B. REVISED TRANSPORT IMPACT ASSESSMENT

B

John Renshaw Drive, Black Hill

40 Lot Industrial Subdivision
Transport Impact Assessment

Prepared by: Stantec Australia Pty Ltd for Broaden Management Pty Ltd

on 15/12/2021

Reference: N171073

Issue #: A

GTAconsultants now Stantec

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40 Lot Industrial Subdivision
Transport Impact Assessment

Client: Broaden Management Pty Ltd

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Issue #: A

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1. INTRODUCTION

01

1.1. Background & Proposal

Broaden Management Pty Ltd engaged GTA, now Stantec to prepare a traffic impact assessment for the proposed 40-lot industrial subdivision of Lot 1 DP 1260203 along John Renshaw Drive in Black Hill, NSW.

The proposed subdivision would create a total of 38 large industrial lots, one environmental conservation lot and one lot to be dedicated to Ausgrid for the purpose of a zone substation. The site is located within Cessnock Local Government Area (Cessnock LGA) and adjoins another proposed industrial subdivision to the east within Newcastle Local Government Area (Newcastle LGA) that is being developed in partnership by The Stevens Group and Hunter Land, herein referred to as the Black Hill Industrial (BHI) site.

1.2. Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing traffic conditions and infrastructure projects surrounding the site
- likely car parking requirements for the site
- considerations for service vehicle access to the site
- pedestrian and cyclist accessibility
- the traffic generating characteristics of the proposed development
- suitability of the proposed access arrangements for the site
- the transport impact of the development proposal on the surrounding road network.

1.3. Response to SEARs and Conditions

The Transport Impact Assessment seeks to address select Secretary Environmental Assessment Requirements (SEARs) for SEAR Number 1224, as well as conditions associated with the Concept Plan approval. Table 1.1 and Table 1.2 identify the relevant SEARs and conditions along with the associated reference within this report.

Table 1.1: SEARs and relevant report reference

SEAR detail	Report reference
Details of road transport routes and access to the site	Section 5, 6.3
Road traffic predictions for the development during construction	Section 6.6
An assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development	Section 2.5, 6.4, 6.5

Table 1.2: Concept Plan conditions and relevant report reference

Condition detail	Report reference
• Any subdivision application must include a revised traffic and transport impact assessment that: ○ Has been prepared in consultation with Council and RMS	Extensive consultation with TfNSW (formerly RMS) has occurred on the modelling methodology for the project. The Applicant has consulted with Council on various aspects relating to the proposal.

Condition detail	Report reference
○ Details traffic generation from each stage of the development	Section 6.2
○ Demonstrates that the site access would accommodate traffic from all stages of the development, and if required, provide details of alternative access arrangements that may be required	Section 6.4 and 6.5
○ Intersection analysis and micro simulation modelling including details of any offsite road upgrades that would be required to accommodate the proposal	Section 6.4 and 6.5
• The first subdivision application for the site must include detailed design for a signal-controlled intersection at the western access to the site on John Renshaw Drive that has been prepared in accordance with RMS requirements.	Appendix A

1.4. References

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

- an inspection of the site and its surrounds
- Transport for NSW (TfNSW) Guide to Traffic Generating Developments 2002 (Guide 2002)
- TfNSW Guide to Traffic Generating Developments Updated Traffic Surveys Technical Direction (TDT 2013/ 04a)
- Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments
- Cessnock Development Control Plan (DCP) 2010
- Black Hill Planning Proposal, Traffic and Transport Report, Hyder Consulting, October 2013
- Part Lot 1131 in DP 1057179 John Renshaw Drive, Black Hill, Industrial Subdivision, Traffic Impact Assessment prepared by Intersect Traffic, dated August 2018
- John Renshaw Drive, Black Hill Industrial Precinct, Microsimulation Modelling Options Testing Report, GTA Consultants, 26 May 2020
- Black Hill Traffic Modelling & Traffic Analysis Report, SMEC, 9 October 2020
- John Renshaw Drive, Black Hill Industrial Precinct, Detailed Evaluation of SMEC Report compared to GTA Report, GTA Consultants, December 2020
- John Renshaw Drive, Black Hill, Proposed Industrial Site, Insights Report prepared by The University of Newcastle and Hunter Research Foundation Centre, dated August 2021
- Stage 1 and 2 Industrial Development – John Renshaw Drive, Black Hill, GTA now Stantec, 22 October 2021
- Civil plans for the proposed subdivision prepared by ADW Johnson as referenced in this report
- other documents and data as referenced in this report.

2. EXISTING CONDITIONS

02

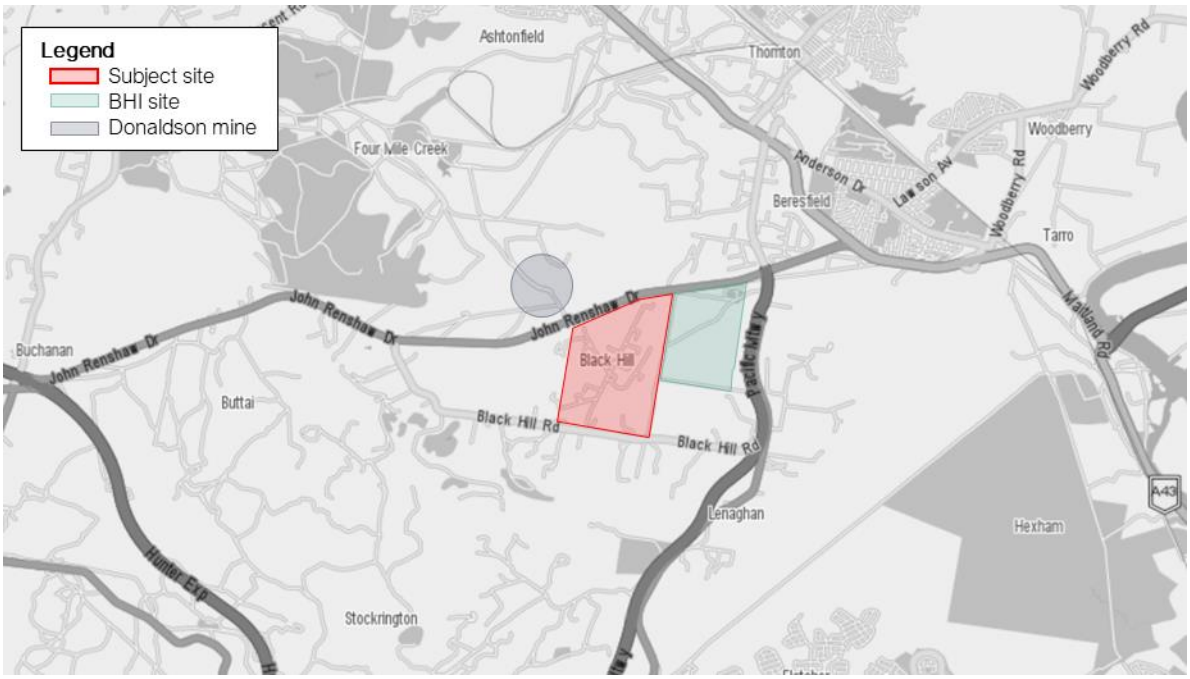
2.1. Location

The subject site occupies land legally described as Lot 1 DP 1260203 along John Renshaw Drive in Black Hill. It is strategically located approximately 2.6 kilometres south-west of the M1 Pacific Motorway and Beresfield Industrial area, 7.3 kilometres east of the M15 Hunter Expressway, 11 kilometres south-east of Maitland CBD and 18 kilometres north-west of the Port of Newcastle.

The site has a frontage of about 1.74 kilometres to John Renshaw Drive along its northern boundary and extends to the west, opposite the Donaldson Coal Mine with a shared common boundary to the BHI site to the east. The surrounding properties mostly include rural lands to the west, industrial estates to the north and east with low density residential further to the east.

The location of the subject site and its surrounding environs are shown in Figure 2.1 and Figure 2.2.

Figure 2.1: Subject site and its environs



Base image source: Sydway

Figure 2.2: Aerial image of subject site

Base image source: Nearmap

2.2. Transport Network

2.2.1. Road Hierarchy

Roads are classified according to the functions they perform. The main purpose of defining a road's functional class is to provide a basis for establishing the policies which guide the management of the road according to their intended service or qualities.

In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions, and throughout the State. Transport for NSW (TfNSW) is responsible for funding, prioritising and carrying out works on State roads. State roads generally include roads classified as freeways, state highways, and main roads under the Roads Act 1993, and the regulation to manage the road system is stated in the Australian Road Rules.

TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

Arterial Roads – Controlled by TfNSW, typically no limit in flow and designed to carry vehicles long distance between regional centres.

Sub-Arterial Roads – Managed by either Council or TfNSW under a joint agreement. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).

Collector Roads – Provide connectivity between local sites and the sub-arterial road network, and typically carry between 2,000 and 10,000 vehicles per day.

Local Roads – Provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

2.2.2. Surrounding Road Network

John Renshaw Drive

John Renshaw Drive is a TfNSW State Road functioning as a sub-arterial road and is aligned in an east-west direction along the site's northern boundary. To the east, John Renshaw Drive connects with the New England Highway and M1 Pacific Motorway providing links to Newcastle and Sydney. It is a two-way road generally configured with one lane in each direction, set within an approximate eight-metre-wide carriageway. John Renshaw Drive has a posted speed limit of 100km/h along the site frontage, reducing to 60km/h further to the east.

M1 Pacific Motorway

The M1 Pacific Motorway is a TfNSW State Road and functions as an arterial road. It is a key north-south road providing access to the Central Coast and Sydney and is an important link in the NSW arterial road (highway) network. Near the site, the M1 Pacific Motorway is a two-way two-lane road with additional turning lanes provided at its northern end where is ceases as a highway at the Weakleys Drive/ John Renshaw Drive signalised intersection. The M1 Pacific Motorway generally has a posted speed limit of 110km/h, which reduces to 60km/h close to John Renshaw Drive.

M15 Hunter Expressway

The M15 Hunter Expressway is a TfNSW State Road and functions as an arterial road. It is a key east-west road linking Newcastle Link Road with New England Highway near Branxton. Near the site, the M15 Hunter Expressway is a two-way two-lane road and intersects with the M1 and Newcastle Link Road at a grade-separated interchange. It generally has a posted speed limit of 110km/h.

2.3. Planned Infrastructure

The M1 Pacific Motorway and Pacific Highway are critical links in the National Land Transport Network and among the busiest transport corridors in Australia.

