.0	NA
Approach	188	9.8	188	9.8		0.473		39.3	LOS D	2.5	19.2				
West: Centre Road															
Lane 1	484	7.0	484	7.0	1020	0.475	100	14.3	LOS B	6.9	51.2	Full	500	0.0	0.0
Lane 2	476	7.0	476	7.0	1002[1]	0.475	100	11.0	LOS B	6.7	49.4	Full	500	0.0	0.0
Lane 3	13	0.0	13	0.0	359	0.037	100	14.1	LOS B	0.1	1.0	Short	20	0.0	NA
Approach	973	6.9	973	6.9		0.475		12.7	LOS B	6.9	51.2				
Intersection	2204	5.9	2202[N1]	5.9		0.475		12.1	LOS B	6.9	51.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Site: 101 [3 CENTRE ROAD / BOSCH ACCESS - AM Peak (Site Folder: Base - 2027)]

Network: 14 [AM (Network Folder: Base Condition - 2027)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Centre Road															
Lane 1	502	4.0	501	4.0	1901	0.264	100	0.0	LOS A	0.0	0.0	Full	200	0.0	0.0
Lane 2	496	4.0	495	4.0	1875	0.264	100	0.0	LOS A	0.0	0.0	Full	200	0.0	0.0
Lane 3	38	5.0	38	5.0	435	0.088	100	11.6	LOS B	0.1	0.7	Short	90	0.0	NA
Approach	1036	4.0	1034 N1	4.0		0.264		0.5	NA	0.1	0.7				
North: Bosch Access															
Lane 1	7	5.0	7	5.0	58	0.124	100	63.0	LOS F	0.1	1.0	Full	500	0.0	0.0
Approach	7	5.0	7	5.0		0.124		63.0	LOS F	0.1	1.0				
West: Centre Road															
Lane 1	28	5.0	28	5.0	1793	0.016	100	5.6	LOS A	0.0	0.0	Short	40	0.0	NA
Lane 2	348	9.0	348	9.0	1842	0.189	100	0.0	LOS A	0.0	0.0	Full	245	0.0	0.0
Lane 3	348	9.0	348	9.0	1842	0.189	100	0.0	LOS A	0.0	0.0	Full	245	0.0	0.0
Approach	725	8.8	725	8.8		0.189		0.2	NA	0.0	0.0				
Intersection	1768	6.0	1766 N1	6.0		0.264		0.6	NA	0.1	1.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Site: 2956 [4 CENTRE ROAD / WESTALL ROAD - AM Peak (Site Folder: Base - 2027)]

Network: 14 [AM (Network Folder: Base Condition - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site Practical Cycle Time)

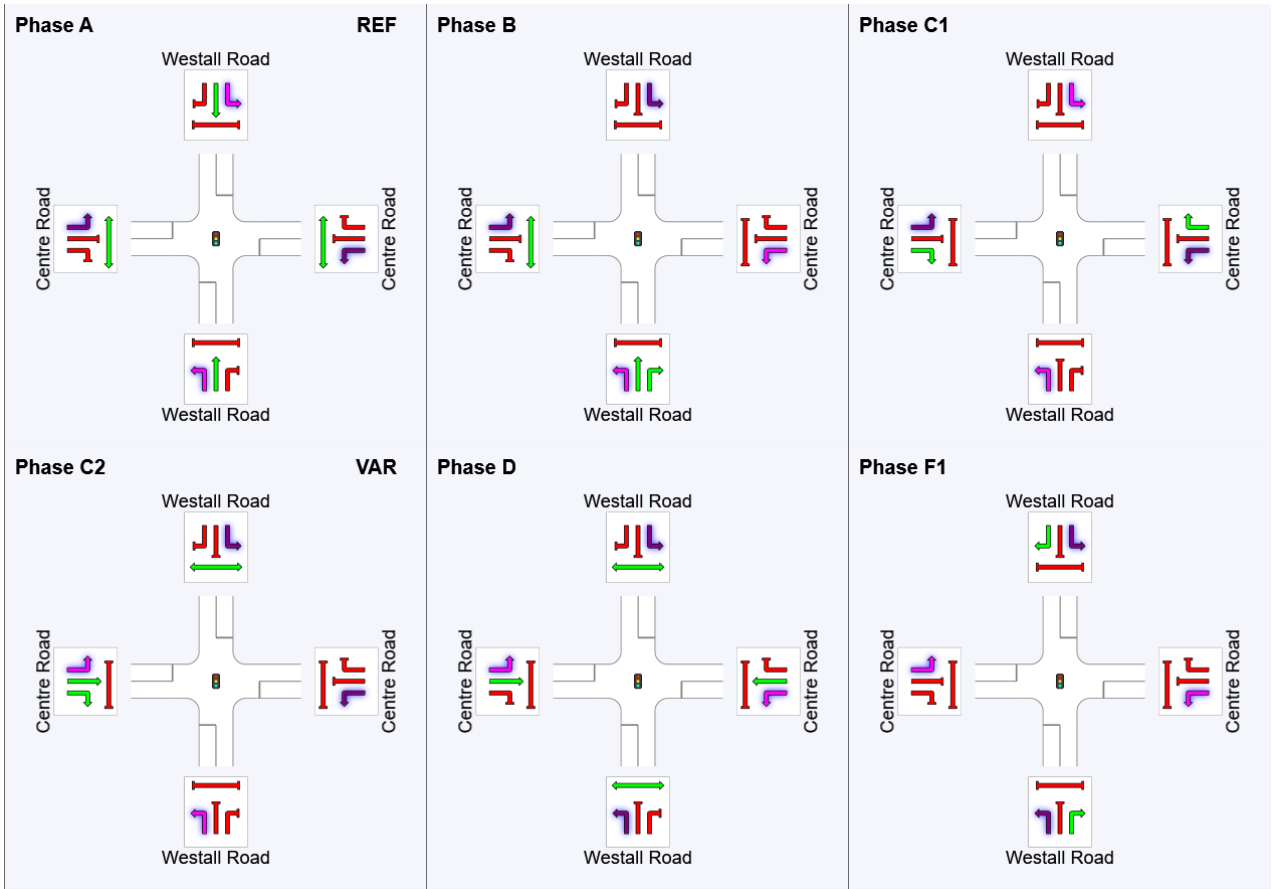
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C1, C2*, C3*, D, F1, F2*, F3*
Output Phase Sequence: A, B, C1, C2*, D, F1, F2*
(* Variable Phase)

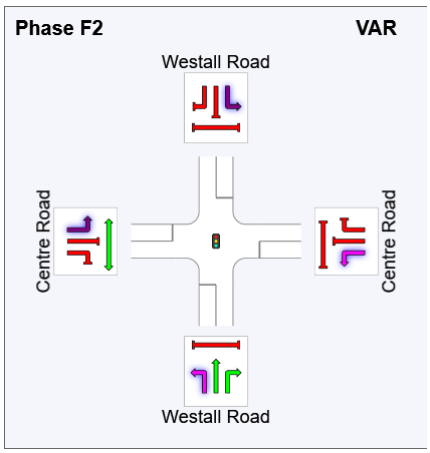
Phase Timing Summary

Phase	A	B	C1	C2	D	F1	F2
Phase Change Time (sec)	0	39	62	78	89	118	133
Green Time (sec)	33	16	9	5	23	8	1
Phase Time (sec)	40	23	15	11	30	14	7
Phase Split	29%	16%	11%	8%	21%	10%	5%

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	323	5.0	323	5.0	1276	0.253	100	13.8	LOS B	4.4	31.9	Short	70	0.0	NA
Lane 2	630	6.0	630	6.0	659[1]	0.956	100	67.9	LOS E	30.2	222.1	Full	500	0.0	0.0
Lane 3	807	6.0	807	6.0	845	0.956	100	67.4	LOS E	41.6	306.1	Full	500	0.0	4.9
Lane 4	625	6.0	625	6.0	654[1]	0.956	100	68.0	LOS E	29.9	219.9	Full	500	0.0	0.0
Lane 5	381	11.0	381	11.0	381	1.000	100	87.5	LOS F	15.7	120.2	Short	105	0.0	NA
Approach	2766	6.6	2766	6.6		1.000		64.2	LOS E	41.6	306.1				
East: Centre Road															
Lane 1	665	7.0	665	7.0	973[1]	0.683	100	23.2	LOS C	17.2	127.9	Short	80	0.0	NA
Lane 2	318	3.0	318	3.0	318[1]	1.003	100	110.0	LOS F	18.4	131.9	Full	500	30.0[N2]	0.0
Lane 3	359	3.0	359	3.0	358[1]	1.003	100	108.3	LOS F	20.6	147.6	Full	500	30.0[N2]	0.0
Lane 4	55	22.0	55	22.0	103	0.529	100	78.3	LOS E	2.4	19.6	Short	40	0.0	NA
Approach	1397	5.6	1397	5.6		1.003		67.0	LOS E	20.6	147.6				
North: Westall Road															
Lane 1	79	18.0	79	18.0	839	0.095	100	19.2	LOS B	1.3	10.8	Short	35	0.0	NA
Lane 2	377	8.0	377	8.0	376[1]	1.002	100	110.1	LOS F	22.5	168.6	Full	500	0.0	0.0
Lane 3	438	8.0	438	8.0	437	1.002	100	107.6	LOS F	25.9	193.6	Full	500	0.0	0.0
Lane 4	421	8.0	421	8.0	420[1]	1.002	100	108.3	LOS F	24.9	186.6	Full	500	0.0	0.0
Lane 5	90	8.0	90	8.0	100	0.893	100	91.7	LOS F	4.3	32.0	Short	100	0.0	NA
Approach	1404	8.6	1404	8.6		1.002		102.5	LOS F	25.9	193.6				
West: Centre Road															
Lane 1	108	8.0	108	8.0	712	0.152	100	31.2	LOS C	2.8	21.3	Short	35	0.0	NA

Lane 2	198	8.0	198	8.0	383[1]	0.516	100	48.3	LOS D	7.0	52.4	Full	200	0.0	0.0
Lane 3	232	8.0	232	8.0	450	0.516	100	49.4	LOS D	8.4	63.1	Full	200	0.0	0.0
Lane 4	170	12.0	170	12.0	244	0.696	100	69.7	LOS E	7.0	54.3	Short	100	0.0	NA
Approach	708	9.0	708	9.0		0.696		51.2	LOS D	8.4	63.1				
Intersection	6275	7.1	6275	7.1		1.003		71.9	LOS E	41.6	306.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N2 Capacity Adjustment specified by user.

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 4700 [1 CENTRE ROAD / MCNAUGHTON ROAD / KOMBI ROAD - PM Peak (Site Folder: Base - 2027)]

Network: 15 [PM (Network Folder: Base Condition - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Cycle Time)

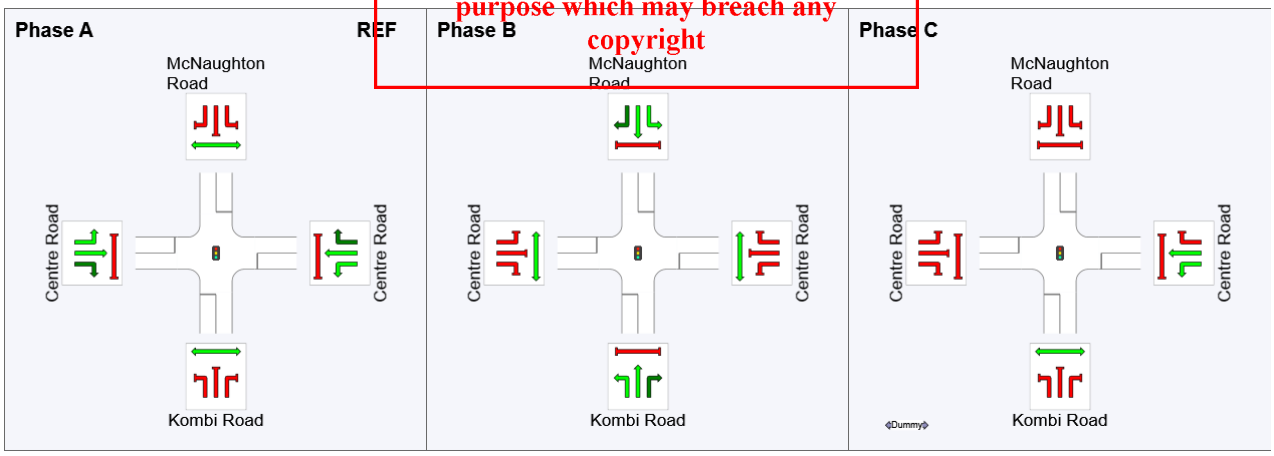
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

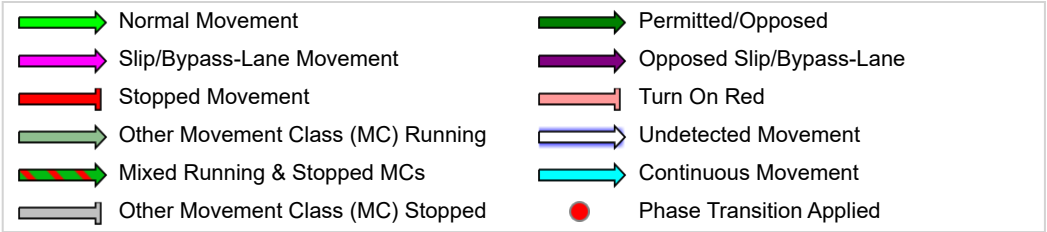
Phase	A	B	C
Phase Change Time (sec)	0	51	73
Green Time (sec)	50	16	1
Phase Time (sec)	56	22	2
Phase Split	70%	28%	3%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Kombi Road															
Lane 1	13	0.0	13	0.0	371	0.036	63[5]	33.5	LOS C	0.3	1.8	Full	500	0.0	0.0
Lane 2	22	5.0	22	5.0	378	0.057	100	28.2	LOS C	0.4	3.1	Full	500	0.0	0.0
Lane 3	12	0.0	12	0.0	272	0.046	100	35.8	LOS D	0.3	1.8	Short	25	0.0	NA
Approach	47	2.3	47	2.3		0.057		31.7	LOS C	0.4	3.1				
East: Centre Road															
Lane 1	409	1.2	409	1.2	1254	0.326	100	6.8	LOS A	4.3	30.4	Full	245	0.0	0.0
Lane 2	411	1.0	411	1.0	1259	0.326	100	6.6	LOS A	4.3	30.5	Full	245	0.0	0.0
Lane 3	30	7.0	30	7.0	262	0.114	100	18.2	LOS B	0.4	3.0	Short	30	0.0	NA
Approach	849	1.3	849	1.3		0.326		7.1	LOS A	4.3	30.5				
North: McNaughton Road															
Lane 1	61	4.0	61	4.0	361	0.168	100	34.7	LOS C	1.2	8.9	Full	500	0.0	0.0
Lane 2	21	5.0	21	5.0	378	0.055	32[5]	28.2	LOS C	0.4	2.9	Full	500	0.0	0.0
Lane 3	162	1.0	162	1.0	308	0.526	100	37.7	LOS D	3.6	25.5	Short	25	0.0	NA
Approach	243	2.1	243	2.1		0.526		36.1	LOS D	3.6	25.5				
West: Centre Road															
Lane 1	632	1.7	632	1.7	1186	0.533	100	10.9	LOS B	8.5	60.0	Full	500	0.0	0.0
Lane 2	619	2.0	619	2.0	1162[1]	0.533	100	8.9	LOS A	8.1	57.9	Full	500	0.0	0.0
Lane 3	12	0.0	12	0.0	387	0.032	100	14.1	LOS B	0.1	0.9	Short	20	0.0	NA
Approach	1264	1.8	1264	1.8		0.533		9.9	LOS A	8.5	60.0				
Intersection	2404	1.7	2404	1.7		0.533		12.0	LOS B	8.5	60.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program

Site: 101 [3 CENTRE ROAD / BOSCH ACCESS - PM Peak (Site Folder: Base - 2027)]

Network: 15 [PM (Network Folder: Base Condition - 2027)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Centre Road															
Lane 1	398	3.0	398	3.0	1913	0.208	100	0.0	LOS A	0.0	0.0	Full	200	0.0	0.0
Lane 2	398	3.0	398	3.0	1913	0.208	100	0.0	LOS A	0.0	0.0	Full	200	0.0	0.0
Lane 3	2	5.0	2	5.0	244	0.008	100	17.8	LOS C	0.0	0.1	Short	90	0.0	NA
Approach	798	3.0	798	3.0		0.208		0.1	NA	0.0	0.1				
North: Bosch Access															
Lane 1	41	5.0	41	5.0	78	0.529	100	78.3	LOS F	0.7	5.3	Full	500	0.0	0.0
Approach	41	5.0	41	5.0		0.529		78.3	LOS F	0.7	5.3				
West: Centre Road															
Lane 1	6	5.0	6	5.0	1793	0.003	100	5.6	LOS A	0.0	0.0	Short	40	0.0	NA
Lane 2	560	2.0	560	2.0	1925	0.291	100	0.0	LOS A	0.0	0.0	Full	245	0.0	0.0
Lane 3	560	2.0	560	2.0	1925	0.291	100	0.0	LOS A	0.0	0.0	Full	245	0.0	0.0
Approach	1126	2.0	1126	2.0		0.291		0.1	NA	0.0	0.0				
Intersection	1965	2.5	1965	2.5		0.529		1.7	NA	0.7	5.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 2956 [4 CENTRE ROAD / WESTALL ROAD - PM Peak (Site Folder: Base - 2027)]

Network: 15 [PM (Network Folder: Base Condition - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site User-Given Cycle Time)

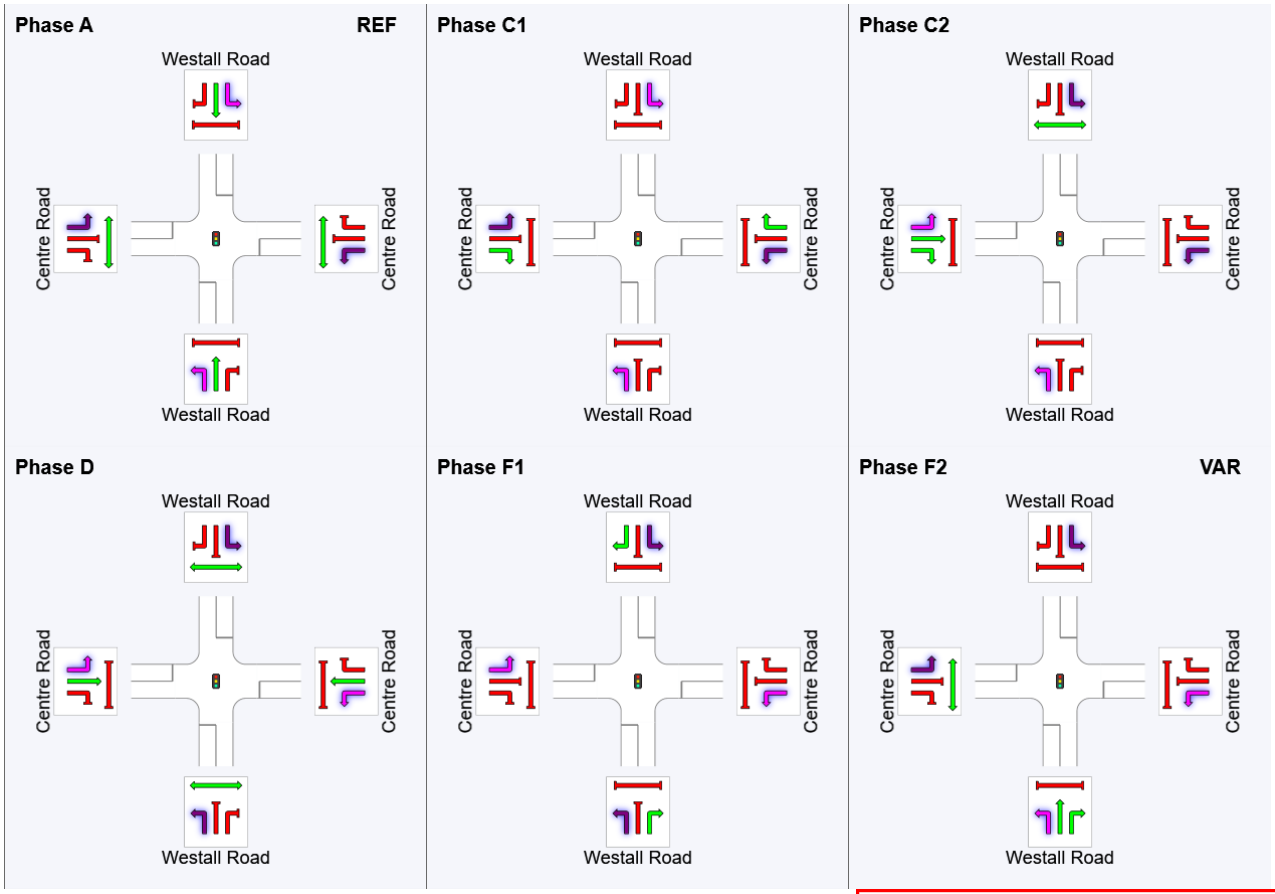
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, C1, C2, D, F1, F2*, F3*
Output Phase Sequence: A, C1, C2, D, F1, F2*
(* Variable Phase)

Phase Timing Summary

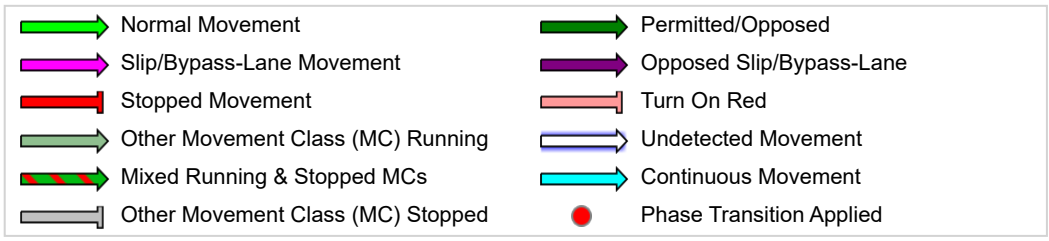
Phase	A	C1	C2	D	F1	F2
Phase Change Time (sec)	0	47	66	79	108	126
Green Time (sec)	41	12	7	23	11	8
Phase Time (sec)	48	18	13	30	17	14
Phase Split	34%	13%	9%	21%	12%	10%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	160	3.0	160	3.0	1286	0.124	100	12.9	LOS B	1.9	13.8	Short	70	0.0	NA
Lane 2	560	3.0	560	3.0	647[1]	0.864	100	47.1	LOS D	22.2	159.5	Full	500	0.0	0.0
Lane 3	650	3.0	650	3.0	751	0.864	100	47.9	LOS D	26.9	192.8	Full	500	0.0	0.0
Lane 4	526	3.0	526	3.0	608[1]	0.864	100	47.0	LOS D	20.6	148.0	Full	500	0.0	0.0
Lane 5	308	3.0	308	3.0	325	0.949	100	94.5	LOS F	15.9	114.3	Short	105	0.0	NA
Approach	2203	3.0	2203	3.0		0.949		51.4	LOS D	26.9	192.8				
East: Centre Road															
Lane 1	620	6.0	620	6.0	841	0.737	100	38.0	LOS D	15.7	115.4	Short	80	0.0	NA
Lane 2	292	3.0	292	3.0	305	0.957	100	90.0	LOS F	15.2	109.0	Full	500	0.0	0.0
Lane 3	235	3.0	235	3.0	246	0.957	100	90.5	LOS F	12.1	86.6	Full	500	0.0	0.0
Lane 4	148	4.0	148	4.0	147	1.009	100	122.7	LOS F	8.6	62.3	Short	40	0.0	NA
Approach	1295	4.6	1295	4.6		1.009		68.9	LOS E	15.7	115.4				
North: Westall Road															
Lane 1	81	13.0	81	13.0	906	0.090	100	20.5	LOS C	1.5	11.4	Short	35	0.0	NA
Lane 2	649	4.0	649	4.0	673[1]	0.965	100	77.5	LOS E	32.4	234.5	Full	500	40.0[N2]	0.0
Lane 3	537	4.0	537	4.0	557	0.965	100	84.5	LOS F	28.8	208.6	Full	500	0.0	0.0
Lane 4	668	4.0	668	4.0	693[1]	0.965	100	77.4	LOS E	33.5	242.4	Full	500	40.0[N2]	0.0
Lane 5	120	0.0	120	0.0	146	0.820	100	83.3	LOS F	5.4	37.8	Short	100	0.0	NA
Approach	2055	4.1	2055	4.1		0.965		77.3	LOS E	33.5	242.4				
West: Centre Road															
Lane 1	235	2.0	235	2.0	792	0.297	100	32.3	LOS C	6.2	44.2	Short	35	0.0	NA
Lane 2	254	2.0	254	2.0	338[1]	0.750	100	50.3	LOS D	9.4	67.0	Full	200	0.0	0.0
Lane 3	371	2.0	371	2.0	495	0.750	100	52.3	LOS D	14.5	103.0	Full	200	0.0	0.0
Lane 4	306	3.0	306	3.0	325	0.942	100	90.8	LOS F	15.6	112.1	Short	100	0.0	NA
Approach	1166	2.3	1166	2.3		0.942		57.9	LOS E	15.6	112.1				
Intersection	6719	3.5	6719	3.5		1.009		63.9	LOS E	33.5	242.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N2 Capacity Adjustment specified by user.

Appendix D

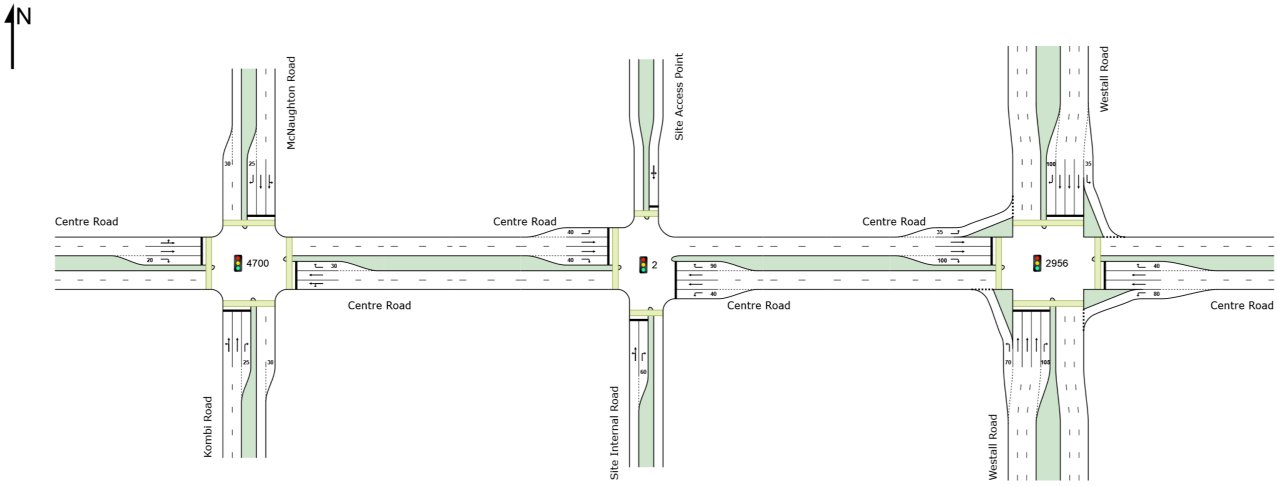
SIDRA Intersection Outputs – Post Development

NETWORK LAYOUT

Network: N101 [PM (Network Folder: Post Development - 2027)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
4700	NA	1 CENTRE ROAD / MCNAUGHTON ROAD / KOMBI ROAD - PM Peak
2	NA	2 CENTRE ROAD / SITE ACCESS SIGNALS - PM Peak
2956	NA	3 CENTRE ROAD / WESTALL ROAD - PM Peak

Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise | Created: 11 August, 2023 12:02:06 PM
Project: U:\300303832\technical\modelling\230810-Final-Report\230809-sid-clayton_business_parkV2_DTP-Update.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 4700 [1 CENTRE ROAD / MCNAUGHTON ROAD / KOMBI ROAD - AM Peak (Site Folder: Post Development - 2027)]

Network: 3 [AM (Network Folder: Post Development - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

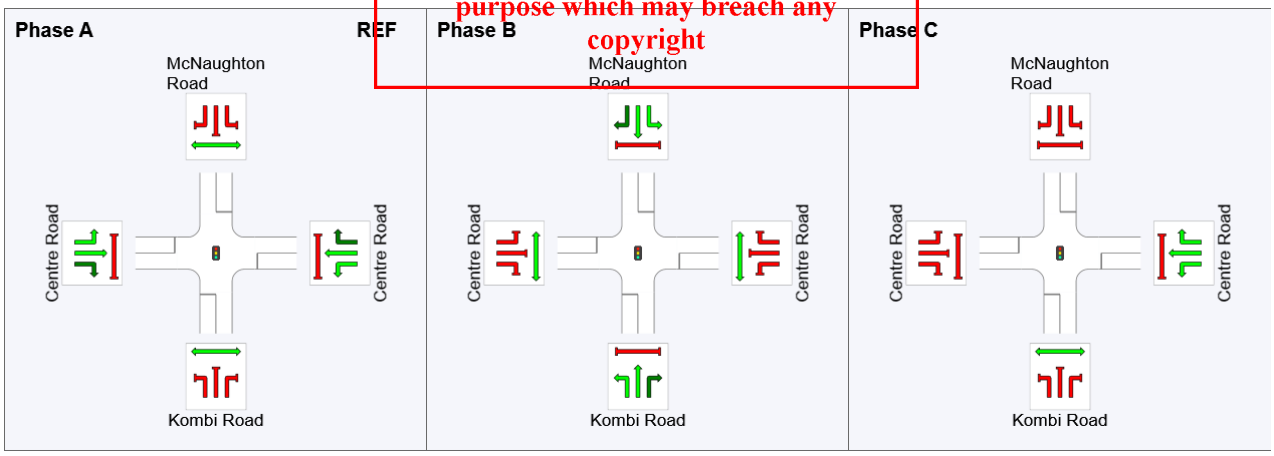
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