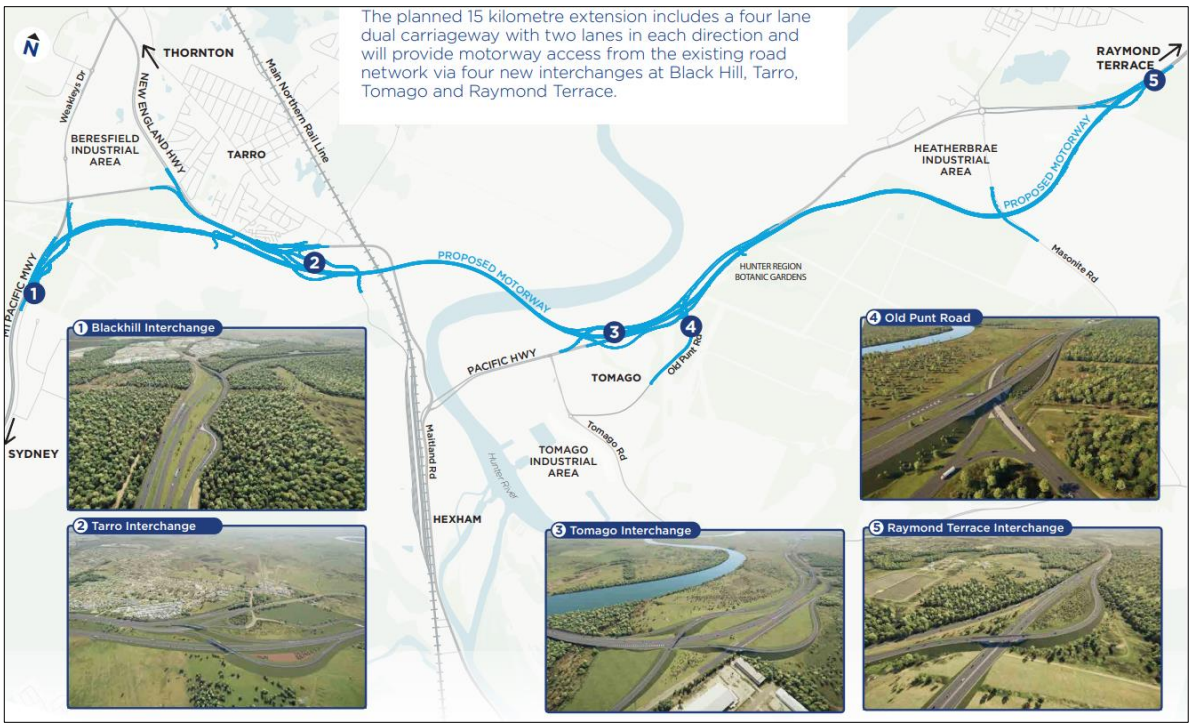
The M1 to Raymond Terrace (M12RT) project addresses a key national motorway 'missing link' between Sydney and Brisbane as the existing M1 Pacific Motorway, New England Highway and Pacific Highway carry some of the highest traffic volumes across the region. Once complete, the extension would remove up to 25,000 vehicles a day from key congestion and merge points along this corridor and would help keep freight, commuters and tourists moving.

The project includes 15 kilometres of dual carriageway and provides motorway access from the existing road network from four new interchanges at Black Hill, Tarro, Tomago and Raymond Terrace. The project also includes a 2.6 kilometre viaduct over the Hunter River and floodplain, the Main North Rail Line, and the New England Highway. It would also provide new bridge crossings over local waterways at Tarro and Raymond Terrace, and an overpass for Masonite Road at Heatherbrae.

The M12RT project is expected to take around four years to build and is anticipated to be open to traffic in 2028.

The Environmental Impact Statement went on exhibition in mid-2021 and is currently in the response to submissions phase. The proposed M12RT connection is shown in Figure 2.3.

Figure 2.3: M12RT project overview



Source: roads-waterways.transport.nsw.gov.au/projects/

2.4. Public Transport and Walking/ Cycling Infrastructure

Public transport in the area is limited and is not readily accessible to the site. The Rover Coaches 160 and 163 services (Cessnock to Newcastle) which previously ran past the site now travel along the M15 Hunter Expressway and therefore no longer service the site.

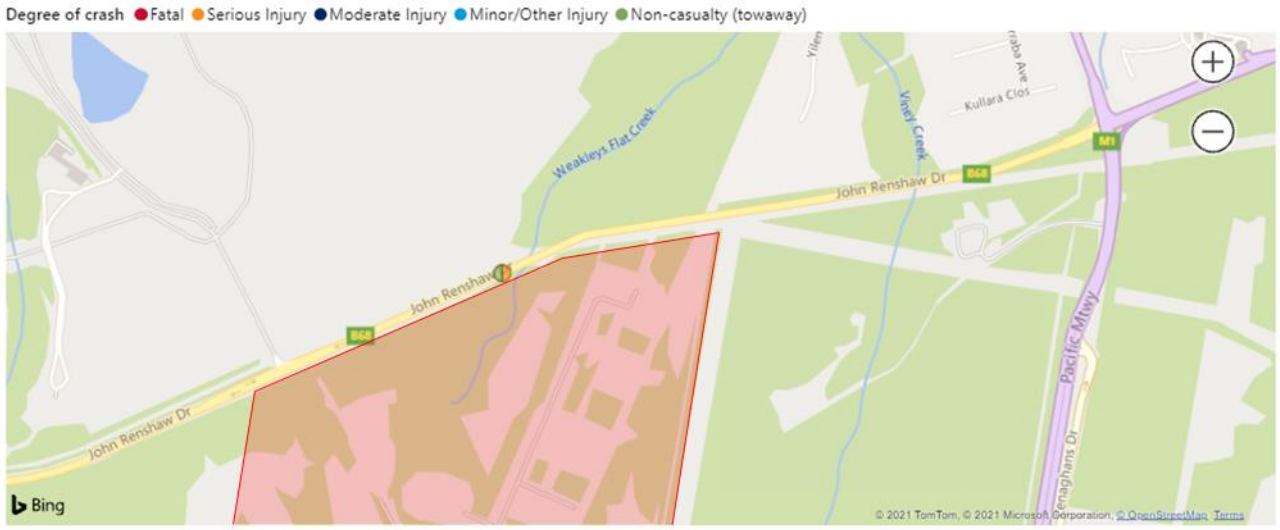
The Hunter Rail Line runs from Newcastle to Scone via Maitland however the nearest railway station at Beresfield is around four kilometres from the site which would not provide benefit to the site unless a new bus service linking the site to the station was provided.

As an existing rural area, there is no designated pedestrian or bicycle network in the vicinity of the site or on John Renshaw Drive itself.

2.5. Crash History

An analysis the most recent five-year period of available crash data (2016-2020) has been undertaken based on crash data obtained from the TfNSW Centre for Road Safety in the vicinity of the subject site for both Cessnock and Newcastle LGAs (given the LGA boundary between the subject site and BHI Site). The locations and severity of the crash data for the five-year period are summarised in Figure 2.4 and Figure 2.5.

Figure 2.4: Cessnock LGA Crashes 2016-2020



Reporting year	Crash Id	Degree of crash	RUM - code	RUM - description	Type of location	Natural lighting	Longitude	Latitude	Number killed	Number injured
2016	1116972	Serious Injury	30	Rear end	2-way undivided	Dawn	151.61	-32.82		4
2020	1222878	Non-casualty (towaway)	20	Head on	2-way undivided	Daylight	151.61	-32.82		

Base image source: https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/index.html

Figure 2.5: Newcastle LGA Crashes 2016-2020

Reporting year	Crash Id	Degree of crash	RUM - code	RUM - description	Type of location	Natural lighting	Longitude	Latitude	Number killed	Number injured
2019	1207678	Moderate Injury	40	U turn	2-way undivided	Daylight	151.63	-32.82		1

Base image source: https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/index.html

The data indicates three crashes were reported near the site on John Renshaw Drive during the five-year study period. Of particular note, there were no reported crashes in the vicinity of the existing or future subject site access locations. As such, the available historical crash data does not indicate there is an existing road safety issue at the existing or future site access locations on John Renshaw Drive.

3. DEVELOPMENT PROPOSAL

03

3.1. Overview

The proposed development is a large lot industrial subdivision on land identified as Lot 1 DP 1260203 along John Renshaw Drive, Black Hill. It would create a total of 38 large industrial lots ranging in size from 1.8 ha to 6.3 ha, one environmental conservation lot and one lot to be dedicated to Ausgrid for the purpose of a zone substation.

Specifically, the development involves the following six stages:

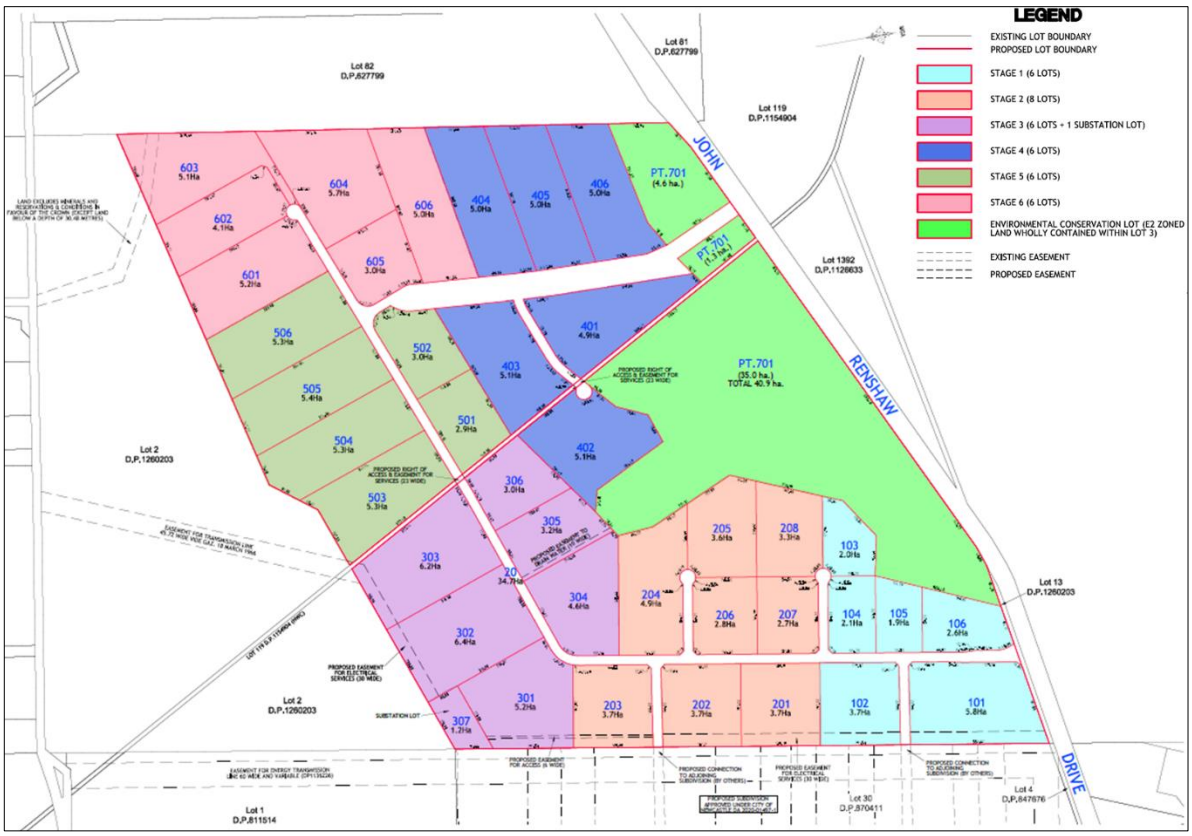
- Stage 1 – 6 Lot subdivision with lot sizes ranging from 1.9 ha to 5.8 ha. Three new public roads and the eastern access intersection are to be constructed in this stage. Total lot area = 18.1 ha. Public road connection to the adjoining BHI site is also able to be realised in this stage.
- Stage 2 – 8 lot subdivision with lot sizes ranging from 2.7 ha to 4.9 ha. An extension of one of the public roads and a new public road. Total lot area = 28.4 ha.
- Stage 3 - 6 lot subdivision plus Ausgrid lot with lot sizes ranging from 1.2 ha to 6.4 ha. An extension of the public road network is provided in this stage. Total developable lot area = 29.8 ha.
- Stage 4 – 6 lot subdivision with lot sizes ranging from 4.9 ha to 5.1 ha. The western access intersection will be constructed, with a new public road access and another public road. Total lot area = 30.1 ha.
- Stage 5 – 6 lot subdivision with lot sizes ranging from 2.9 ha to 5.4 ha. Extension of two public roads and completion of main internal circulation road. Total lot area = 27.2 ha.
- Stage 6 – 6 lot subdivision with lot sizes ranging from 3.0 ha to 5.7 ha and extension of road network. Total lot area = 28.1 ha.