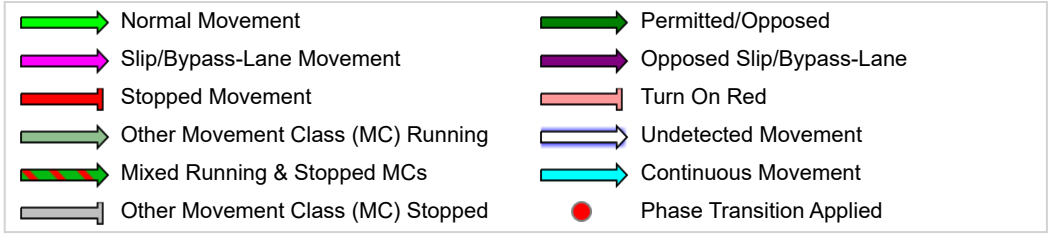
Phase	A	B	C
Phase Change Time (sec)	1	101	125
Green Time (sec)	95	18	10
Phase Time (sec)	101	24	15
Phase Split	72%	17%	11%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Kombi Road															
Lane 1	9	33.0	9	33.0	193	0.048	47[5]	64.1	LOS E	0.3	3.1	Full	500	0.0	0.0
Lane 2	25	4.0	25	4.0	244	0.101	100	58.4	LOS E	0.9	6.7	Full	500	0.0	0.0
Lane 3	4	0.0	4	0.0	125	0.033	100	71.1	LOS E	0.2	1.1	Short	25	0.0	NA
Approach	38	10.6	38	10.6		0.101		61.2	LOS E	0.9	6.7				
East: Centre Road															
Lane 1	457	3.9	451	3.9	1493	0.302	100	1.4	LOS A	1.4	9.8	Full	245	0.0	0.0
Lane 2	457	4.0	451	4.0	1493	0.302	100	0.5	LOS A	0.5	3.8	Full	245	0.0	0.0
Lane 3	131	5.0	129	5.0	459	0.281	100	6.0	LOS A	0.1	0.6	Short	30	0.0	NA
Approach	1045	4.1	1032[N1]	4.1		0.302		1.5	LOS A	1.4	9.8				
North: McNaughton Road															
Lane 1	93	16.0	93	16.0	214	0.433	100	67.9	LOS E	3.7	29.3	Full	500	0.0	0.0
Lane 2	25	0.0	25	0.0	251	0.099	23[5]	58.3	LOS E	0.9	6.4	Full	500	0.0	0.0
Lane 3	110	9.0	110	9.0	172[1]	0.642	100	71.6	LOS E	4.6	34.6	Short	25	0.0	NA
Approach	228	10.9	228	10.9		0.642		68.6	LOS E	4.6	34.6				
West: Centre Road															
Lane 1	515	7.0	515	7.0	1233	0.418	100	13.5	LOS B	9.5	70.1	Full	500	0.0	0.0
Lane 2	498	7.0	498	7.0	1191[1]	0.418	100	10.4	LOS B	8.9	66.2	Full	500	0.0	0.0
Lane 3	13	0.0	13	0.0	375	0.036	100	13.5	LOS B	0.2	1.3	Short	20	0.0	NA
Approach	1027	6.9	1027	6.9		0.418		12.0	LOS B	9.5	70.1				
Intersection	2338	6.1	2325[N1]	6.1		0.642		13.7	LOS B	9.5	70.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Site: 2 [2 CENTRE ROAD / SITE ACCESS SIGNALS - AM Peak (Site Folder: Post Development - 2027)]

Network: 3 [AM (Network Folder: Post Development - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

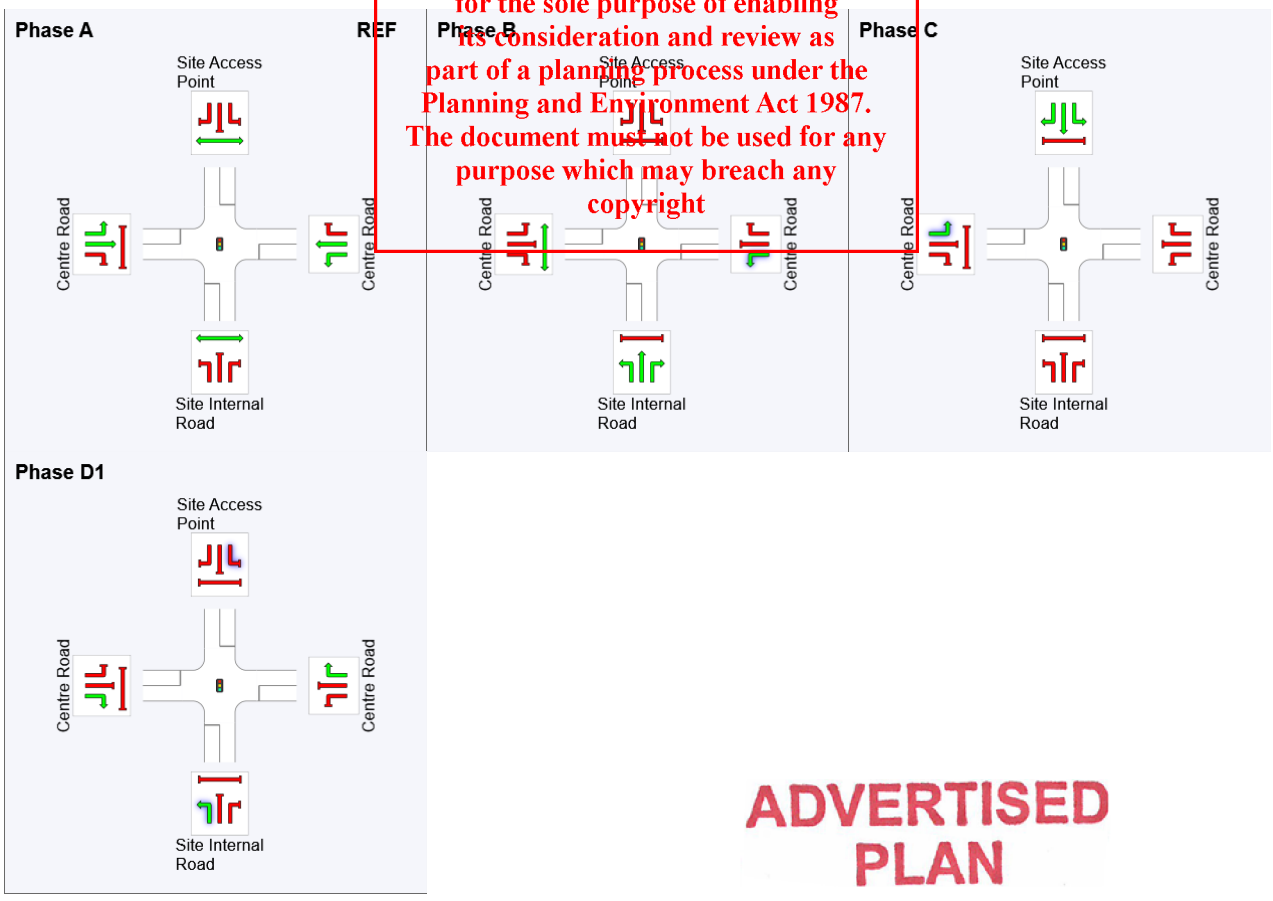
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D1, D2*, D3*
Output Phase Sequence: A, B, C, D1
(* Variable Phase)

Phase Timing Summary

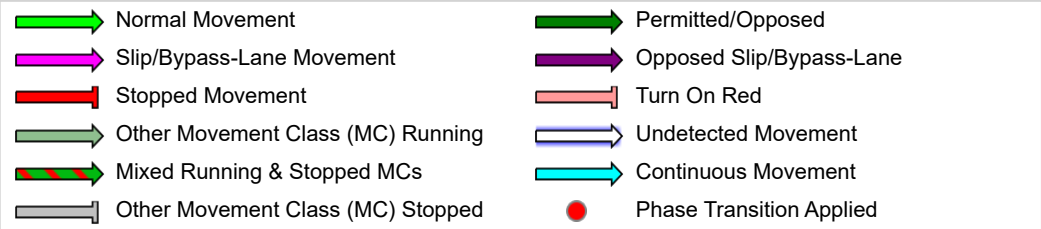
Phase	A	B	C	D1
Phase Change Time (sec)	0	79	104	116
Green Time (sec)	73	19	6	18
Phase Time (sec)	79	25	12	24
Phase Split	56%	18%	9%	17%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Site Internal Road															
Lane 1	44	5.0	44	5.0	459	0.097	100	36.3	LOS D	1.2	8.6	Full	500	0.0	0.0
Lane 2	72	5.0	72	5.0	243	0.297	100	65.3	LOS E	2.8	20.2	Short	60	0.0	NA
Approach	116	5.0	116	5.0		0.297		54.2	LOS D	2.8	20.2				
East: Centre Road															
Lane 1	193	5.0	191	5.0	1255	0.152	100	17.5	LOS B	4.4	31.8	Short	40	0.0	NA
Lane 2	447	4.0	443	4.0	780[1]	0.568	100	26.4	LOS C	13.5	97.8	Full	185	0.0	0.0
Lane 3	550	4.0	545	4.0	960[1]	0.568	100	43.9	LOS D	21.2	153.2	Full	185	0.0	32.4
Lane 4	38	5.0	38	5.0	231	0.164	100	52.7	LOS D	1.2	8.5	Short	90	0.0	NA
Approach	1229	4.2	1216[N1]	4.2		0.568		33.7	LOS C	21.2	153.2				
North: Site Access Point															
Lane 1	8	5.0	8	5.0	77	0.107	100	78.0	LOS E	0.3	2.6	Full	500	0.0	0.0
Approach	8	5.0	8	5.0		0.107		78.0	LOS E	0.3	2.6				
West: Centre Road															
Lane 1	28	5.0	28	5.0	1012	0.028	100	12.7	LOS B	0.3	2.0	Short	40	0.0	NA
Lane 2	346	9.0	346	9.0	936[1]	0.370	100	19.9	LOS B	8.1	60.9	Full	245	0.0	0.0
Lane 3	351	9.0	351	9.0	947	0.370	100	14.4	LOS B	5.6	42.0	Full	245	0.0	0.0
Lane 4	131	5.0	131	5.0	231	0.568	100	76.7	LOS E	5.6	40.6	Short	40	0.0	NA
Approach	856	8.3	856	8.3		0.568		26.1	LOS C	8.1	60.9				
Intersection	2209	5.8	2196[N1]	5.8		0.568		32.0	LOS C	21.2	153.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Site: 2956 [3 CENTRE ROAD / WESTALL ROAD - AM Peak (Site Folder: Post Development - 2027)]

Network: 3 [AM (Network Folder: Post Development - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C1, C2*, C3*, D, F1, F2
Output Phase Sequence: A, B, C1, C2*, D, F1, F2
(* Variable Phase)

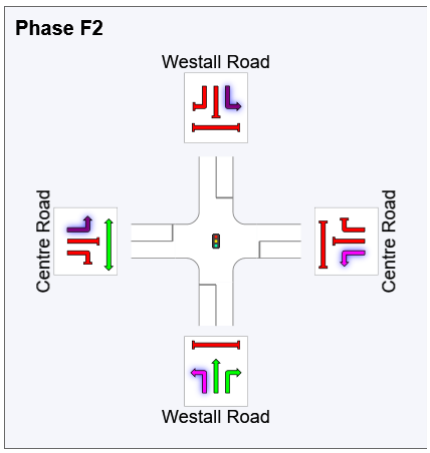
Phase Timing Summary

Phase	A	B	C1	C2	D	F1	F2
Phase Change Time (sec)	0	41	61	76	84	114	136
Green Time (sec)	35	13	8	2	24	15	***
Phase Time (sec)	42	20	14	8	31	21	4
Phase Split	30%	14%	10%	6%	22%	15%	3%

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%.

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	390	5.0	390	5.0	1165	0.334	100	18.3	LOS B	6.5	47.6	Short	70	0.0	NA
Lane 2	622	6.0	622	6.0	606[1]	1.027	100	116.7	LOS F	41.1	302.2	Full	500	0.0	3.8
Lane 3	813	6.0	813	6.0	791	1.027	100	110.3	LOS F	52.1	383.8	Full	500	0.0	25.5
Lane 4	638	6.0	638	6.0	621[1]	1.027	100	116.2	LOS F	42.0	309.0	Full	500	0.0	5.8
Lane 5	392	11.0	392	11.0	394	0.995	100	87.7	LOS F	16.4	125.7	Short	105	0.0	NA
Approach	2855	6.5	2855	6.5		1.027		97.4	LOS F	52.1	383.8				
East: Centre Road															
Lane 1	689	7.0	689	7.0	979[1]	0.704	100	26.0	LOS C	17.6	130.6	Short	80	0.0	NA
Lane 2	329	3.0	329	3.0	323[1]	1.019	100	118.4	LOS F	19.8	142.4	Full	500	30.0[N2]	0.0
Lane 3	382	3.0	382	3.0	375[1]	1.019	100	116.3	LOS F	22.8	163.7	Full	500	30.0[N2]	0.0
Lane 4	55	22.0	55	22.0	92	0.596	100	80.4	LOS F	2.4	20.0	Short	40	0.0	NA
Approach	1455	5.6	1455	5.6		1.019		72.7	LOS E	22.8	163.7				
North: Westall Road															
Lane 1	79	18.0	79	18.0	835	0.095	100	20.1	LOS C	1.4	11.2	Short	35	0.0	NA
Lane 2	392	8.0	392	8.0	400[1]	0.980	100	95.2	LOS F	21.5	160.9	Full	500	0.0	0.0
Lane 3	454	8.0	454	8.0	463	0.980	100	95.1	LOS F	25.4	189.9	Full	500	0.0	0.0
Lane 4	416	8.0	416	8.0	424[1]	0.980	100	95.1	LOS F	22.9	171.7	Full	500	0.0	0.0
Lane 5	130	8.0	130	8.0	127	1.021	100	136.8	LOS F	8.1	60.5	Short	100	-32.4[N3]	NA
Approach	1471	8.5	1471	8.5		1.021		94.7	LOS F	25.4	189.9				
West: Centre Road															
Lane 1	126	8.0	126	8.0	742	0.170	100	7.2	LOS A	0.2	1.5	Short	35	0.0	NA

Lane 2	196	8.0	196	8.0	336[1]	0.585	100	61.6	LOS E	8.0	59.8	Full	185	0.0	0.0
Lane 3	248	8.0	248	8.0	424	0.585	100	52.0	LOS D	9.3	69.4	Full	185	0.0	0.0
Lane 4	199	12.0	199	12.0	196	1.018	100	121.5	LOS F	11.6	89.4	Short	100	0.0	NA
Approach	769	9.0	769	9.0		1.018		65.1	LOS E	11.6	89.4				
Intersection	6549	7.1	6549	7.1		1.027		87.5	LOS F	52.1	383.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N2 Capacity Adjustment specified by user.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update | **Template: Site Summary (Network)**

Site: 4700 [1 CENTRE ROAD / MCNAUGHTON ROAD / KOMBI ROAD - PM Peak (Site Folder: Post Development - 2027)] | **Network: 4 [PM (Network Folder: Post Development - 2027)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

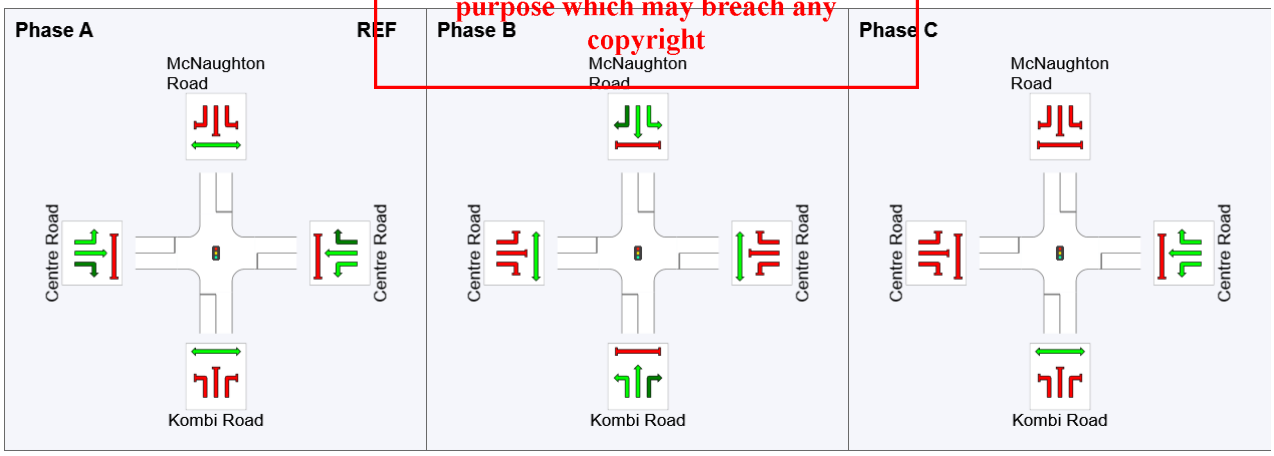
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