The proposal includes two signalised access intersections on John Renshaw Drive as described below:

- Eastern access – A signalised T-intersection to be located towards the eastern section of the site which will primarily service Stages 1, 2 & 3 of the development once fully developed. This intersection would be located approximately 370 metres west of the signalised intersection as approved for the BHI site under DA2020-01497-1.
- Western access – A four-leg signalised intersection to replace the existing 'seagull' intersection at the existing Donaldson Mine access.

The overall total developable lot area within the subdivision is 161.7 ha. The proposed subdivision plan is shown in Figure 3.1 and Appendix A.

Figure 3.1: Proposed subdivision plan



Source: ADW Johnson, Project Number 239590, Drawing Number 004 dated 7 October 2021

4. PARKING AND SUSTAINABLE TRAVEL

04

4.1. Car Parking and Loading Requirements

As an industrial subdivision, the development itself does not generate any on-site parking or loading demand. On-site parking and loading requirements will be investigated further as part of future development application stages for the development of each individual allotment. It is noted that the proposed lots are large and therefore reasonable to conclude that they are large enough to accommodate industrial development conforming to the on-site car parking requirements listed within Cessnock DCP 2010.

Similarly, lot frontages would comply with the minimum requirements of Cessnock City Council and therefore considered wide enough to readily construct a heavy vehicle site access crossing to Cessnock City Council requirements.

4.2. Pedestrian and Cyclist Facilities

As an industrial development the proposal is unlikely to generate significant pedestrian and cyclist activity. Internal infrastructure would be designated within Cessnock City Council's subdivision standards and conditioned as part of any consent.

Contribution to external facilities aside from immediate connections would be more appropriately dealt with by S94 developer contributions or a voluntary planning agreement to ensure a fair and reasonable contribution is made to these facilities.

Pedestrian crossing facilities are shown in the concept design for the eastern access intersection and would connect to any future pedestrian and bus stop facilities along John Renshaw Drive. The western access road traverses the E2 Environmental Conservation land for a substantial distance between the proposed industrial lots and John Renshaw Drive. Accordingly, no pedestrian facilities are proposed at the western signalised intersection. The John Renshaw Drive intersection layouts are discussed further in Section 5.

4.3. Public Transport Facilities

As future development of individual allotments occurs, there may be some demand for public transport services. As an industrial subdivision, all roads will be constructed to a standard that exceeds the requirements of buses and therefore suitable for bus access. On this basis, the proposed road network is not a constraint to the future bus service provision within the estate.

The internal circulation road would allow buses to enter and exit via either of the proposed signalised intersections on John Renshaw Drive. The provision of future connections to the adjacent BHI site would also allow for future bus services to traverse both sites as necessary.

5. SITE ACCESS AND LAYOUT REVIEW

05

5.1. Vehicle Access

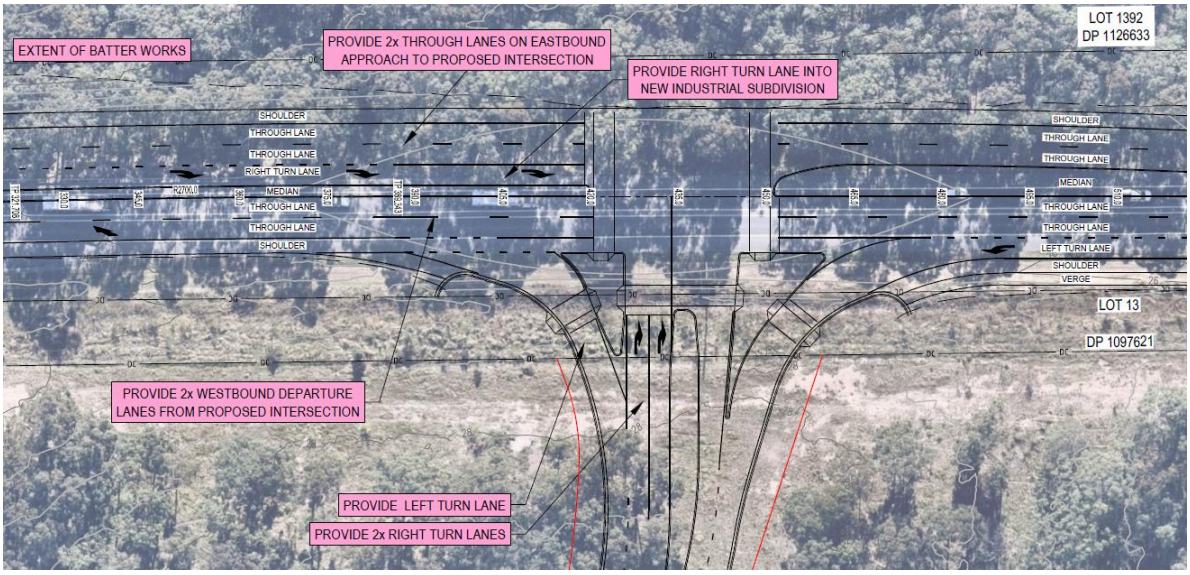
As discussed, two new signalised intersections are proposed along John Renshaw Drive and designed to facilitate all vehicle movements in and out of the site.

The western intersection is proposed opposite the existing Donaldson Mine access road, with this existing unsignalised 'seagull' T-intersection to effectively be upgraded to a four-way signalised intersection. This would also result in improved and safer Donaldson Mine site access arrangements.

The eastern intersection is proposed 230 metres west of the eastern site boundary and designed as a signalised T-intersection with dedicated turning lanes. With the adjacent BHI site recently approved for access via a new signalised intersection on John Renshaw Drive 140 metres east of the eastern site boundary, the two signalised intersections would be separated by 370 metres. Detailed traffic modelling has been completed to confirm the adequacy of this intersection separation, together with the three signalised intersection arrangement along John Renshaw Drive to facilitate access to the industrial precinct more broadly. These details are covered in Section 6.

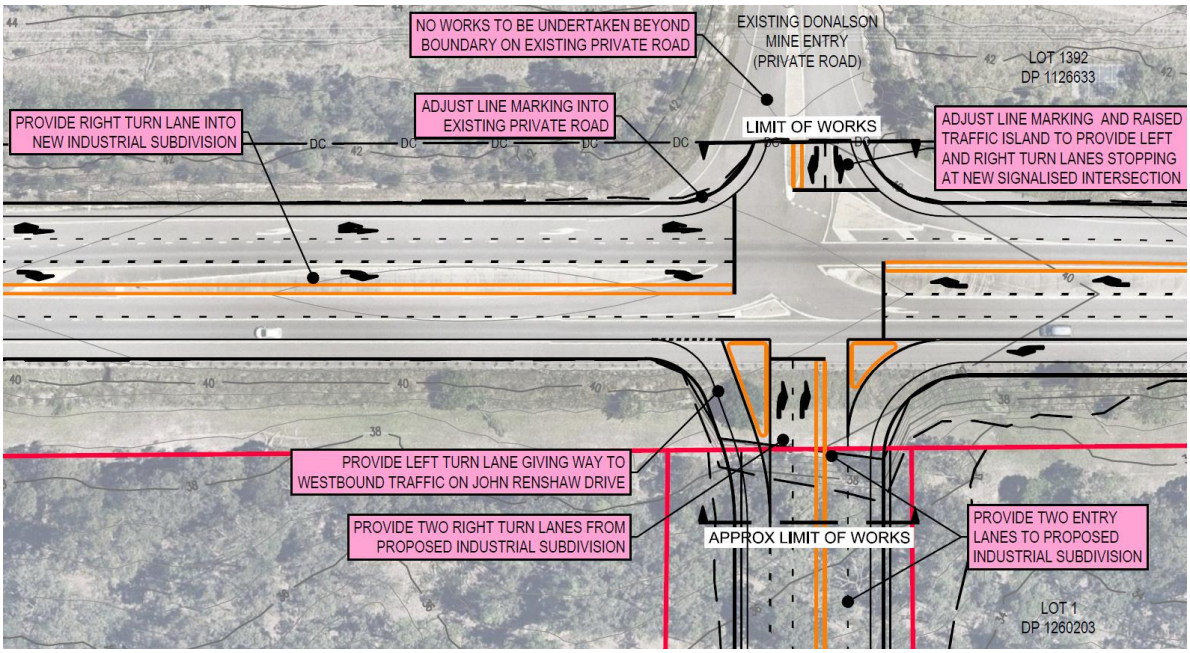
The proposed intersection layouts for the two proposed John Renshaw Drive signalised intersections are shown in Figure 5.1, Figure 5.2, and Appendix A.

Figure 5.1: Eastern John Renshaw Drive site access intersection



Source: ADW Johnson, Drawing Number RD-0501 dated 6 August 2021 (consistent with the ADW Johnson plans dated 7 October 2021)

Figure 5.2: Western John Renshaw Drive site access intersection



Source: ADW Johnson, Drawing Number RD-0701 dated 17 May 2021 (consistent with the ADW Johnson plans dated 7 October 2021)

5.2. Internal Road Layout

Part D1 of Cessnock DCP 2010 provides guidance for road cross sectional requirements for industrial subdivisions. Specifically, DCP 2010 outlines requirements for a 20-metre road reserve width made up of a minimum carriageway width of 13 metres and 3.5 metre verges.

An internal circulation road is proposed through the site effectively connecting all other internal roads and industrial properties with the western and eastern site access intersections on John Renshaw Drive. Local access roads for the purposes of industrial property access intersect with the circulation road internal to the site. A review of the civil plans indicates that the cross sections of the proposed internal roads meet the minimum dimensional requirements outlined in Part D1 of Cessnock DCP 2010 and are considered suitable for servicing the site.

6. TRAFFIC IMPACT ASSESSMENT

06

6.1. Overview

The location of the site and proposed access arrangements on John Renshaw Drive together with consideration of the impacts associated with the Black Hill precinct over and above the site in isolation is key to understanding the traffic related impacts on the surrounding road network. Overall, several microsimulation traffic models, and detailed intersection traffic modelling have been completed in consultation with TfNSW.

In this regard, this section provides a summary of the key inputs informing the traffic modelling, along with the associated modelling outputs.

The primary components of the traffic modelling completed for the project include:

- VISSIM modelling based on the SMEC model completed for TfNSW, adapted to incorporate three sets of traffic signals for the Black Hill Precinct (two for the subject site and one for the BHI site).
- SIDRA network modelling along John Renshaw Drive to assess the full site development impacts on the three proposed traffic signals for the Black Hill Precinct.

Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments suggests transport assessments should assess the impact of developments for 10 years after opening. This is to identify whether the development would use up any spare capacity in the surrounding transport network, thus potentially bringing forward the need for road upgrades and improvements. While the (full) opening year of the industrial development site is not yet defined and dependent on market conditions, allowing a timeframe of 10 years to fully develop the site, 2032 would be the assumed opening year. 2042 would then represent the 10-year design horizon.

The SIDRA modelling outlined above references traffic data from the BHI site Stage 2-7 Traffic Assessment[1] to ensure consistency between the assessments completed for the two sites. That SIDRA assessment looked at a 2038 future design year. The VISSIM modelling outlined above has been developed based on a model produced by SMEC for the broader area. This broader model assessed a 2048 future design year. On this basis, although the anticipated 10-year post opening design year for the proposed development (2042) has not specifically been analysed, the SIDRA and VISSIM analysis which has been completed for the 2038 and 2048 scenarios ensures that the traffic impact analysis outlined in this section provides a robust assessment of the Black Hill precinct comprising the subject site and BHI site. It should also be noted that key locations on the surrounding road network are currently at or close to capacity, as evidenced by the planning of the M1 Motorway to Raymond Terrace project.

6.2. Traffic Generation

Reference has been made to the traffic generation rates for Business Parks and Industrial Estates in the TfNSW Guide to Traffic Generating Developments 2002 (the Guide) and Technical Direction: Updated Traffic Surveys (TDT 2013/ 04a). Data for the key industrial estates in Erskine Park and Eastern Creek referenced in the TDT 2013/ 04a are considered appropriate for comparison purposes given they comprise large lot heavy industrial sites, have a similar level of public transport accessibility and are similar in total size to the proposal.

[1] Attachment B, Barr Property and Planning Pty Ltd V Cessnock City Council & ORS Statement of Evidence – Land and Environment Court Proceedings 2020/331104, Traffic Matters Evidence, Colston Budd Rogers & Kafes Pty Ltd, November 2021.

It is noted that while there are regional industrial estates referenced in the TDT 2013/ 04a, the size of these sites range between 14,000 and 136,000 square metres gross floor area which is significantly less than that proposed for the subject site and are therefore not appropriate for comparative purposes. The adjacent BHI site is however similar to the regional sites, as confirmed by the AECOM study[2]

A summary of the traffic generation characteristics during the road network peak hours at the Erskine Park and Eastern Creek industrial sites is shown in Table 6.1.

Table 6.1: Heavy industrial estate traffic generation rates

Location	GFA (m^2)	AM traffic generation	PM traffic generation	AM traffic generation rate (trips/100m^2)	PM traffic generation rate (trips/100m^2)
Erskine Park	693,605	929	965	0.13	0.14
Eastern Creek	406,600	724	714	0.18	0.18
			Average	**0.16**	**0.16**

Table 6.1 indicates that the similar large lot heavy industrial sites have an average traffic generation rate of 0.16 trips per 100 square metres per hour in both the AM and PM road network peak hours. Even accounting for the site peak hours (which do not coincide with the road network peak hours), the traffic generation rates are 0.163 and 0.202 trips per 100 square metres respectively. This equates to an average of 0.183 trips per 100 square metres.

Notwithstanding the above, and following extensive consultation with TfNSW, the following trip generation rates have been necessary to adopt in order to be consistent with the TfNSW rates for the precinct as a whole, rather than considering each site in isolation.

- Black Hill precinct TfNSW specified trip generation rate:
  - AM 0.38 vehicles per 100 square metres GFA
  - PM 0.40 vehicles per 100 square metres GFA.
- Lot yield of 26 per cent GFA of total Net Developable Area.

Considering the above, Table 6.2 has been prepared to outline the estimated traffic generation of the proposed development in the AM and PM peak hours.

[2] Assessment of Hunter Valley Business Park Trip Rates, AECOM Australia Pty Ltd, 17 December 2017

Table 6.2: Stage 1 to 6 traffic generation

Stage	Developable area (ha)	GFA (m^2)	Traffic generation	
			AM peak	PM peak
1	18.1	47,060	179	188
2	28.4	73,840	281	295
3	29.8	77,480	294	310
4	30.1	78,260	297	313
5	27.2	70,720	269	283
6	28.1	73,060	278	292
Total	**161.7**	**420,420**	**1,598**	**1,681**

Based on the TfNSW imposed assumptions, the site would generate about 1,600 and 1,680 vehicle trips in the weekday AM and PM peak hours respectively.

6.3. Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- distribution of households in the vicinity of the site
- likely distribution of employee residences in relation to the site
- configuration of access points to the site.

As part of the previous Traffic Impact Assessment (Intersect Traffic, 2018) prepared for the site, the following traffic distribution was adopted for site development traffic:

- 40 per cent via M1 Pacific Motorway
- 25 per cent via M15 Hunter Expressway
- 25 per cent via John Renshaw Drive (east)
- 10 per cent via Weakleys Drive (north).

Further to this, an Insights Report[3] has been prepared by the University of Newcastle to further understand the likely distribution of future employees when travelling to and from the site. The analysis has been completed utilising an SA2 level journey-to-work matrix drawn from the 2016 Census. Three methodologies were investigated as part of the assessment, which considered the average distance employees in the surrounding area generally travelled to work as well as current and projected employment and population changes from the 2016 Census data.

[3] John Renshaw Drive Black Hill – Proposed Industrial Site, Insights Report, August 2021

In all three methodologies of defining the site's commuting catchment, the Insights Report identified the directional split between east and west as generally being 60:40, which has a slightly higher weighting towards traffic travelling to/ from the west than the assumed traffic distribution in the previous Traffic Impact Assessment (Intersect Traffic, 2018) prepared for the site.

A review of the potential travel routes to and from the site on Google Maps indicates that for vehicles approaching or departing to the south, travelling via the M1, Hunter Expressway and John Renshaw Drive is currently only around three minutes slower than travelling via the M1 and turning left onto John Renshaw Drive to reach the site. Similarly for vehicles approaching or departing to the north, travelling via Louth Park Road, Buchanan Road and John Renshaw Drive is currently only around two minutes slower than travelling via the New England Highway, Weakleys Drive and turning right onto John Renshaw Drive. Considering this, approaching from the west would likely become the preferred route for anyone approaching or departing the site to/ from the south (south or east of the Hunter Expressway) or north (north of Louth Park Road) given more reliable travel times and nominal difference in overall travel time. This is particularly the case for heavy vehicles and the strong preference to avoid congestion on the road network.

Based on the above, previous transport studies completed for the site suggest that around 25 to 40 per cent of development traffic would likely travel to/ from the west. While this provides definitive evidence to support a more even split of traffic using John Renshaw Drive west of the site, the TfNSW required traffic distribution have been adopted for this assessment. This includes just 20 per cent travelling to/ from the west.

- Weekday AM trip distribution (reversed in the PM):
  - South 35% (entry), 20% (exit)
  - West 20% (entry), 20% (exit)
  - East 25% (entry), 40% (exit)
  - North 20% (entry), 20% (exit).

In addition, TfNSW also advised of the following modelling assumptions for inclusion in the traffic model:

- Site entry and exit movements:
  - AM 66.3% (entry), 33.7% (exit)
  - PM 36.3% (entry), 63.7% (exit).
- Heavy vehicle proportions:
  - AM 20%
  - PM 15.5%.

Based on the above, an estimate of the weekday AM and PM peak hour traffic demands is set out in Table 6.3, indicating that proposed Stages 1 to 6 are forecast to generate 1,598 and 1,682 vehicle trips during the AM and PM peak periods respectively.

Table 6.3: Stage 1 to 6 traffic generation and distribution

Direction	AM				PM			
	Entry		Exit		Entry		Exit	
	Distribution	Generation	Distribution	Generation	Distribution	Generation	Distribution	Generation
South	35%	371	20%	108	20%	122	35%	375
West	20%	212	20%	108	20%	122	20%	214
East	25%	265	40%	215	40%	244	25%	268
North	20%	212	20%	108	20%	122	20%	214
Total	**1,598**				**1,682**			

For the purposes of this assessment, vehicles accessing Stage 1 to 3 are assumed to use the eastern access and vehicles accessing Stage 4 to 6 are assumed to use the western access. No vehicles are assumed to use the BHI site access for this analysis, however there will obviously be some reciprocal use of the two eastern signalised intersections on entry and exit.

Based on the above, Figure 6.1 and Figure 6.2 have been prepared to show the estimated increase in turning movements near the subject site following full development during the AM and PM peak hours respectively.