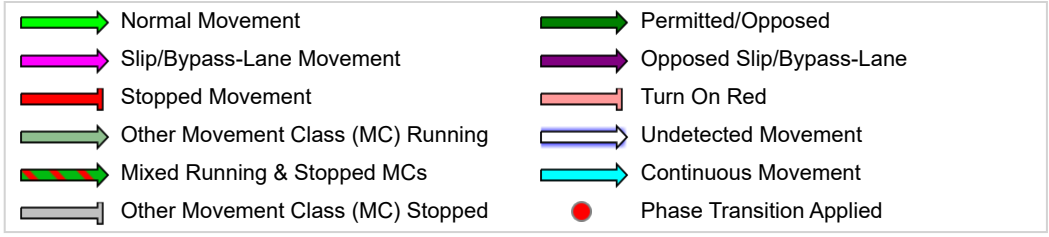
Phase	A	B	C
Phase Change Time (sec)	36	134	22
Green Time (sec)	92	22	8
Phase Time (sec)	98	28	14
Phase Split	70%	20%	10%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Kombi Road															
Lane 1	13	0.0	13	0.0	292	0.046	63[5]	59.3	LOS E	0.5	3.3	Full	500	0.0	0.0
Lane 2	22	5.0	22	5.0	297	0.073	100	54.1	LOS D	0.8	5.6	Full	500	0.0	0.0
Lane 3	12	0.0	12	0.0	180	0.069	100	65.2	LOS E	0.5	3.3	Short	25	0.0	NA
Approach	47	2.3	47	2.3		0.073		58.4	LOS E	0.8	5.6				
East: Centre Road															
Lane 1	471	1.2	466	1.2	1462	0.319	100	8.0	LOS A	8.5	60.3	Full	245	0.0	0.0
Lane 2	402	1.0	398	1.0	1249[1]	0.319	100	7.0	LOS A	6.6	46.7	Full	245	0.0	0.0
Lane 3	70	7.0	69	7.0	343	0.202	100	13.2	LOS B	0.6	4.8	Short	30	0.0	NA
Approach	943	1.6	934[N1]	1.6		0.319		7.9	LOS A	8.5	60.3				
North: McNaughton Road															
Lane 1	78	4.0	78	4.0	284	0.276	100	62.1	LOS E	2.9	21.1	Full	500	0.0	0.0
Lane 2	21	5.0	21	5.0	297	0.069	25[5]	54.0	LOS D	0.7	5.4	Full	500	0.0	0.0
Lane 3	162	1.0	162	1.0	215[1]	0.751	100	71.3	LOS E	6.9	48.6	Short	25	0.0	NA
Approach	261	2.2	261	2.2		0.751		67.2	LOS E	6.9	48.6				
West: Centre Road															
Lane 1	648	1.7	648	1.7	1247	0.520	100	15.0	LOS B	13.8	98.0	Full	500	0.0	0.0
Lane 2	626	2.0	626	2.0	1204[1]	0.520	100	12.8	LOS B	13.0	92.5	Full	500	0.0	0.0
Lane 3	12	0.0	12	0.0	381	0.033	100	15.0	LOS B	0.2	1.3	Short	20	0.0	NA
Approach	1287	1.8	1287	1.8		0.520		13.9	LOS B	13.8	98.0				
Intersection	2538	1.8	2528[N1]	1.8		0.751		18.1	LOS B	13.8	98.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Site: 2 [2 CENTRE ROAD / SITE ACCESS SIGNALS - PM Peak (Site Folder: Post Development - 2027)]

Network: 4 [PM (Network Folder: Post Development - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D1, D2*, D3*
Output Phase Sequence: A, B, C, D1, D3*
(* Variable Phase)

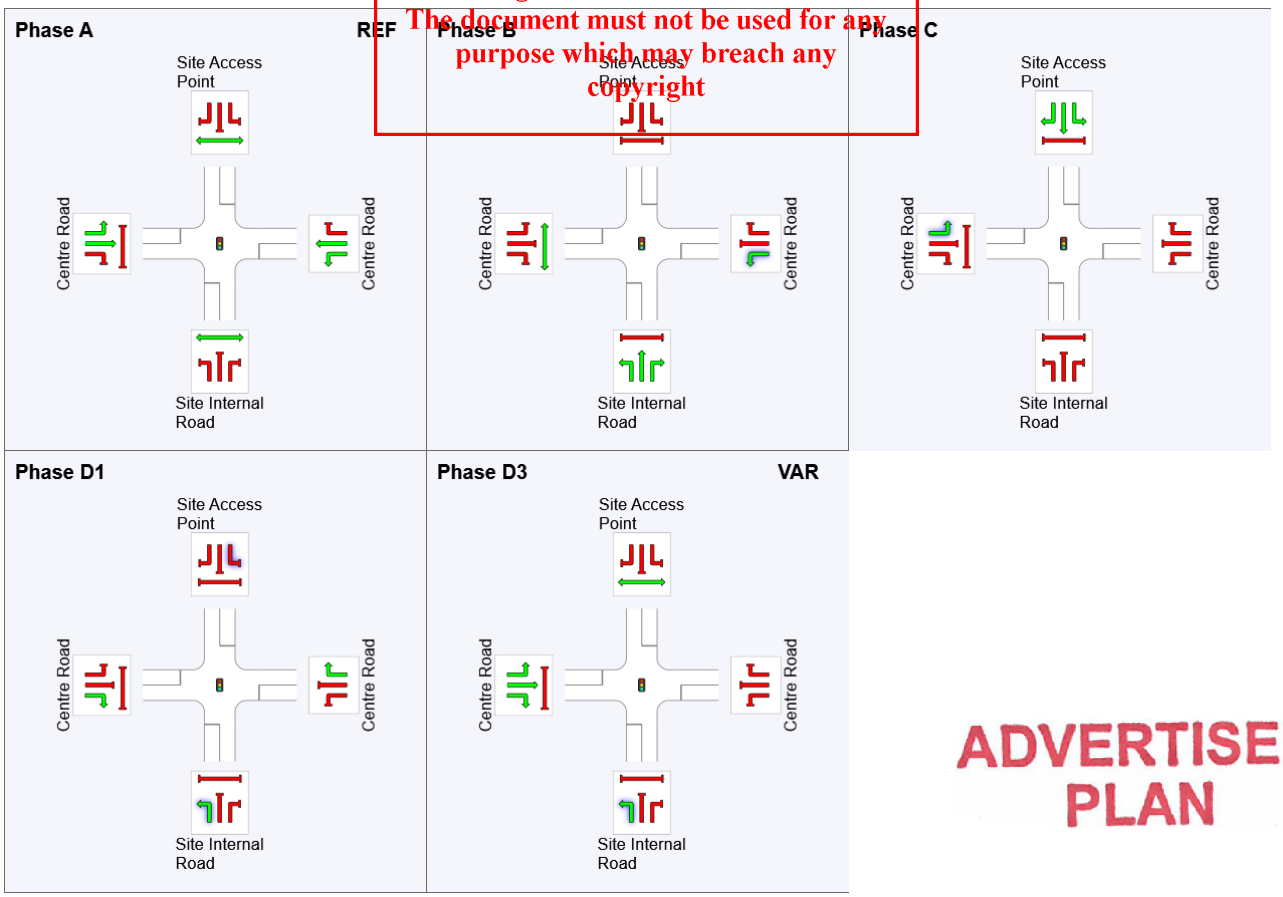
Phase Timing Summary

Phase	A	B	C	D1	D3
Phase Change Time (sec)	55	129	29	41	53
Green Time (sec)	68	34	6	6	***
Phase Time (sec)	74	40	12	12	2
Phase Split	53%	29%	9%	9%	1%

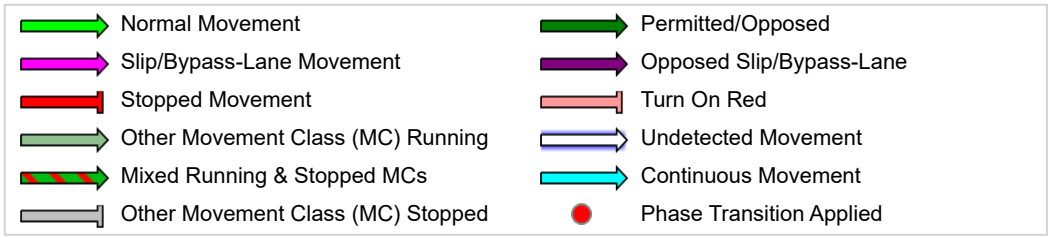
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified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

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Site Internal Road															
Lane 1	130	5.0	130	5.0	548	0.237	100	32.8	LOS C	3.3	24.1	Full	500	0.0	0.0
Lane 2	172	5.0	172	5.0	218	0.791	100	68.2	LOS E	7.6	55.4	Short	60	-50.0 N3	NA
Approach	302	5.0	302	5.0		0.791		53.0	LOS D	7.6	55.4				
East: Centre Road															
Lane 1	68	5.0	67	5.0	1383	0.049	100	7.4	LOS A	0.3	1.9	Short	40	0.0	NA
Lane 2	393	3.0	388	3.0	907	0.428	100	16.1	LOS B	6.6	47.7	Full	185	0.0	0.0
Lane 3	403	3.0	398	3.0	929	0.428	100	20.0	LOS B	8.1	58.4	Full	185	0.0	0.0
Lane 4	2	5.0	2	5.0	77	0.026	100	79.0	LOS F	0.1	0.6	Short	90	0.0	NA
Approach	866	3.2	855 N1	3.2		0.428		17.4	LOS B	8.1	58.4				
North: Site Access Point															
Lane 1	42	5.0	42	5.0	77	0.549	100	81.7	LOS F	1.9	13.7	Full	500	0.0	0.0
Approach	42	5.0	42	5.0		0.549		81.7	LOS F	1.9	13.7				
West: Centre Road															
Lane 1	6	5.0	6	5.0	973	0.006	100	11.8	LOS B	0.0	0.4	Short	40	0.0	NA
Lane 2	755	2.0	755	2.0	957 1	0.789	100	17.7	LOS B	19.0	135.2	Full	245	0.0	0.0
Lane 3	365	2.0	365	2.0	462 1	0.789	100	13.4	LOS B	7.7	55.0	Full	245	-50.0 N3	0.0
Lane 4	41	5.0	41	5.0	102	0.402	100	80.9	LOS F	1.8	13.2	Short	40	0.0	NA
Approach	1167	2.1	1167	2.1		0.789		18.6	LOS B	19.0	135.2				
Intersection	2377	2.9	2367 N1	2.9		0.791		23.7	LOS C	19.0	135.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

Site: 2956 [3 CENTRE ROAD / WESTALL ROAD - PM Peak (Site Folder: Post Development - 2027)]

Network: 4 [PM (Network Folder: Post Development - 2027)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

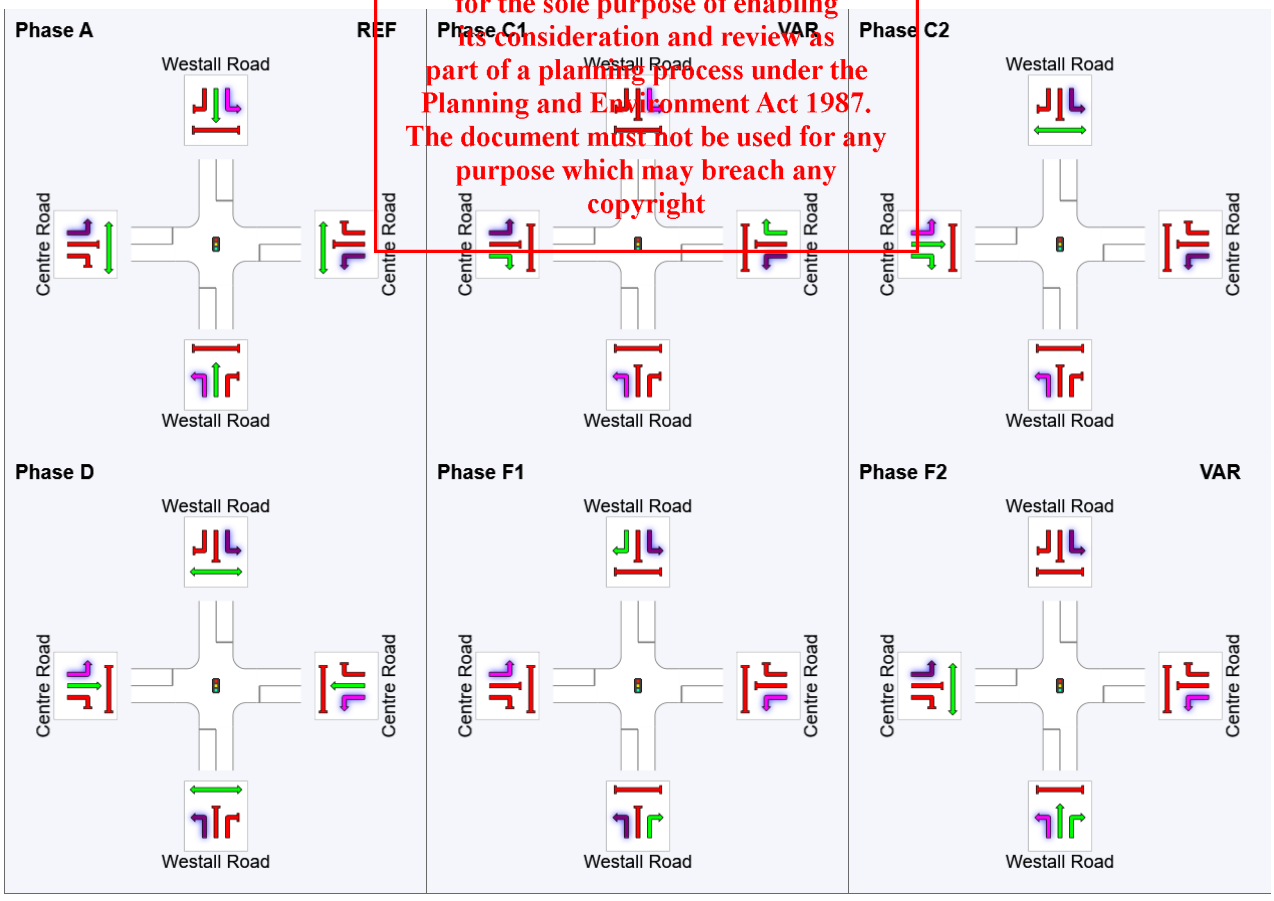
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, C1*, C2, D, F1, F2*, F3*
Output Phase Sequence: A, C1*, C2, D, F1, F2*
(* Variable Phase)

Phase Timing Summary

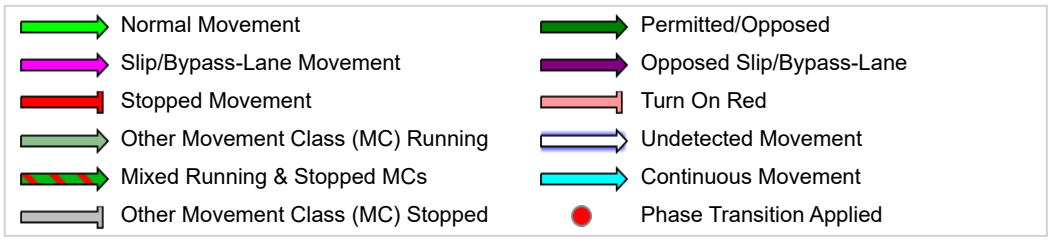
Phase	A	C1	C2	D	F1	F2
Phase Change Time (sec)	0	49	66	82	110	129
Green Time (sec)	43	10	10	22	12	5
Phase Time (sec)	50	16	16	29	18	11
Phase Split	36%	11%	11%	21%	13%	8%