Figure 6.1: Stage 1 to 6 weekday AM peak hour traffic volumes

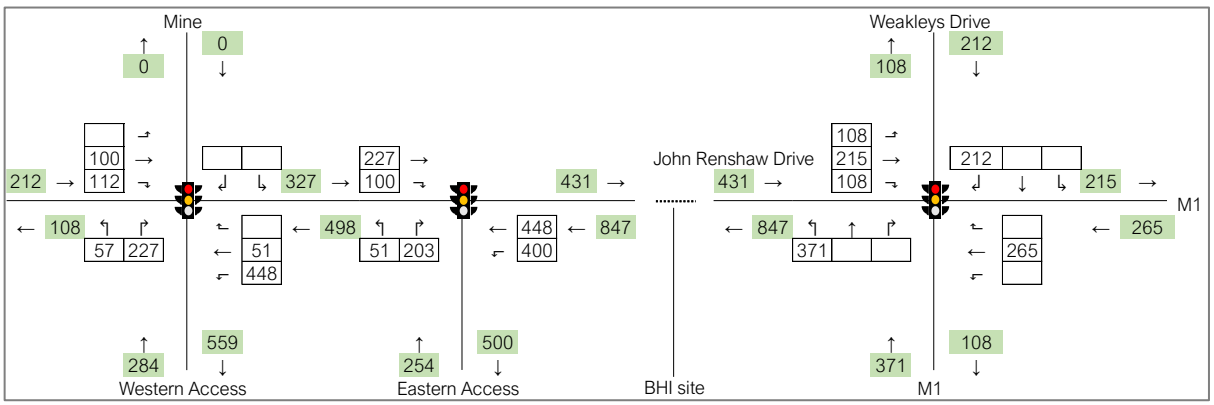
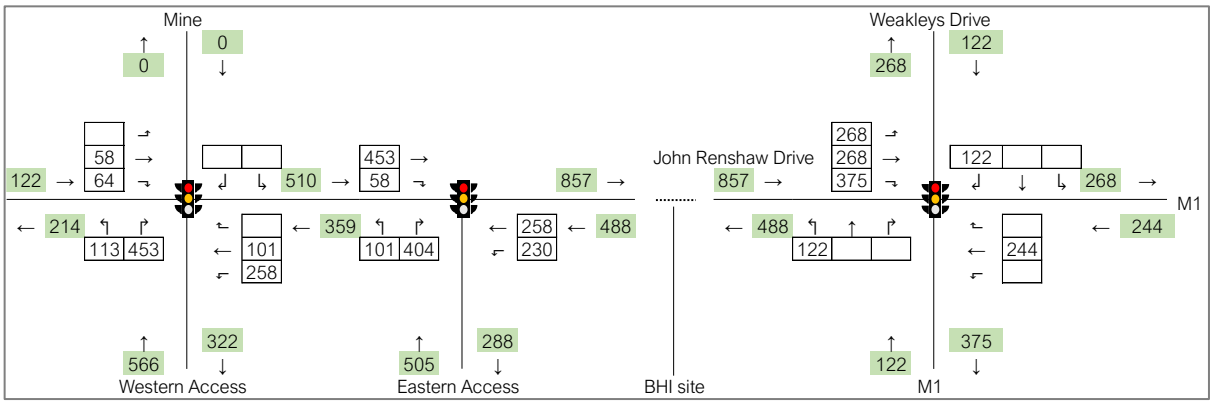
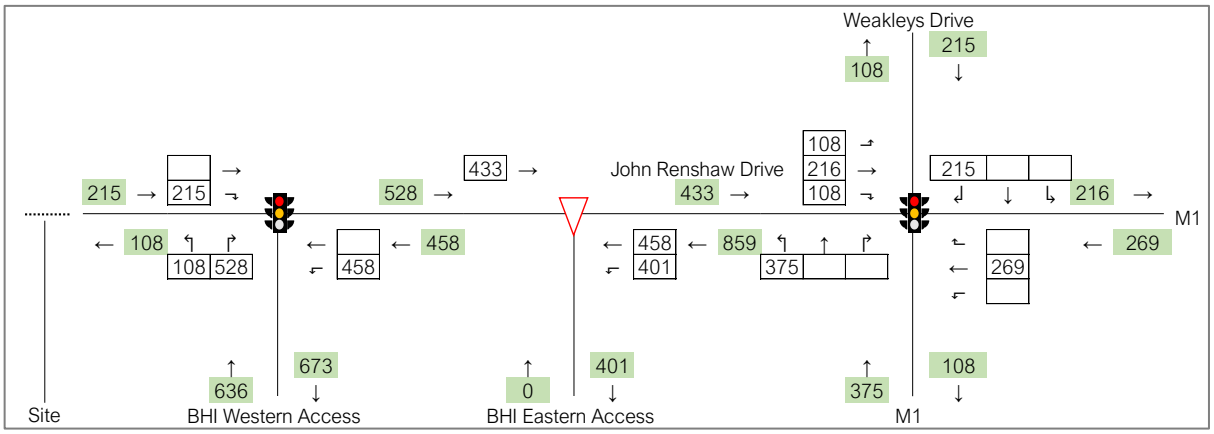


Figure 6.2: Stage 1 to 6 weekday PM peak hour traffic volumes



Traffic volume estimates for the adjacent BHI site have been sourced from the Stage 2-7 Traffic Assessment (CBRK, 2021), noting these are understood to be based on the same TfNSW traffic generation, distribution and assignment assumptions. Figure 6.3 and Figure 6.4 have been prepared to show the estimated increase in turning movements near the subject site following development of the BHI site in the AM and PM peak hours respectively.

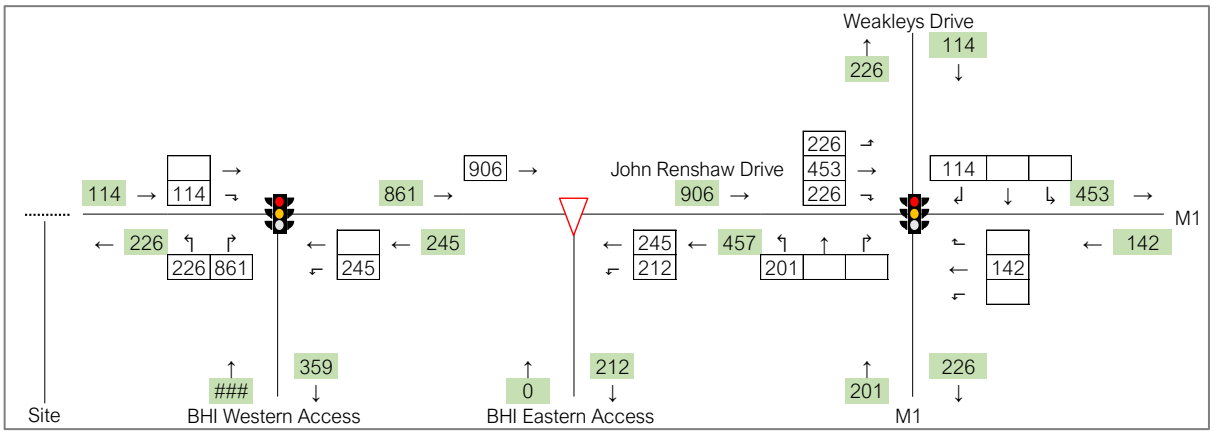
Figure 6.3: BHI Stage 1 to 7 weekday AM peak hour traffic volumes [1][2]



[1] Source: Page 32, Figure 2 2038 "Weekday morning peak hour traffic flows plus Stages 1-7 development traffic plus M12RT Bypass", Barr Property and Planning Pty Ltd V Cessnock City Council & ORS Statement of Evidence – Land and Environment Court Proceedings 2020/331104, Traffic Matters Evidence, Colston Budd Rogers & Kafes Pty Ltd, November 2021

[2] Note minor error for left in volume at the eastern BHI access, shown as 265 vehicles. This should be 401 vehicles as detailed in Table 1 on page 27 of the source document. Note error was not carried through to volumes elsewhere on the diagrams.

Figure 6.4: BHI Stage 1 to 7 weekday PM peak hour traffic volumes [1]



[1] Source: Page 33, Figure 2 2038 "Weekday afternoon peak hour traffic flows plus Stages 1-7 development traffic plus M12RT Bypass", Barr Property and Planning Pty Ltd V Cessnock City Council & ORS Statement of Evidence – Land and Environment Court Proceedings 2020/331104, Traffic Matters Evidence, Colston Budd Rogers & Kafes Pty Ltd, November 2021.

6.4. SIDRA Network Modelling

6.4.1. Overview

SIDRA Network analysis was completed to supplement the VISSIM microsimulation modelling and assess the operation of the John Renshaw Drive intersections (and associated layouts/ improvements) in more detail.

The commonly used measure of intersection performance is vehicle delay. SIDRA determines the average delay that vehicles encounter and provides a measure of the level of service. Table 6.4 shows the criteria that SIDRA software adopts in assessing the level of service.

Table 6.4: SIDRA Level of Service criteria

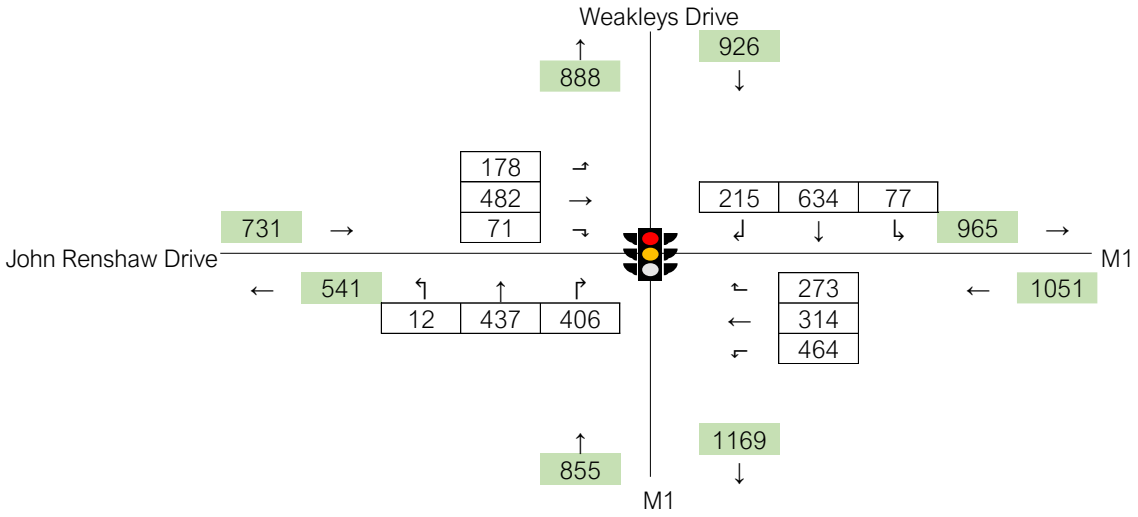
Level of service (LOS)	Average delay per vehicle (secs/veh)	Traffic signals, roundabouts & give ways
A	Less than 14	Good operation
B	15 to 28	Acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Near capacity
E	57 to 70	At capacity, at signals incidents will cause excessive delays
F	Greater than 70	Extreme delay, major treatment required

6.4.2. Traffic Volumes

For the purposes of this assessment, 2038 traffic volumes have been adopted from the BHI site Stage 2-7 Traffic Assessment (Colston Budd Rogers & Kafes, September 2021). It is understood these traffic volumes have been supplied by TfNSW and consider the effects of the M1 Extension to Raymond Terrace link (M12RT) that is planned to be opened in 2028 and expected to result in a significant redistribution of traffic at the John Renshaw Drive/ Weakleys Drive/ M1 intersection.