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



Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	189	3.0	189	3.0	1262	0.149	100	14.0	LOS B	2.5	17.9	Short	70	0.0	NA
Lane 2	561	3.0	561	3.0	622[1]	0.902	100	55.3	LOS E	24.2	173.9	Full	500	0.0	0.0
Lane 3	666	3.0	666	3.0	738	0.902	100	55.7	LOS E	30.0	215.3	Full	500	0.0	0.0
Lane 4	535	3.0	535	3.0	592[1]	0.902	100	55.3	LOS E	22.9	164.2	Full	500	0.0	0.0
Lane 5	341	3.0	341	3.0	299	1.142	100	214.5	LOS F	27.8	199.6	Short	105	0.0	NA
Approach	2292	3.0	2292	3.0		1.142		75.7	LOS E	30.0	215.3				
East: Centre Road															
Lane 1	630	6.0	630	6.0	776	0.812	100	45.2	LOS D	18.6	136.9	Short	80	0.0	NA
Lane 2	298	3.0	298	3.0	292	1.020	100	120.8	LOS F	18.1	129.9	Full	500	0.0	0.0
Lane 3	244	3.0	244	3.0	239	1.020	100	123.5	LOS F	15.0	107.5	Full	500	0.0	0.0
Lane 4	148	4.0	148	4.0	129	1.151	100	220.9	LOS F	12.1	87.7	Short	40	0.0	NA
Approach	1320	4.5	1320	4.5		1.151		96.4	LOS F	18.6	136.9				
North: Westall Road															
Lane 1	81	13.0	81	13.0	913	0.089	100	18.6	LOS B	1.3	10.4	Short	35	0.0	NA
Lane 2	611	4.0	611	4.0	524[1]	1.165	100	222.0	LOS F	53.2	385.4	Full	500	0.0	25.9
Lane 3	680	4.0	680	4.0	584	1.165	100	220.5	LOS F	59.1	427.5	Full	500	0.0	35.4
Lane 4	632	4.0	632	4.0	542[1]	1.165	100	221.5	LOS F	55.0	398.2	Full	500	0.0	28.9
Lane 5	137	0.0	137	0.0	159	0.861	100	85.3	LOS F	6.3	44.2	Short	100	0.0	NA
Approach	2141	4.1	2141	4.1		1.165		204.8	LOS F	59.1	427.5				
West: Centre Road															
Lane 1	275	2.0	275	2.0	823	0.335	100	9.9	LOS A	1.4	9.7	Short	35	0.0	NA
Lane 2	281	2.0	281	2.0	388[1]	0.723	100	21.4	LOS C	6.1	43.3	Full	185	0.0	0.0
Lane 3	378	2.0	378	2.0	522	0.723	100	31.4	LOS C	11.9	85.0	Full	185	0.0	50.0[8]
Lane 4	382	3.0	382	3.0	338	1.133	100	204.7	LOS F	25.8[N4]	185.0[N4]	Short	100	0.0	NA
Approach	1316	2.3	1316	2.3		1.133		75.1	LOS E	25.8	185.0				
Intersection	7069	3.5	7069	3.5		1.165		118.6	LOS F	59.1	427.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

N4 Average back of queue has been restricted to the available queue storage space.

Appendix E

SIDRA Intersection Outputs – Centre Road/Westall Road Signalised Intersection Mitigation

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 2956 [4 CENTRE ROAD / WESTALL ROAD - AM Peak (Site Folder: Post Development - 2027 - Mitigation (Double Right N Approach) - Diamond Phase))]

Network: 18 [AM (Network Folder: Post Development - 2027 - Mitigation (Double Right N Approach - Diamond Phase))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

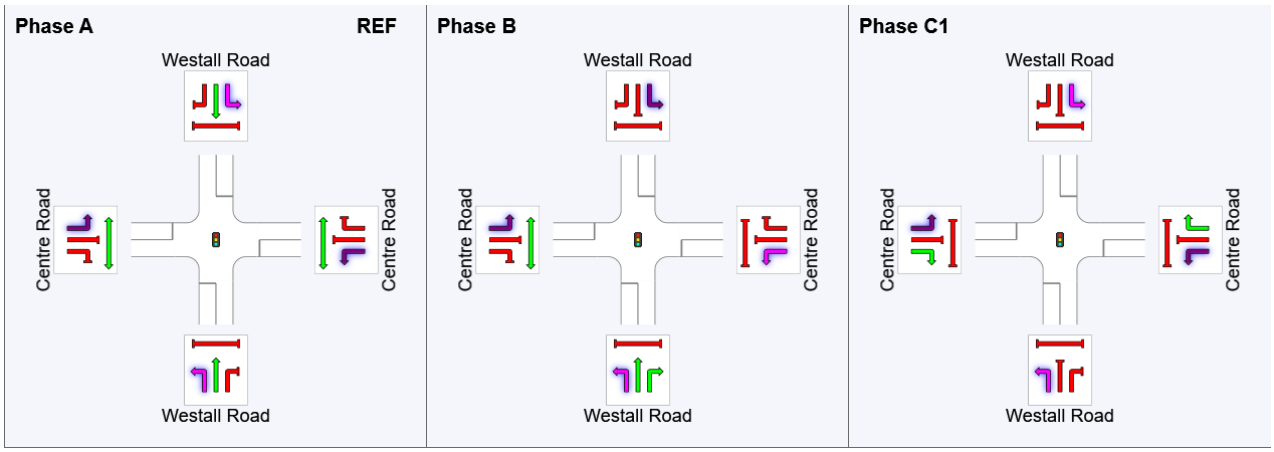
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C1, C2*, C3*, D, F1, F2*, F3*
Output Phase Sequence: A, B, C1, D, F1, F2*
(* Variable Phase)

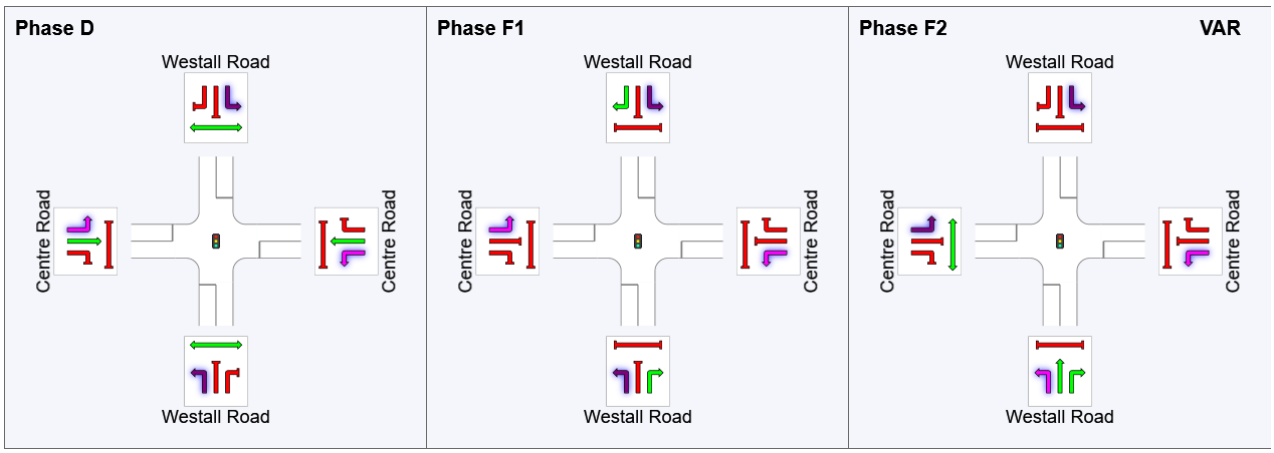
Phase Timing Summary

Phase	A	B	C1	D	F1	F2
Phase Change Time (sec)	139	39	62	85	116	130
Green Time (sec)	34	16	16	25	7	3
Phase Time (sec)	41	23	22	32	13	9
Phase Split	29%	16%	16%	23%	9%	6%

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dis:] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	390	5.0	390	5.0	1269	0.307	100	13.2	LOS B	5.1	37.6	Short	70	-2.6 N3	NA
Lane 2	596	6.0	596	6.0	630 1	0.946	100	62.5	LOS E	26.9	197.8	Full	500	0.0	0.0
Lane 3	837	6.0	837	6.0	885	0.946	100	61.1	LOS E	41.5	305.6	Full	500	0.0	4.8
Lane 4	641	6.0	641	6.0	678 1	0.946	100	61.8	LOS E	29.3	215.5	Full	500	0.0	0.0
Lane 5	392	11.0	392	11.0	394	0.995	100	88.8	LOS F	15.8	121.1	Short	105	0.0	NA
Approach	2855	6.5	2855	6.5		0.995		58.8	LOS E	41.5	305.6				
East: Centre Road															
Lane 1	689	7.0	689	7.0	980 1	0.703	100	25.0	LOS C	18.0	133.2	Short	80	0.0	NA
Lane 2	325	3.0	325	3.0	327 1	0.992	100	101.1	LOS F	17.6	126.4	Full	500	30.0 N2	0.0
Lane 3	387	3.0	387	3.0	390 1	0.992	100	100.3	LOS F	21.2	152.1	Full	500	30.0 N2	0.0
Lane 4	55	22.0	55	22.0	183	0.298	100	68.8	LOS E	2.2	17.9	Short	40	0.0	NA
Approach	1455	5.6	1455	5.6		0.992		63.6	LOS E	21.2	152.1				
North: Westall Road															
Lane 1	79	18.0	79	18.0	882	0.090	100	20.4	LOS C	1.4	11.2	Short	35	0.0	NA
Lane 2	385	8.0	385	8.0	388 1	0.993	100	102.5	LOS F	21.9	163.6	Full	500	0.0	0.0
Lane 3	447	8.0	447	8.0	450	0.993	100	102.3	LOS F	25.8	193.3	Full	500	0.0	0.0
Lane 4	429	8.0	429	8.0	433 1	0.993	100	102.3	LOS F	24.7	184.7	Full	500	0.0	0.0
Lane 5	79	8.0	79	8.0	86	0.920	100	95.9	LOS F	3.9	28.9	Short	100	-2.6 N3	NA
Lane 6	51	8.0	51	8.0	56	0.920	100	100.7	LOS F	2.6	19.6	Short	80	-36.6 N3	NA
Approach	1471	8.5	1471	8.5		0.993		97.5	LOS F	25.8	193.3				
West: Centre Road															

Lane 1	126	8.0	126	8.0	655	0.192	100	7.1	LOS A	0.2	1.6	Short	35	0.0	NA
Lane 2	193	8.0	193	8.0	254[1]	0.760	100	70.8	LOS E	8.3	62.3	Full	185	0.0	0.0
Lane 3	251	8.0	251	8.0	331	0.760	100	61.2	LOS E	10.4	77.9	Full	185	0.0	0.0
Lane 4	199	12.0	199	12.0	196	1.018	100	121.5	LOS F	11.6	89.4	Short	100	0.0	NA
Approach	769	9.0	769	9.0		1.018		70.4	LOS E	11.6	89.4				
Intersection	6549	7.1	6549	7.1		1.018		69.9	LOS E	41.5	305.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N2 Capacity Adjustment specified by user.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 2956 [4 CENTRE ROAD / WESTALL ROAD - PM Peak (Site Folder: Post Development - 2027 - Mitigation (Double Right N Approach) - Diamond Phase))]

Network: 19 [PM (Network Folder: Post Development - 2027 - Mitigation (Double Right N Approach - Diamond Phase))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

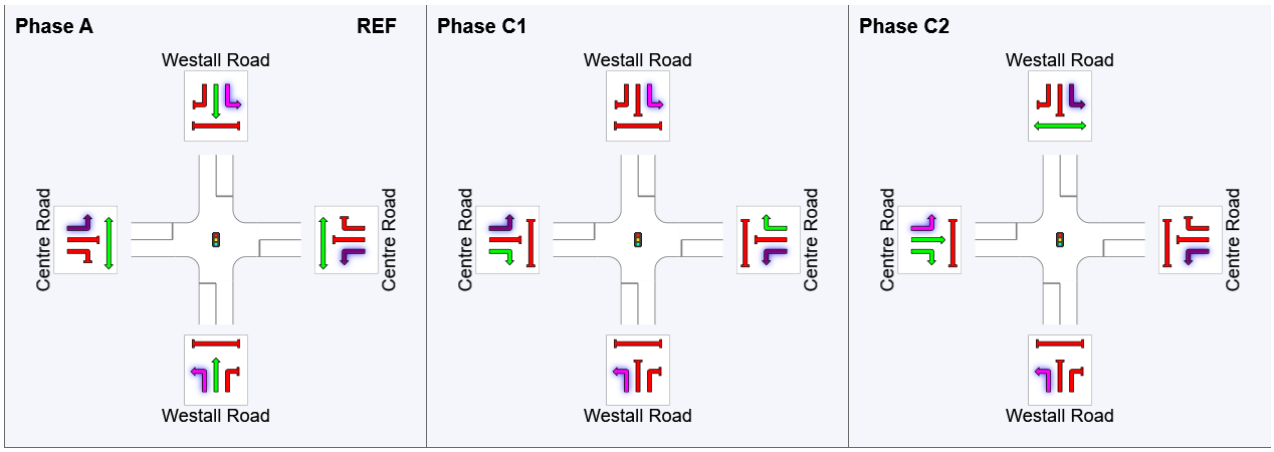
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, C1, C2, D, F1, F2*, F3*
Output Phase Sequence: A, C1, C2, D, F1, F2*
(* Variable Phase)

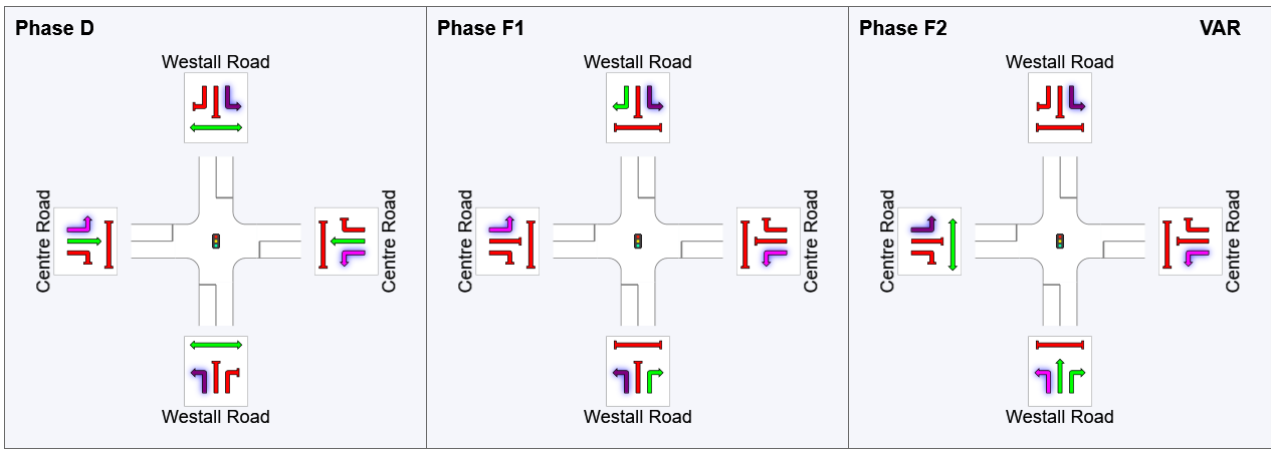
Phase Timing Summary

Phase	A	C1	C2	D	F1	F2
Phase Change Time (sec)	0	45	66	80	108	121
Green Time (sec)	39	14	8	22	6	13
Phase Time (sec)	46	20	14	29	12	19
Phase Split	33%	14%	10%	21%	9%	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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	189	3.0	189	3.0	1329	0.142	100	12.4	LOS B	2.2	15.6	Short	70	0.0	NA
Lane 2	563	3.0	563	3.0	667[1]	0.844	100	41.9	LOS D	21.0	150.9	Full	500	0.0	0.0
Lane 3	669	3.0	669	3.0	792	0.844	100	42.9	LOS D	26.3	188.6	Full	500	0.0	0.0
Lane 4	530	3.0	530	3.0	627[1]	0.844	100	41.8	LOS D	19.5	140.1	Full	500	0.0	0.0
Lane 5	331	3.0	331	3.0	325	1.019	100	127.4	LOS F	20.3	145.4	Short	105	0.0	NA
Approach	2282	3.0	2282	3.0		1.019		52.1	LOS D	26.3	188.6				
East: Centre Road															
Lane 1	630	6.0	630	6.0	801	0.786	100	41.9	LOS D	17.5	129.2	Short	80	0.0	NA
Lane 2	304	3.0	304	3.0	292[1]	1.043	100	134.5	LOS F	19.6	140.8	Full	500	0.0	0.0
Lane 3	237	3.0	237	3.0	227[1]	1.043	100	138.0	LOS F	15.5	111.1	Full	500	-7.3[N3]	0.0
Lane 4	148	4.0	148	4.0	169[1]	0.878	100	84.1	LOS F	6.9	49.9	Short	40	0.0	NA
Approach	1320	4.5	1320	4.5		1.043		85.3	LOS F	19.6	140.8				
North: Westall Road															
Lane 1	81	13.0	81	13.0	881	0.092	100	22.0	LOS C	1.6	12.2	Short	35	0.0	NA
Lane 2	641	4.0	641	4.0	639[1]	1.003	100	100.7	LOS F	37.1	268.5	Full	500	40.0[N2]	0.0
Lane 3	531	4.0	531	4.0	529	1.003	100	105.0	LOS F	31.6	228.6	Full	500	0.0	0.0
Lane 4	694	4.0	694	4.0	692[1]	1.003	100	99.1	LOS F	39.8	288.4	Full	500	40.0[N2]	0.0
Lane 5	71	0.0	71	0.0	80	0.894	100	92.5	LOS F	3.4	23.8	Short	100	0.0	NA
Lane 6	66	0.0	66	0.0	74	0.894	100	93.2	LOS F	3.2	22.2	Short	80	-7.3[N3]	NA
Approach	2084	4.1	2084	4.1		1.003		97.7	LOS F	39.8	288.4				
West: Centre Road															