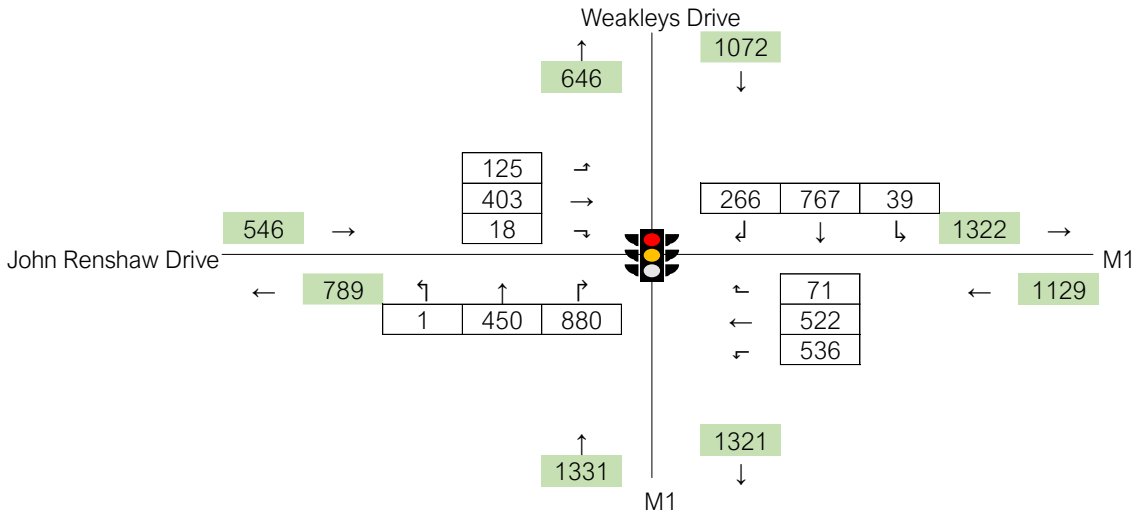
The weekday AM and PM peak hour traffic volumes are summarised in Figure 6.5 and Figure 6.6.

Figure 6.5: 2038 AM peak hour traffic volumes



[2] Source: Page 32, Figure 2 2038 "Weekday morning peak hour traffic flows plus Stages 1-7 development traffic plus M12RT Bypass", Barr Property and Planning Pty Ltd V Cessnock City Council & ORS Statement of Evidence – Land and Environment Court Proceedings 2020/331104, Traffic Matters Evidence, Colston Budd Rogers & Kafes Pty Ltd, November 2021.

Figure 6.6: 2038 PM peak hour traffic volumes



[3] Source: Page 33, Figure 2 2038 "Weekday afternoon peak hour traffic flows plus Stages 1-7 development traffic plus M12RT Bypass", Barr Property and Planning Pty Ltd V Cessnock City Council & ORS Statement of Evidence – Land and Environment Court Proceedings 2020/331104, Traffic Matters Evidence, Colston Budd Rogers & Kafes Pty Ltd, November 2021.

6.4.3. Model Calibration

Pedestrians

Pedestrian volumes for all relevant movements are set at 50 pedestrians per hour as per the default SIDRA settings. Each signalised intersection has been coded with full pedestrian protection, resulting in late starts for vehicles conflicting with the pedestrian movement and in turn, reducing the capacity of specific movements. This includes the south approach right turn movement at the site's eastern intersection and the BHI site western intersection. Given an approximate 25 metre walking distance, pedestrian timings of 27

seconds are required for full protection (six seconds walk and 23 seconds clearance). Noting the low frequency of pedestrian movements expected, they have been coded to occur in 25 per cent of cycles, resulting in an average pedestrian time of seven seconds per cycle. This has been applied using the Gap Acceptance – Opposing Peds (Signals) parameter in the model.

This is a key difference between the SIDRA model prepared by GTA, now Stantec and SIDRA model prepared by CBRK, noting the CBRK model results in an average pedestrian time of three seconds per cycle. Assuming full pedestrian protection is provided during each pedestrian movement, this implies pedestrian movements occur in 10 per cent of cycles.

Signal Timing

The subject site eastern access, BHI western access and John Renshaw Drive/ M1/ Weakleys Drive intersections have been set up as being coordinated, with Signal Offsets set to program and therefore calculated by SIDRA. The coordination was observed to have limited benefit to the operation of the John Renshaw Drive/ M1/ Weakleys Drive intersection and rather, the primary benefit was observed at the BHI western access, with significant improvements to the operation of the westbound through movement.

The subject site western access has been set with a minimum cycle length of 80 seconds, 30 seconds above SIDRA calculated cycle time of 50 seconds, to maintain priority for through traffic movements along John Renshaw Drive.

6.4.4. Primary Modelling Scenarios

The primary modelling scenarios assessed are described in Table 6.5. Each scenario considers the cumulative impact of full development of the subject site in combination with full development of the adjacent BHI site for the project study year 2038.

Table 6.5: Primary modelling scenarios for modelling traffic impacts

#	Scenario	Description
1	2038 with Development and BHI, and SMEC Stage 2 road network upgrades	2038 base volumes, incorporating traffic effects associated with M1RT, plus site development traffic and adjacent BHI site with upgrades to John Renshaw Drive/ Weakleys Drive/ M1 intersection based on the Stage 2 mitigation works[1].
2	2038 with Development and BHI, and extension of SMEC Stage 2 road network upgrades	Scenario 1 with additional upgrades as follows: • Extend the short departure lane on John Renshaw Drive westbound direction. • Introduce an additional right-turn lane on the John Renshaw Drive' eastbound direction.

[1] As recommended in the Black Hill Traffic Modelling & Traffic Analysis Report (SMEC, 9 October 2020) and illustrated in Figure 6.7

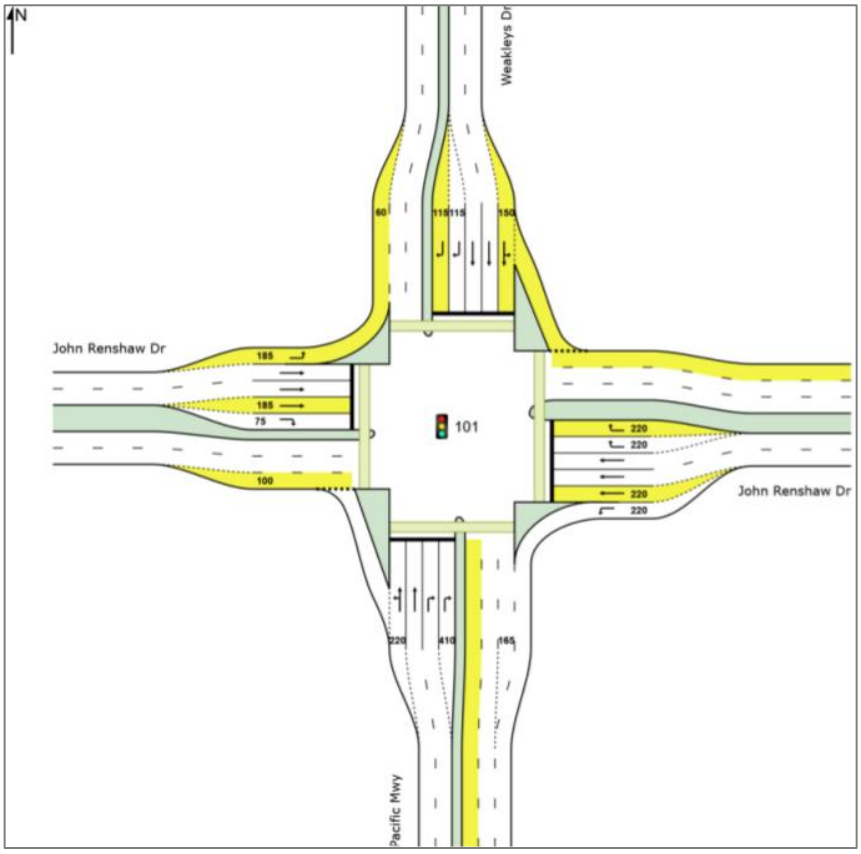
Scenario 1

Given that the John Renshaw Drive/ M1/ Weakleys Drive intersection is expected to operate over capacity in 2038, the following road network upgrades are considered necessary. These upgrades are based on the Stage 2 mitigation works as recommended in the Black Hill Traffic Modelling & Traffic Analysis Report (SMEC, 9 October 2020). The works are shown in Figure 6.7 and defined as follows:

- Introduce an additional through lane on the John Renshaw Drive eastbound direction.
- Introduce an additional through lane on the John Renshaw Drive westbound direction.

- Introduce an additional through lane on the Weakleys Drive southbound direction.
- Introduce an additional right-turn lane on the Weakleys Drive southbound direction.
- Introduce an additional right-turn lane on the John Renshaw Drive westbound direction.
- Convert the left-turn movement on the John Renshaw Drive eastbound to a free-flow slip lane.

Figure 6.7: SMEC Stage 2 Mitigation works John Renshaw Drive/ M1/ Weakleys Drive intersection



[2] Source: Figure 5-5 Mitigation Works – Change #5 (Stage 2), The Black Hill Traffic Modelling & Traffic Analysis Report prepared by SMEC, dated 9 October 2020

Table 6.6 presents a summary of the operation of the key intersections in the 2038 growth year, assuming full development of the subject site and adjacent BHI site, and Stage 2 upgrades to the John Renshaw Drive/ M1/ Weakleys Drive intersection as recommended by SMEC.

Table 6.6: Scenario 1: 2038 with development site traffic and BHI site traffic plus Stage 2 SMEC intersection upgrades

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ M1/ Weakleys Drive	AM	1.04	67	312	E
	PM	1.38	184	579	F
	AM	0.90	26	187	B

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ BHI Site Western Access	PM	0.89	29	172	C
John Renshaw Drive/ Site Eastern Access	AM	0.60	12	67	A
	PM	0.63	17	88	B
John Renshaw Drive/ Site Western Access	AM	0.57	13	39	A
	PM	0.59	17	70	B

Table 6.6 indicates the John Renshaw Drive/ M1/ Weakleys Drive intersection would be operating over capacity in both the AM and PM peak hours as indicated by the DOS being over 1.00. As such, further upgrades are required to accommodate the anticipated traffic through the intersection. The remaining study intersections along John Renshaw Drive providing access to the BHI site and the subject site are expected to operate well at a LOS C or better in any peak hour.

Scenario 2

Given that the John Renshaw Drive/ M1/ Weakleys Drive intersection is expected to operate over capacity in 2038, modifications to the suite of road network upgrades proposed by SMEC are considered necessary. The additional works are shown in Figure 6.8 and defined as follows:

- Extend the short departure lane on John Renshaw Drive westbound direction.
- Introduce an additional right-turn movement lane on the John Renshaw Drive eastbound direction.