Lane 1	275	2.0	275	2.0	755	0.365	100	9.0	LOS A	1.1	8.2	Short	35	0.0	NA
Lane 2	261	2.0	261	2.0	302[1]	0.867	100	62.3	LOS E	11.4	81.0	Full	185	0.0	0.0
Lane 3	397	2.0	397	2.0	459[1]	0.867	100	59.3	LOS E	17.1	122.0	Full	185	0.0	37.4[8]
Lane 4	371	3.0	371	3.0	361[1]	1.028	100	123.4	LOS F	22.5	161.6	Short	100	0.0	NA
Approach	1305	2.3	1305	2.3		1.028		67.5	LOS E	22.5	161.6				
Intersection	6990	3.5	6990	3.5		1.043		74.8	LOS E	39.8	288.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N2 Capacity Adjustment specified by user.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise | Created: 11 August, 2023 11:58:48 AM
Project: U:\300303832\technical\modelling\230810-Final-Report\230809-sid-clayton_business_parkV2_DTP-Update.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 2956 [4 CENTRE ROAD / WESTALL ROAD - AM Peak (Site Folder: Post Development - 2027 - Mitigation (Double Right N + S Approach) - Diamond Phase))]

Network: 7 [AM (Network Folder: Post Development - 2027 - Mitigation (Double Right N + S Approach - Diamond Phase))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C1, C2*, C3*, D, F1, F2*, F3*
Output Phase Sequence: A, B, C1, C2*, D, F1, F2*
(* Variable Phase)

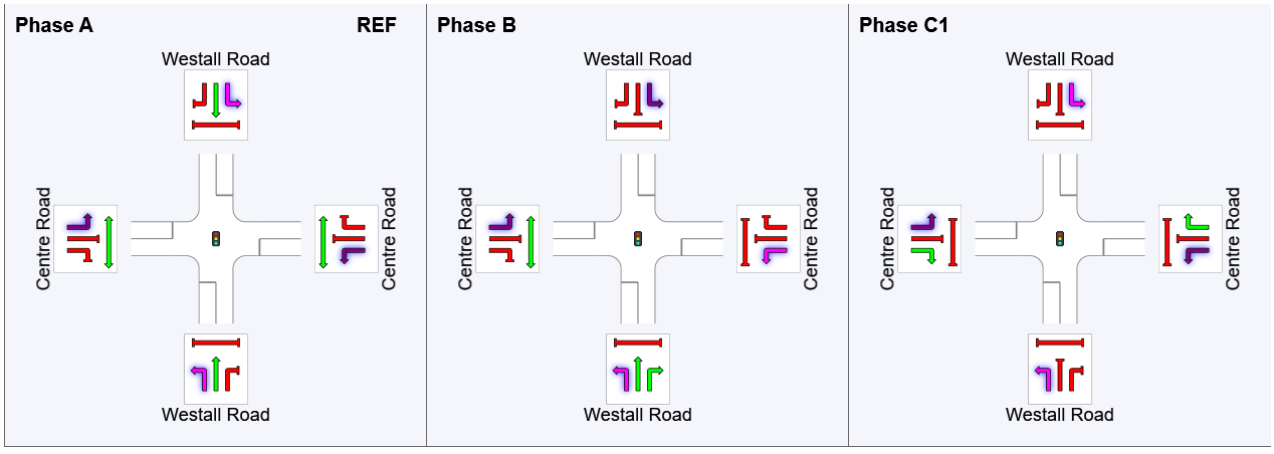
Phase Timing Summary

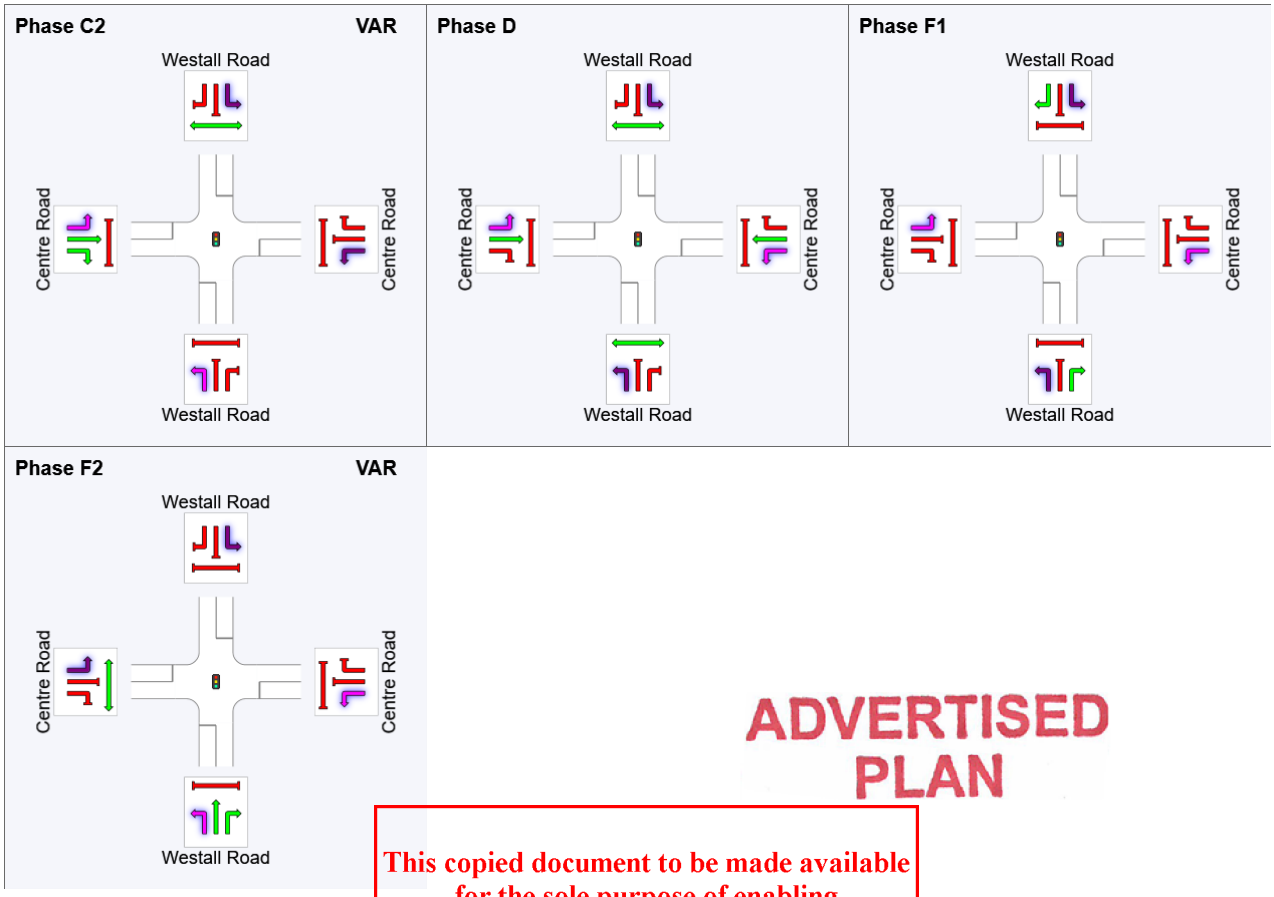
Phase	A	B	C1	C2	D	F1	F2
Phase Change Time (sec)	139	46	62	78	89	121	135
Green Time (sec)	41	9	9	5	26	7	***
Phase Time (sec)	48	16	15	11	33	13	4
Phase Split	34%	11%	11%	8%	24%	9%	3%

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%.

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Output Phase Sequence





REF: Reference Phase
VAR: Variable Phase

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	390	5.0	390	5.0	1302	0.299	100	13.1	LOS B	5.1	37.2	Short	70	0.0	NA
Lane 2	574	6.0	574	6.0	586[1]	0.980	100	81.8	LOS F	29.5	216.8	Full	500	0.0	0.0
Lane 3	801	6.0	801	6.0	818	0.980	100	80.6	LOS F	44.7	329.2	Full	500	0.0	11.5
Lane 4	698	6.0	698	6.0	712[1]	0.980	100	80.5	LOS F	37.2	273.9	Full	500	0.0	0.0
Lane 5	196	11.0	196	11.0	246	0.796	100	45.1	LOS D	5.0	38.3	Short	105	0.0	NA
Lane 6	196	11.0	196	11.0	246	0.796	100	45.1	LOS D	5.0	38.3	Short	85	0.0	NA
Approach	2855	6.5	2855	6.5		0.980		66.7	LOS E	44.7	329.2				
East: Centre Road															
Lane 1	689	7.0	689	7.0	929[1]	0.741	100	26.6	LOS C	18.8	139.7	Short	80	0.0	NA
Lane 2	319	3.0	319	3.0	330[1]	0.968	100	89.6	LOS F	16.3	116.8	Full	500	30.0[N2]	0.0

Lane 3	392	3.0	392	3.0	405[1]	0.968	100	88.6	LOS F	20.2	145.1	Full	500	30.0[N2]	0.0
Lane 4	55	22.0	55	22.0	103	0.529	100	78.3	LOS E	2.4	19.6	Short	40	0.0	NA
Approach	1455	5.6	1455	5.6		0.968		59.1	LOS E	20.2	145.1				
North: Westall Road															
Lane 1	79	18.0	79	18.0	978	0.081	100	13.9	LOS B	1.0	7.9	Short	35	0.0	NA
Lane 2	390	8.0	390	8.0	471[1]	0.828	100	53.3	LOS D	15.7	117.5	Full	500	0.0	0.0
Lane 3	450	8.0	450	8.0	543	0.828	100	54.2	LOS D	18.6	139.2	Full	500	0.0	0.0
Lane 4	423	8.0	423	8.0	510[1]	0.828	100	53.8	LOS D	17.3	129.3	Full	500	0.0	0.0
Lane 5	78	8.0	78	8.0	88	0.890	100	92.1	LOS F	3.7	27.9	Short	100	0.0	NA
Lane 6	52	8.0	52	8.0	58	0.890	100	96.2	LOS F	2.6	19.2	Short	80	-33.9[N3]	NA
Approach	1471	8.5	1471	8.5		0.890		55.2	LOS E	18.6	139.2				
West: Centre Road															
Lane 1	126	8.0	126	8.0	728	0.173	100	7.1	LOS A	0.2	1.5	Short	35	0.0	NA
Lane 2	195	8.0	195	8.0	384[1]	0.508	100	59.3	LOS E	8.0	59.5	Full	185	0.0	0.0
Lane 3	249	8.0	249	8.0	490	0.508	100	47.4	LOS D	9.2	69.2	Full	185	0.0	0.0
Lane 4	199	12.0	199	12.0	244	0.814	100	73.8	LOS E	8.7	67.1	Short	100	0.0	NA
Approach	769	9.0	769	9.0		0.814		50.7	LOS D	9.2	69.2				
Intersection	6549	7.1	6549	7.1		0.980		60.6	LOS E	44.7	329.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
N2 Capacity Adjustment specified by user.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 230809-sid-clayton_business_parkV2_DTP-Update

Template: Site Summary (Network)

Site: 2956 [4 CENTRE ROAD / WESTALL ROAD - PM Peak (Site Folder: Post Development - 2027 - Mitigation (Double Right N + S Approach) - Diamond Phase))]

Network: 9 [PM (Network Folder: Post Development - 2027 - Mitigation (Double Right N + S Approach - Diamond Phase))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

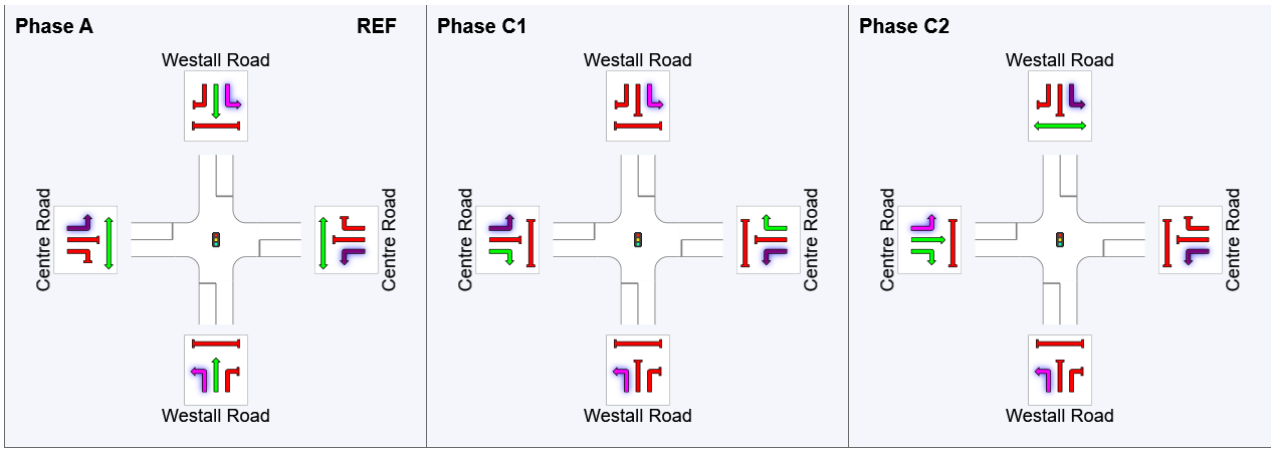
Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: SCATS Op sheets phasing
Reference Phase: Phase A
Input Phase Sequence: A, C1, C2, D, F1, F2*, F3*
Output Phase Sequence: A, C1, C2, D, F1, F2*
(* Variable Phase)