Figure 6.8: Extension of SMEC Stage 2 mitigation works John Renshaw Drive/ M1/ Weakleys Drive intersection

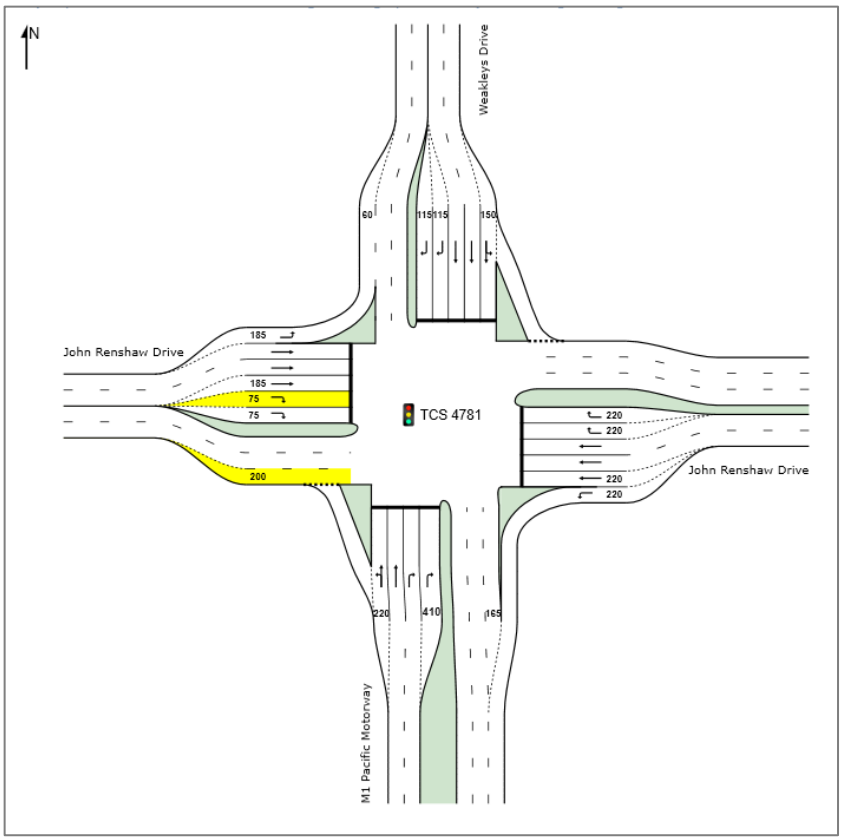


Table 6.7 presents a summary of the operation of the key intersections in the 2038 growth year, assuming full development of the subject site and adjacent BHI site, Stage 2 upgrades to the John Renshaw Drive/ M1/ Weakleys Drive intersection as recommended by SMEC and the above additional upgrade works.

Table 6.7: Scenario 2: 2038 with development site traffic and BHI site traffic plus extension of Stage 2 SMEC intersection upgrades

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ M1/ Weakleys Drive	AM	0.94	56	207	D
	PM	1.03	63	201	E
John Renshaw Drive/ BHI Site Western Access	AM	0.94	28	197	B
	PM	0.97	33	179	C
John Renshaw Drive/ Site Eastern Access	AM	0.64	12	65	A
	PM	0.69	16	80	B
	AM	0.57	13	40	A

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ Site Western Access	PM	0.63	16	76	B

Table 6.7 demonstrates that with the additional upgrade works, practical intersection operation at John Renshaw Drive/ Weakleys Drive/ M1 is expected, with the intersection close to capacity, however with all vehicle approach demands being met. Similar to Scenario 1, the other intersections along John Renshaw Drive providing access to the BHI site and the subject site are expected to operate well at a LOS C or better in any peak hour.

6.4.5. Additional Modelling Scenarios

In addition to the above, additional modelling scenarios were prepared to understand the incremental impact of proposed site and Precinct development beyond the current BHI Stage 1 approval and are described in Table 6.8.

Table 6.8: Additional modelling scenarios for modelling traffic impacts

#	Scenario	Description
3	2038 without proposed development, but with SMEC Stage 2 road network upgrades	2038 base volumes, plus BHI site Stage 1 development traffic only, with upgrades to John Renshaw Drive/ Weakleys Drive/ M1 intersection based on the SMEC Stage 2 mitigation works[1]. Comparing Scenario 3 with Scenario 1 demonstrates the incremental development traffic impact of the balance of the Precinct, without the proposed M1/ Black Hill Road south-facing ramps.
4	2038 with Development and BHI Stages 1-7, and SMEC Stage 2 road network upgrades including Black Hill Road ramps	Scenario 1 with new south-facing ramps at the Black Hill Road interchange with M1, resulting in a redistribution of development and BHI traffic travelling to/ from the south to approach via the Black Hill Road ramps. Scenario 4 provides a direct comparison with the VISSIM modelling as it contains the same road network improvements. Comparing Scenario 4 with Scenario 1 demonstrates the level of improvement that the proposed M1/ Black Hill Road south-facing ramps have on the John Renshaw Drive/ Weakleys Drive/ M1 intersection.
5a	2038 with Development and BHI Stage 1, and SMEC Stage 2 road network upgrades	2038 base volumes, plus 50 per cent of Emerging Black Hill Precinct developed, including Stage 1 to 4 of the development site and Stage 1 BHI site, with upgrades to John Renshaw Drive/ Weakleys Drive/ M1 intersection based on the Stage 2 mitigation works[1]. Scenario 5a demonstrates road network operation prior to the introduction of further grade separation (M1/ Black Hill Road south-facing ramps or east-west grade separation at John Renshaw Drive/ Weakleys Drive/ M1 intersection) as determined by the SMEC 2020 VISSIM modelling which introduces grade separation at 75% Precinct development.
5b	2038 with Development and BHI Stage 1, and extension of SMEC Stage 2 road network upgrades	Scenario 5a with additional upgrades as follows (similar to Scenario 2): • Extend the short departure lane on John Renshaw Drive westbound direction. • Introduce an additional right-turn movement lane on the John Renshaw Drive' eastbound direction. Scenario 5b tests the benefits of further intersection improvements at the John Renshaw Drive/ Weakleys Drive/ M1 intersection (as per

#	Scenario	Description
		Scenario 2), noting the additional right turn lane makes this west approach consistent with the other three approaches which are proposed to have double right turns upon completion of the SMEC Stage 2 works.

[1] As recommended in the Black Hill Traffic Modelling & Traffic Analysis Report (SMEC – 9 October 2020) and illustrated in Figure 6.7

In relation to Scenario 5a and 5b, it is understood that 50 per cent of the Emerging Black Hill Precinct equates to around 150 hectares. Noting the approved BHI site Stage 1 development comprises 49.2 hectares, development of Stage 1 to 4 of the subject site would result in a total of 155.6 hectares, effectively 50 per cent of the precinct. In these scenarios, the western site access would service Stage 4 only, with Stage 1-3 traffic using the eastern access only.

The SMEC VISSIM Modelling (October 2020) indicates that the potential Black Hill Road south facing ramps are not required until between 50 and 75 per cent development of the Precinct and hence this mitigation measure is not included in Scenario 5a and 5b.

Scenario 3

Table 6.9 presents a summary of the operation of the key intersections under Scenario 3.

Table 6.9: Scenario 3: 2038 without proposed development, but with SMEC Stage 2 road network upgrades

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ M1/ Weakleys Drive	AM	0.58	32	48	C
	PM	0.81	35	112	C
John Renshaw Drive/ BHI Site Western Access	AM	0.33	12	35	A
	PM	0.45	14	31	A

Table 6.9 indicates the John Renshaw Drive/ M1/ Weakleys Drive is expected to operate satisfactorily (generally defined as a LOS D or better) in both weekday peak periods in 2038 with Stage 1 of the BHI site and the SMEC Stage 2 road network upgrades. The western site access to the BHI site is also expected to operate well at a LOS A overall in both peak hours.

Scenario 4

Table 6.10 presents a summary of the operation of the key intersections under Scenario 4.

Table 6.10: Scenario 4: 2038 with Development and BHI Stages 1-7 and SMEC Stage 2 road network upgrades including Black Hill Road ramps

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ M1/ Weakleys Drive	AM	0.80	37	86	C
	PM	0.92	44	144	D
John Renshaw Drive/ BHI Site Western Access	AM	0.74	19	87	B
	PM	0.83	22	90	B
John Renshaw Drive/ Site Eastern Access	AM	0.53	11	58	A
	PM	0.61	13	48	A
John Renshaw Drive/ Site Western Access	AM	0.49	12	40	A
	PM	0.56	12	60	A

Table 6.10 indicates the John Renshaw Drive/ M1/ Weakleys Drive intersection is expected to operate satisfactorily with the proposed development traffic along with the BHI development when considering the SMEC Stage 2 road network upgrades including the Black Hill Road ramps.

Similar to Scenario 1 and 2, the other site access intersections along John Renshaw Drive are also expected to operate satisfactorily in both peak hours.

Scenario 5a

Table 6.11 presents a summary of the operation of the key intersections under Scenario 5a.

Table 6.11: Scenario 5a: 2038 with Development and BHI Stage 1, and SMEC Stage 2 road network upgrades

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ M1/ Weakleys Drive	AM	0.72	34	77	C
	PM	1.05	63	194	E
John Renshaw Drive/ BHI Site Western Access	AM	0.59	9	40	A
	PM	0.58	10	38	A
John Renshaw Drive/ Site Eastern Access	AM	0.47	13	46	A
	PM	0.60	16	47	B
John Renshaw Drive/ Site Western Access	AM	0.32	8	28	A
	PM	0.45	10	44	A

Table 6.11 indicates the John Renshaw Drive/ M1/ Weakleys Drive intersection is expected to operate satisfactorily in the AM peak hour, however will be over capacity and operating at a LOS E overall in the PM peak hour in 2038 with development of 50 per cent of the Emerging Black Hill Precinct with the SMEC Stage 2 road network upgrades.

The other site access intersections along John Renshaw Drive are also expected to operate satisfactorily in both peak hours.

Scenario 5b

Table 6.12 presents a summary of the operation of the key intersections under Scenario 5b.

Table 6.12: Scenario 5b: 2038 with Development and BHI Stage 1, and extension of SMEC Stage 2 road network upgrades

Intersection	Peak Period	Degree of Saturation (DOS)	Average Delay (sec)	Average Queue (m)	Level of Service (LOS)
John Renshaw Drive/ M1/ Weakleys Drive	AM	0.70	33	76	C
	PM	0.89	40	134	C
John Renshaw Drive/ BHI Site Western Access	AM	0.59	9	41	A
	PM	0.60	10	36	A
John Renshaw Drive/ Site Eastern Access	AM	0.47	13	46	A
	PM	0.60	16	47	B
John Renshaw Drive/ Site Western Access	AM	0.32	8	28	A
	PM	0.46	10	45	A

Table 6.12 indicates that with the extension of the SMEC Stage 2 road network upgrades at the John Renshaw Drive/ M1/ Weakleys Drive intersection similar to that proposed under Scenario 2, the intersection would operate satisfactorily in both peak hours with the traffic associated with development of 50 per cent of the Emerging Development Precinct, with intersection performance similar to the Scenario 3 future base case and therefore demonstrating adequate mitigation measures.