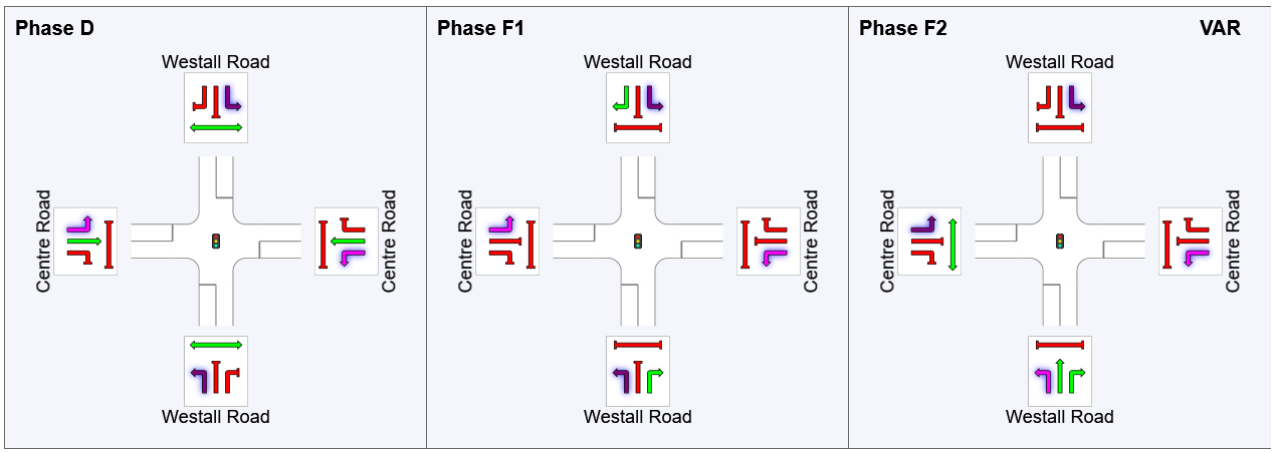
Phase Timing Summary

Phase	A	C1	C2	D	F1	F2
Phase Change Time (sec)	0	49	72	87	119	132
Green Time (sec)	43	16	9	26	6	2
Phase Time (sec)	50	22	15	33	12	8
Phase Split	36%	16%	11%	24%	9%	6%

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

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [veh	Dis:] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Westall Road															
Lane 1	189	3.0	189	3.0	1330	0.142	100	12.1	LOS B	2.1	15.0	Short	70	0.0	NA
Lane 2	539	3.0	539	3.0	581[1]	0.927	100	64.2	LOS E	24.9	179.0	Full	500	0.0	0.0
Lane 3	646	3.0	646	3.0	697	0.927	100	64.3	LOS E	31.1	223.5	Full	500	0.0	0.0
Lane 4	577	3.0	577	3.0	622[1]	0.927	100	64.1	LOS E	27.1	194.2	Full	500	0.0	0.0
Lane 5	166	3.0	166	3.0	182	0.910	100	90.2	LOS F	8.0	57.3	Short	105	0.0	NA
Lane 6	166	3.0	166	3.0	182	0.910	100	90.2	LOS F	8.0	57.3	Short	85	0.0	NA
Approach	2282	3.0	2282	3.0		0.927		63.7	LOS E	31.1	223.5				
East: Centre Road															
Lane 1	630	6.0	630	6.0	763	0.826	100	46.0	LOS D	18.4	135.1	Short	80	0.0	NA
Lane 2	300	3.0	300	3.0	318[1]	0.942	100	83.7	LOS F	15.0	108.1	Full	500	0.0	0.0
Lane 3	241	3.0	241	3.0	256[1]	0.942	100	85.5	LOS F	12.1	87.2	Full	500	-9.2[N3]	0.0
Lane 4	148	4.0	148	4.0	201[1]	0.738	100	74.0	LOS E	6.3	45.9	Short	40	0.0	NA
Approach	1320	4.5	1320	4.5		0.942		65.0	LOS E	18.4	135.1				
North: Westall Road															
Lane 1	81	13.0	81	13.0	989	0.082	100	16.3	LOS B	1.2	9.5	Short	35	0.0	NA
Lane 2	643	4.0	643	4.0	705[1]	0.911	100	59.5	LOS E	28.0	202.6	Full	500	40.0[N2]	0.0
Lane 3	532	4.0	532	4.0	584	0.911	100	65.5	LOS E	25.1	181.5	Full	500	0.0	0.0
Lane 4	690	4.0	690	4.0	757[1]	0.911	100	59.6	LOS E	30.4	220.0	Full	500	40.0[N2]	0.0
Lane 5	72	0.0	72	0.0	80	0.903	100	93.4	LOS F	3.5	24.2	Short	100	0.0	NA
Lane 6	65	0.0	65	0.0	72	0.903	100	94.3	LOS F	3.2	22.2	Short	80	-9.2[N3]	NA
Approach	2084	4.1	2084	4.1		0.911		61.6	LOS E	30.4	220.0				

West: Centre Road															
Lane 1	275	2.0	275	2.0	814	0.338	100	8.8	LOS A	1.1	7.6	Short	35	0.0	NA
Lane 2	252	2.0	252	2.0	346[1]	0.729	100	55.7	LOS E	10.0	71.3	Full	185	0.0	0.0
Lane 3	407	2.0	407	2.0	558[1]	0.729	100	47.2	LOS D	15.2	108.0	Full	185	0.0	22.2[8]
Lane 4	371	3.0	371	3.0	392[1]	0.947	100	89.2	LOS F	19.1	137.0	Short	100	0.0	NA
Approach	1305	2.3	1305	2.3		0.947		52.7	LOS D	19.1	137.0				
Intersection	6990	3.5	6990	3.5		0.947		61.3	LOS E	31.1	223.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.
N2 Capacity Adjustment specified by user.
N3 Capacity Adjustment due to downstream lane blockage determined by the program.

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Project: U:\300303832\technical\modelling\230810-Final-Report\230809-sid-clayton_business_parkV2_DTP-Update.sip9

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13 October 2023

Project/File: 300303832

Kathy Aves
Transport Services – Metro Transport – Inner Metropolitan Region
Department of Transport and Planning

Via email: kathy.aves@transport.vic.gov.au

Dear Kathy,

Reference: Clayton Business Park, 1486-1550 Centre Road, Clayton South
Department of Transport and Planning Response

A planning permit application has been lodged for an industrial estate development located at 1486-1550 Centre Road, Clayton South (Clayton Business Park). Stantec prepared a Transport Impact Assessment report for the proposed development planning permit application.

The Department of Transport and Planning (DTP) has provided preliminary comments on an earlier version of the Transport Impact Assessment report in email correspondence dated 28 July 2023 (the DTP response). Further information has been requested regarding a number of transportation engineering related matters and a response to these matters is presented in this letter.

In preparing this letter, reference has been made to the following:

- DTP email correspondence from Kathy Aves dated 28 July 2023.
- Kingston Planning Scheme.
- Stantec Transport Impact Assessment report for the proposed development dated 29 August 2023.
- VicRoads Guidelines for Transport Impact Assessment Reports.

Centre Road/Development Site Access Signalised Intersection

The DTP response has requested consideration of the following regarding the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection:

- Investigation of the performance impact on the provision of a left turn slip lane on the Centre Road east approach of the signalised intersection.
- Investigation of the performance impact on the provision of a third approach and departure side lane for the Centre Road westbound direction at the signalised intersection.
- Confirmation of the largest vehicles that can access the Bosch Site Access.
- Clarification of the proposed traffic signal phasing.

Each of these matters is discussed in the following sections.

Left Turn Slip Lane/Additional Through Lane at Proposed Site Access Signalised Intersection

The performance of the road network comprising the Centre Road/Kombi Road/McNaughton Road signalised intersection, the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection and the Westall Road/Centre Road signalised intersection has been assessed as a 'Network' using the SIDRA program with the following changes requested by DTP:

- Option 1 – The provision of a left turn slip lane on the Centre Road east approach of the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection.
- Option 2 – The provision of a third approach and departure side lane for the Centre Road westbound direction at the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection.

The intersection performance of the signalised intersections in the 'Network' with the provision of the left turn lane at the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection in comparison to the performance with no provision of the left turn slip lane is presented in Table 1.

Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Table 1: Year 2027 Post Development (Intersection Values) – Left Turn Slip Lane (Option 1)

Intersection	Peak Hour	With Slip Lane			Without Slip Lane		
		DOS	Average Delay	50th %ile Queue	DOS	Average Delay	50th %ile Queue
Centre Road/Kombi Road/McNaughton Road Signalised Intersection	AM Peak	0.64	14s	70m	0.64	14s	70m
	PM Peak	0.75	18s	98m	0.75	18s	98m
Centre Road/Site Access/Bosch Site Access Signalised Intersection	AM Peak	0.57	31s	153m	0.57	32s	153m
	PM Peak	0.79	24s	135m	0.79	24s	135m
Westall Road/Centre Road Signalised Intersection	AM Peak	1.03	88s	384m	1.03	88s	384m
	PM Peak	1.17	119s	428m	1.17	119s	428m

The analysis suggests that there are no intersection performance benefits with the provision of a left turn slip lane at the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection. Additionally, the provision of a left turn slip lane will detract from the pedestrian environment along Centre Road. Based on these factors, a left turn slip lane is not considered warranted.

The intersection performance of the signalised intersections in the 'Network' with the provision of an additional through lane with a length of 160m on the Centre Road east approach, and an additional lane with a length of 100m on the departure side at the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection, is presented in Table 2.

Table 2: Year 2027 Post Development (Intersection Values) – Additional Lanes on Centre Road (Option 2)

Intersection	Peak Hour	With Additional Lanes			Without Additional Lanes		
		DOS	Average Delay	50th %ile Queue	DOS	Average Delay	50th %ile Queue
Centre Road/Kombi Road/McNaughton Road Signalised Intersection	AM Peak	0.64	14s	70m	0.64	14s	70m
	PM Peak	0.75	18s	98m	0.75	18s	98m
Centre Road/Site Access/Bosch Site Access Signalised Intersection	AM Peak	0.46	35s	117m	0.57	32s	153m
	PM Peak	0.79	23s	134m	0.79	24s	135m
Westall Road/Centre Road Signalised Intersection	AM Peak	1.02	84s	377m	1.03	88s	384m
	PM Peak	1.17	119s	428m	1.17	119s	428m

The analysis suggests that there are modest performance benefits at the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection during the weekday AM peak hour with the provision of an additional through lane on Centre Road in the westbound direction (the intersection DOS decreases from 0.57 to 0.46 and the average queue length on the Centre Road east approach decreases from 153m to 117m). There are negligible performance benefits at the existing Centre Road/Kombi Road/McNaughton Road and Westall Road/Centre Road signalised intersections.

The disruption and cost disbenefits of the provision of the additional through lane far outweigh any road network performance improvements, which analysis suggests would be negligible. For this reason, the provision of the additional traffic lanes is not warranted.

Largest Vehicle Accessing the Bosch Centre Site Access

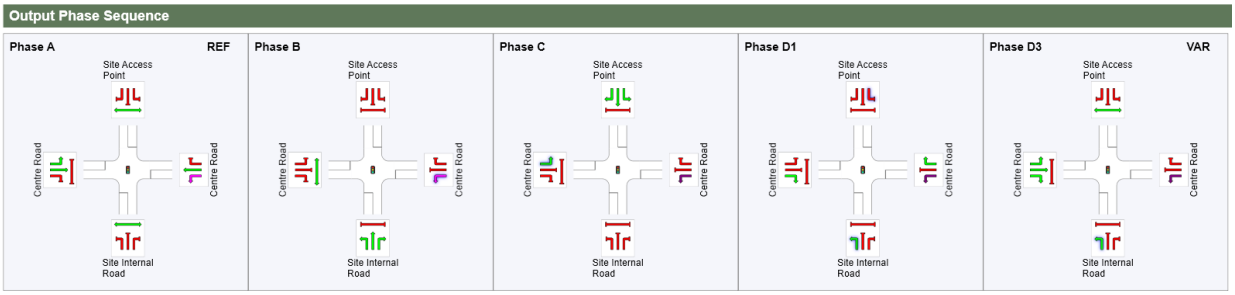
Swept paths have bene prepared that demonstrate that the largest vehicle that can access the existing Bosch Site Access is a 19m semi-trailer. The swept paths for this access and the proposed Development Site Access are presented as Attachment A.

Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Clarification of Traffic Signal Phasing

The proposed phasing of the Centre Road/Development Site Access/Bosch Site Access signalised intersection is presented at Figure 1.

Figure 1: Centre Road/Development Site Access/Bosch Site Access Signalised Intersection – Signal Phasing



REF: Reference Phase
VAR: Variable Phase

The existing Bosch Site Access layout, with all turning movements from a single traffic lane, will be retained as part of the signalised intersection. This necessitates running traffic from this approach in a separate phase to movements from the Development Site Access.

10-Year Post Development (Year 2037) Road Network Performance

The contemporary VicRoads Guidelines for Transport Impact Assessment Reports identify the following performance objectives need to be satisfied:

"The transport performance objectives of the proposed development should ensure that:

- *For new access arrangements direct to a site - provision is made for all access arrangements to operate safely and efficiently into the future (at least 10 years after full development).*
- *For existing road infrastructure - any potential adverse effects from land use development proposals on road safety and operational efficiency are identified and, where necessary, developers provide mitigating road improvement works as part of the development costs to minimise these effects and retain, within practical limitations, the level of safety and operational efficiency that would have existed without the development."*

The guidelines further state:

"The TIAR should also demonstrate that the proposed site access arrangements (as compared to any mitigating works to existing road network) will operate satisfactorily for an appropriate future time period after full development (ie at least 10 years)."

It is evident from this guidance that new intersections serving proposed development are to be assessed under 10-year post development conditions, but there is no requirement to assess existing intersections under 10-year post development conditions.

Regardless, the performance of the road network comprising the Centre Road/Kombi Road/McNaughton Road signalised intersection, the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection and the Westall Road/Centre Road signalised intersection has been assessed as a 'Network' using the SIDRA program. The year 2037 post development weekday AM and PM peak hour traffic volumes are presented at Figure 2 and Figure 3.

Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Figure 2: Weekday AM Peak Hour – Year 2037 Post Development Traffic

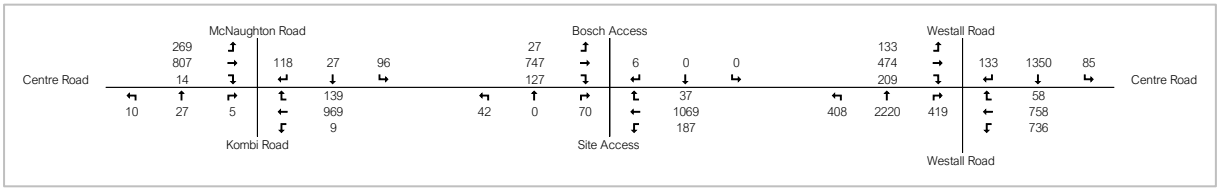
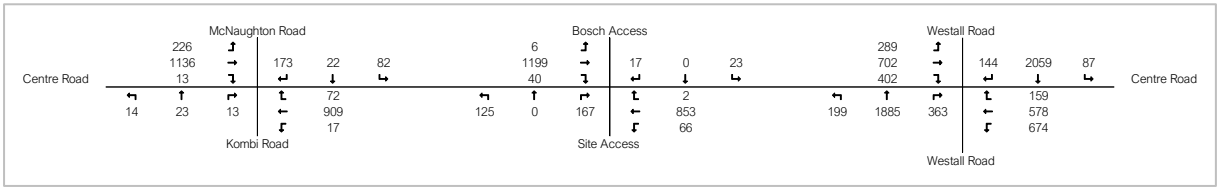


Figure 3: Weekday PM Peak Hour – Year 2037 Post Development Traffic



The intersection performance of the signalised intersections under year 2037 post development conditions is presented in Table 3. Also presented is the year 2037 post development intersection performance with the inclusion of the additional right turn lane on the Westall Road north approach of the Westall Road/Centre Road signalised intersection.

Table 3: Year 2037 Post Development (Intersection Values)

Intersection	Peak Hour	No Improvements on Westall Road			Additional Right Turn Lane on Westall Road (North)		
		DOS	Average Delay	50th %ile Queue	DOS	Average Delay	50th %ile Queue
Centre Road/Kombi Road/McNaughton Road Signalised Intersection	AM Peak	0.73	14s	80m	0.73	14s	80m
	PM Peak	0.84	19s	112m	0.92	17s	107m
Centre Road/Site Access/Bosch Site Access Signalised Intersection	AM Peak	0.59	32s	158m	0.60	32s	165m
	PM Peak	0.85	24s	164m	0.87	39s	202m
Westall Road/Centre Road Signalised Intersection	AM Peak	1.13	139s	543m	1.13	121s	466m
	PM Peak	1.28	167s	551m	1.13	122s	444m

The analysis results suggest that the Centre Road/Kombi Road/McNaughton Road and the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersections will operate satisfactorily under year 2037 post development conditions. The estimated queuing on the Centre Road east approach to the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection of 158m in the weekday AM peak hour (165m with the additional right turn lane on the Westall Road north approach) and 54m in the weekday PM peak hour (122m with the additional right turn lane on the Westall Road north approach) does not extend back to the Westall Road/Centre Road signalised intersection.

The Westall Road/Centre Road signalised intersection is assessed to be at its theoretical capacity, with this finding consistent with the year 2027 base case and post development conditions.

Westall Road/Centre Road Signalised Intersection

The DTP response has requested confirmation that the second right turn lane on the Westall Road north approach of the Westall Road/Centre Road signalised intersection can accommodate the swept paths of expected vehicle movements. The concept layout plan of the Westall Road/Centre Road signalised intersection with the additional right tun lane accommodating the swept paths is presented as Attachment B.

Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Other Considerations

The DTP email has identified the following other matters:

- Clarification of how the proposed development traffic distribution has been derived.
- Confirmation that the traffic movement data for the site accesses on Centre Road and Rayhur Street are reasonable.
- Potential provision of a pedestrian crossing on the Centre Road east approach of the proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection as a result of potential future bus stop delivery.
- Location of the pedestrian operated signals on Rayhur Street.
- Bosch agreement to the proposed signalised intersection.

Proposed Development Traffic Distribution

The proposed traffic distribution has been estimated with regard to existing traffic volume proportions at the Westall Road/Centre Road and the Centre Road/Kombi Road/McNaughton Road signalised intersections. Existing traffic to/from the north, south and east at the Westall Road/Centre Road signalised intersection, and to/from the north and west at the Centre Road/Kombi Road/McNaughton Road signalised intersection during the weekday AM and PM peak hours has been aggregated and then the movements proportioned accordingly with directionality for both peak periods combined.

Traffic Movement Data

Traffic movements were surveyed at the existing site access locations on Centre Road and Rayhur Street in 2022. A review of weekday AM and PM peak hour SCATS traffic volumes at the Westall Road/Centre Road signalised intersection for a typical weekday in November for the years 2014 to 2022 (data presented in Table 4.1 of the Stantec Report) suggests little variance in the total traffic passing through the intersection. This suggests that data collected at the site access locations is 2022 is largely representative of the traffic activity that would have existed pre-COVID. Additionally, the traffic generation of industrial uses has typically been less responsive to the impact of changed working conditions as a result of COVID in comparison to other uses, such as office use which has seen a greater take-up of flexible working conditions. Lastly, much of the existing use on the subject site which is generating traffic movements to/from the arterial road network will be removed as a result of the proposed development. For these reasons, the 2022 traffic data is considered fit-for-purpose.

Pedestrian Crossing on the Centre Road East Approach

The proposed Centre Road/Development Site Access/Bosch Site Access signalised intersection provides pedestrian crossing facilities on the Centre Road west approach, the Development Site Access and the Bosch Site Access. These facilities will provide satisfactory access to both sides of Centre Road and across the north and south approaches to the intersection and will readily provide access to any new bus stops on Centre Road close to the signalised intersection. The provision of a pedestrian crossing on the east approach to the signalised intersection as a result of unplanned bus stop infrastructure is considered unnecessary and onerous.

Rayhur Street Pedestrian Operated Signals

The pedestrian operated signals (POS) on Rayhur Street are located approximately 100m to the west of the entrance to the Westall train station and are adjacent to the bus stop on the north side of Rayhur Street.

The current location of the POS is considered appropriate in terms of pedestrian connectivity between public transport services and noting that industrial uses are typically low generators of pedestrian activity. The internal pedestrian network of the proposed development could be amended to provide a more direct pedestrian connection towards the POS if necessary.

Bosch Agreement to the Proposed Signalised Intersection

The Applicant will be engaging with Bosch in order to obtain their agreement to the proposed signalised intersection.

I trust the discussion and analysis presented in this letter provides sufficient detail for DTP to progress their review of the planning permit submission. Should you have any queries, please do not hesitate to contact the undersigned.

Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Yours sincerely,

STANTEC AUSTRALIA PTY LTD

Jason Sellars
Senior Principal Transportation Engineer

Attachment A: Proposed Centre Road/Development Site Access/Bosch Site Access Signalised Intersection Swept Path Plan
Attachment B: Westall Road/Centre Road Signalised Intersection Swept Path Plan

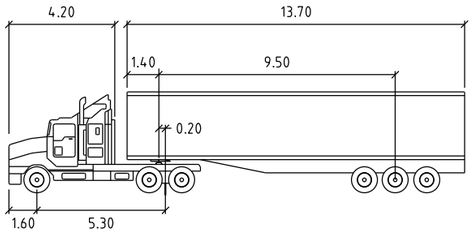
Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Attachment A: Proposed Centre Road/Development Site Access/Bosch Site Access Signalised Intersection Swept Path Plan

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h



PM S 19M

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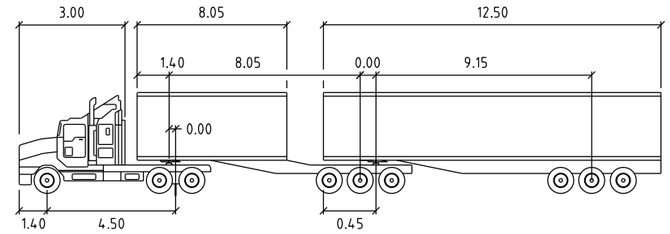
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		



B-DOUBLE 26M

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Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

ADVERTISED PLAN

BOSCH AUSTRALIA

BOSCH SITE ACCESS

BOSCH AUSTRALIA

CENTRE ROAD

PROPOSED BOUNDARY MODIFICATIONS

PROPOSED BOUNDARY MODIFICATIONS

PROPOSED DEVELOPMENT

PROPOSED SITE ACCESS

PROPOSED DEVELOPMENT

PM S 19M AUSTROADS 2013 (AU)

B-DOUBLE 26M AUSTROADS 2013 (AU)

3.5 3.5 2.0 3.5

N

MAP REF 79/G4

ON 12/10/2023 AT 2:33:31 PM

PLOTTED BY : bklinko

Stantec

PRELIMINARY PLAN
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DESIGNED R. ABRAHAM	DESIGN CHECK A. DELL'ISOLA
APPROVED BY J. SELLARS	DATE ISSUED 12 OCTOBER 2023

SCALE A3 — 0 5 10 — 1:500

CAD FILE NO. 300303832-03-P2.dgn

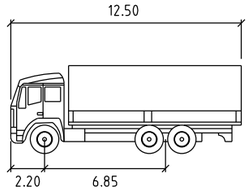
CLAYTON BUSINESS PARK
CENTRE RD / PROPOSED SITE ACCESS / BOSCH SITE ACCESS, CLAYTON
SWEPT PATH ASSESSMENT

DRAWING NO. 300303832-03(AT01) ISSUE P2

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h



SU TRUCK

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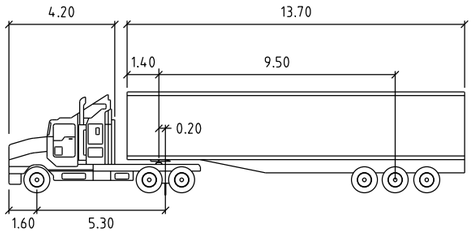

PM S 19M

	metres		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
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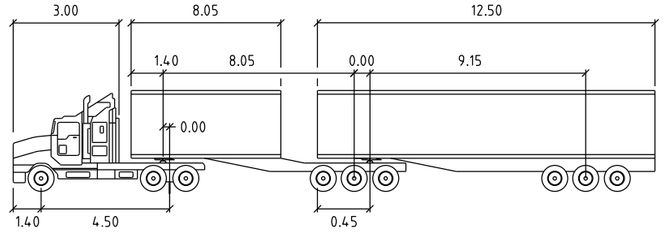

B-DOUBLE 26M

	metres		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

ADVERTISED PLAN

BOSCH AUSTRALIA

BOSCH SITE ACCESS

BOSCH AUSTRALIA

ROAD

CENTRE

PROPOSED BOUNDARY MODIFICATIONS

PROPOSED BOUNDARY MODIFICATIONS

PROPOSED DEVELOPMENT

PROPOSED SITE ACCESS

PROPOSED DEVELOPMENT

N

MAP REF 79/G4

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DESIGN CHECK	A. DELL'ISOLA
APPROVED BY	J. SELLARS
DATE ISSUED	12 OCTOBER 2023
SCALE	A3
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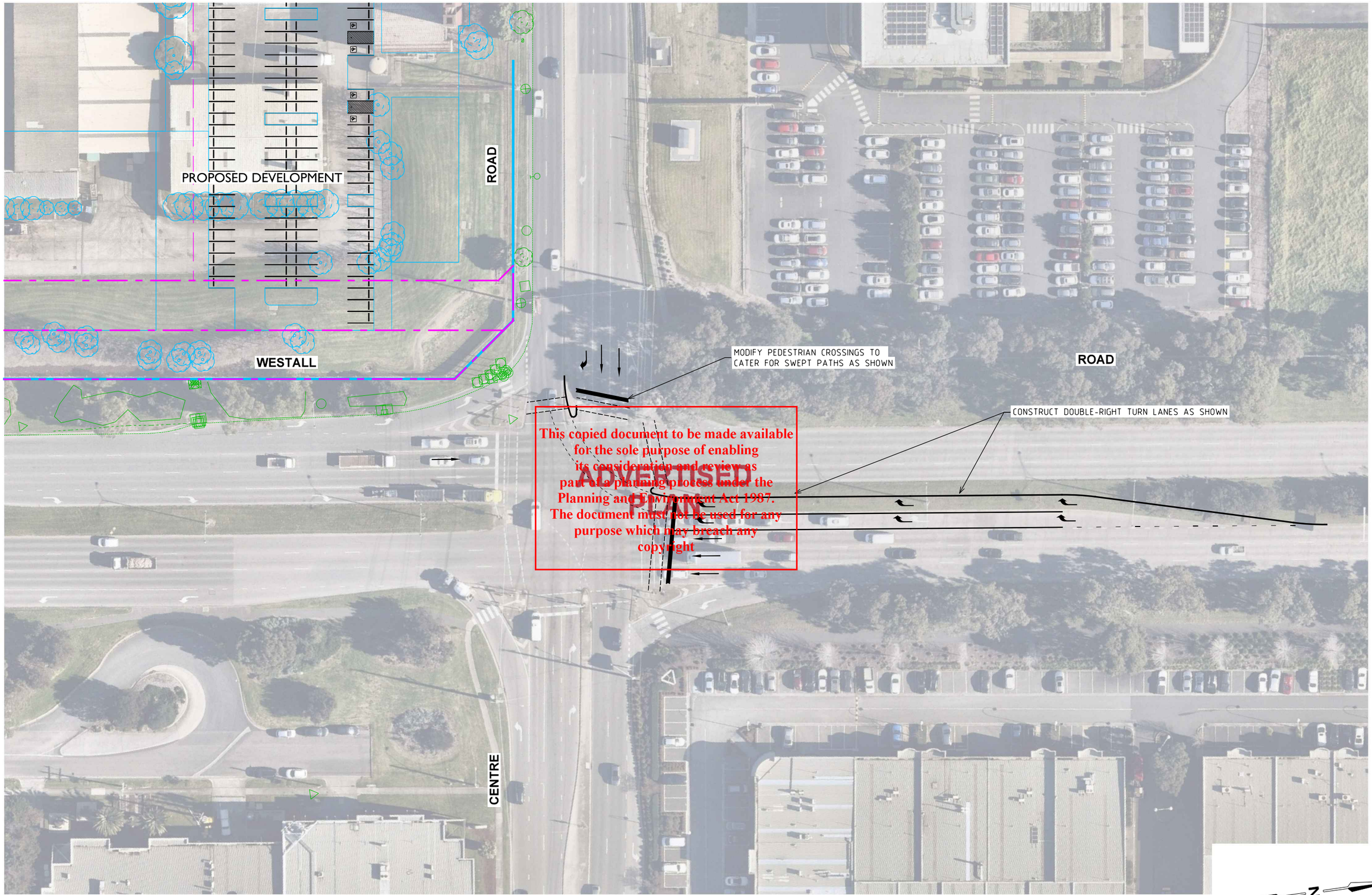
CAD FILE NO.	300303832-03-P2.dgn

CLAYTON BUSINESS PARK
CENTRE RD / PROPOSED SITE ACCESS / BOSCH SITE ACCESS, CLAYTON
SWEPT PATH ASSESSMENT

DRAWING NO. 300303832-03(AT02) ISSUE P2

Reference: **Clayton Business Park, 1486-1550 Centre Road, Clayton South**
Department of Transport and Planning Response

Attachment B: Westall Road/Centre Road Signalised Intersection Swept Path Plan



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ON 10/10/2023 AT 11:29:06 AM

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DESIGNED R. ABRAHAM	DESIGN CHECK A. DELL'ISOLA
APPROVED BY J. SELLARS	DATE ISSUED 10 OCTOBER 2023

SCALE A3 — 0 7.5 15 — 1:750

CAD FILE NO. 300303832-05-P1.dgn

CLAYTON BUSINESS PARK
WESTALL ROAD / CENTRE ROAD
PROPOSED INTERSECTION UPGRADE OPTION
CONCEPT LAYOUT

DRAWING NO. 300303832-05 ISSUE P1

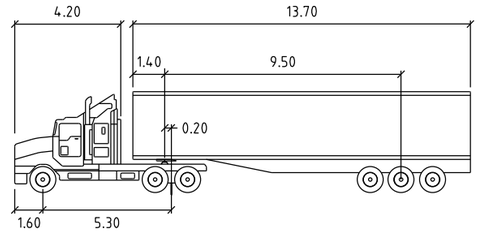
PROPOSED DEVELOPMENT

WESTALL

ROAD

CENTRE

ROAD



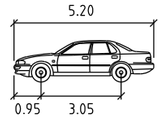
PM S 19M

	metres		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR

	metres
Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

ADVERTISED PLAN

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DESIGN CHECK	A. DELL'ISOLA
APPROVED BY	J. SELLARS
DATE ISSUED	10 OCTOBER 2023
SCALE	A3
	0 7.5 15 1:750
CAD FILE NO.	300303832-05-P1.dgn

CLAYTON BUSINESS PARK
WESTALL ROAD / CENTRE ROAD
PROPOSED INTERSECTION UPGRADE OPTION
SWEPT PATH ASSESSMENT

DRAWING NO. 300303832-05(AT01) ISSUE P1

PLOTTED BY : bklinko ON 10/10/2023 AT 11:29:07 AM