The other site access intersections along John Renshaw Drive are also expected to operate satisfactorily in both peak hours similar to Scenario 5a.

6.5. VISSIM Modelling

6.5.1. Overview

VISSIM microsimulation modelling has been previously prepared for the Black Hill Precinct and documented in the following reports:

- John Renshaw Drive, Black Hill Industrial Precinct, Microsimulation Modelling Options Testing Report, GTA Consultants, 26 May 2020 (GTA 2020).
- Black Hill Traffic Modelling & Traffic Analysis Report, SMEC, 9 October 2020 (SMEC 2020).

A further report was prepared to compare the above two modelling reports as follows:

- John Renshaw Drive, Black Hill Industrial Precinct, Detailed Evaluation of SMEC Report compared to GTA Report, GTA Consultants, December 2020.

To best progress modelling outcomes for the project, updated VISSIM modelling was developed using the SMEC VISSIM model (SMEC 2020) provided by TfNSW on 15 November 2021. The assessment was prepared to determine the impact of an additional intersection access to the proposed Industrial Precinct along John Renshaw Drive. The assessment includes comparison between two new signalised intersections on John Renshaw Drive to facilitate vehicle access to the Precinct, and three signalised intersections. This is supplemented by some minor reconfigurations to the internal road network, as shown in Figure 6.9 and Figure 6.10.

Figure 6.9: John Renshaw Drive with two new signalised intersections

Figure 6.10:John Renshaw Drive with three new signalised intersections

The following assumptions were adopted as part of this assessment:

- Completed based on the 2048 100 per cent demand scenario with the mitigation works as proposed in the SMEC model (Chapter 5 of Black Hill Traffic Modelling, Traffic Analysis Report, SMEC, 9 October 2020).
- SMEC VISSIM model scenario for the two-intersection layout re-run to ensure reporting can assess performance metrics not included in the SMEC modelling report (including travel times on John Renshaw Drive). This has allowed for all metrics reported in this report to be based on the models run by Stantec.
- Reported results based on an average of five seed runs, consistent with SMEC reporting.
- Traffic signal timings for the eastern subject site signalised intersection within the three-intersection scenario adjusted to account for the redistribution of traffic.

6.5.2. Network Performance Results

The network performance metrics presented in Table 6.13 indicate that the 3-intersection configuration improves overall network performance across the model extent when compared with the 2-intersection configuration. This is indicated by the following key outcomes:

- The average network speed increases by 1.5km/h and 2.1km/h in the AM and PM peaks respectively with the introduction of the additional intersection.
- A decrease in average network delay of approximately 20 seconds in the AM and PM peaks is expected, as well as a decrease in the number of stops.
- The latent demand (or unreleased demand) decreases by 47 vehicles and 130 vehicles in the AM and PM peaks respectively with the introduction of the additional intersection.
- Some of the improvements to overall network performance is based on reducing some of the internal road network congestion with the 3-intersection configuration given that it provides additional opportunities/ alternative routes for site traffic to exit the Precinct.

Table 6.13: Network performance results

Performance Metric	2048 100% Demand Scenario 2-Intersection Configuration		2048 100% Demand Scenario 3-Intersection Configuration	
	AM	PM	AM	PM
Vehicle Kilometres Travelled (VKT) - end of 2nd hour	92,816	111,060	92,283	110,295
Vehicle Hours Travelled (VHT) - end of 2nd hour	2,471	2,129	2,363	2,033
Average Network Speed (km/h) - end of 2nd hour	37.6	52.2	39.1	54.3
Total Delay on Network (h) - end of 2nd hour	1,284	721	1,196	649
Average Delay on Network (s) - end of 2nd hour	314	151	292	136
Total Number of Stops - end of 2nd hour	770,662	134,310	709,281	118,147
Average Number of Stops - end of 2nd hour	52	8	48	7
Vehicles Active - end of 3rd hour	2,763	2,357	2,613	2,174
Vehicles Arrived - end of 3rd hour	12,277	15,288	12,279	15,496
Latent Demand - end of 3rd hour	5,410	747	5,363	617

6.5.3. Travel Time Results

The travel time results for John Renshaw Drive eastbound and westbound movements between the John Renshaw Drive/ Weakleys Drive/ M1 intersection and immediately west of the western signalised intersection are shown in Figure 6.11 to Figure 6.14. The results indicate that travel times are generally comparable between the 3-intersection and 2-intersection configuration scenarios indicating that the additional signalised intersection on John Renshaw Drive will not negatively impact travel times and overall mid-block performance along the corridor.

It is also noted that slight improvements are evident in the westbound direction in both the AM and PM peaks, with the eastbound direction also slightly improving in the AM peak.

Figure 6.11:John Renshaw Drive eastbound travel time (2nd hour) – AM peak

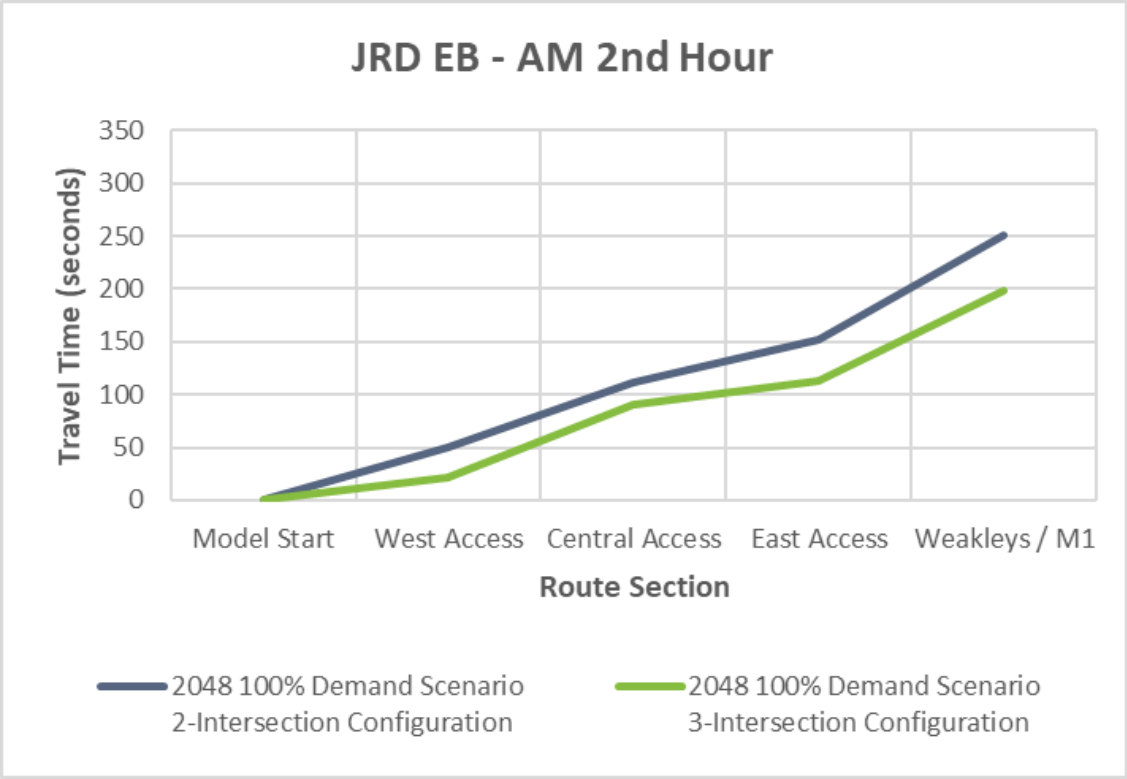


Figure 6.12:John Renshaw Drive westbound travel time (2nd hour) – AM peak

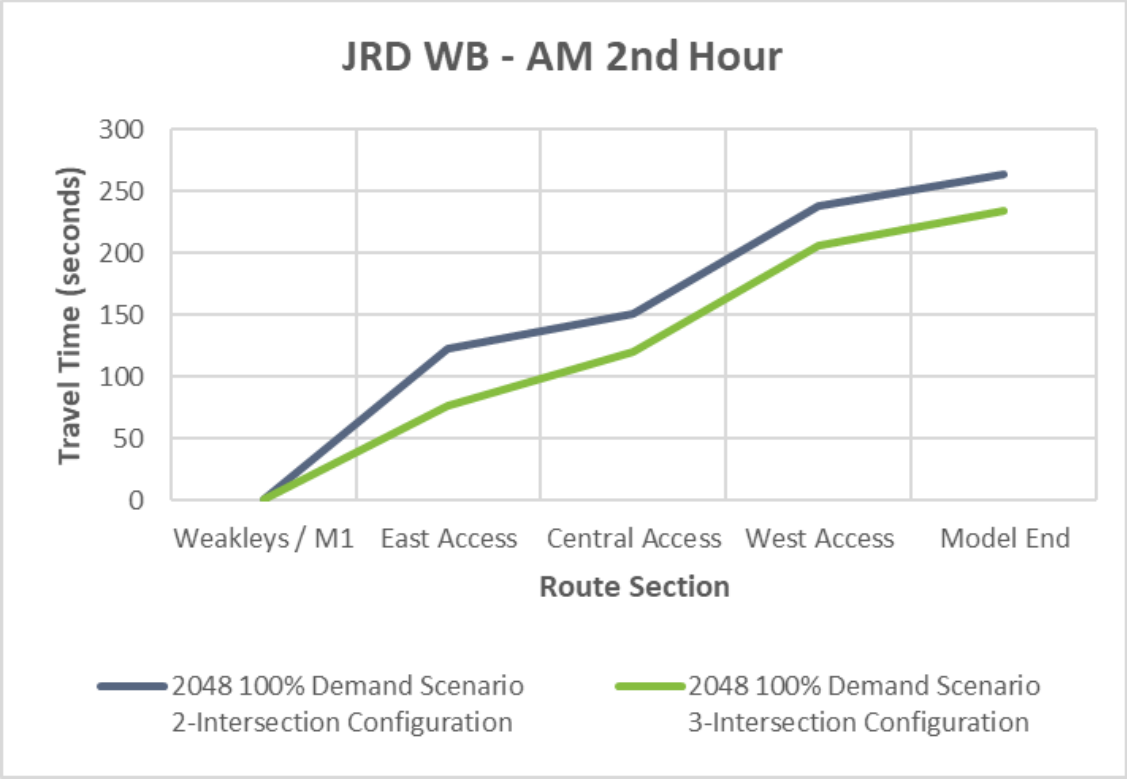


Figure 6.13:John Renshaw Drive eastbound travel time (2nd hour) – PM peak

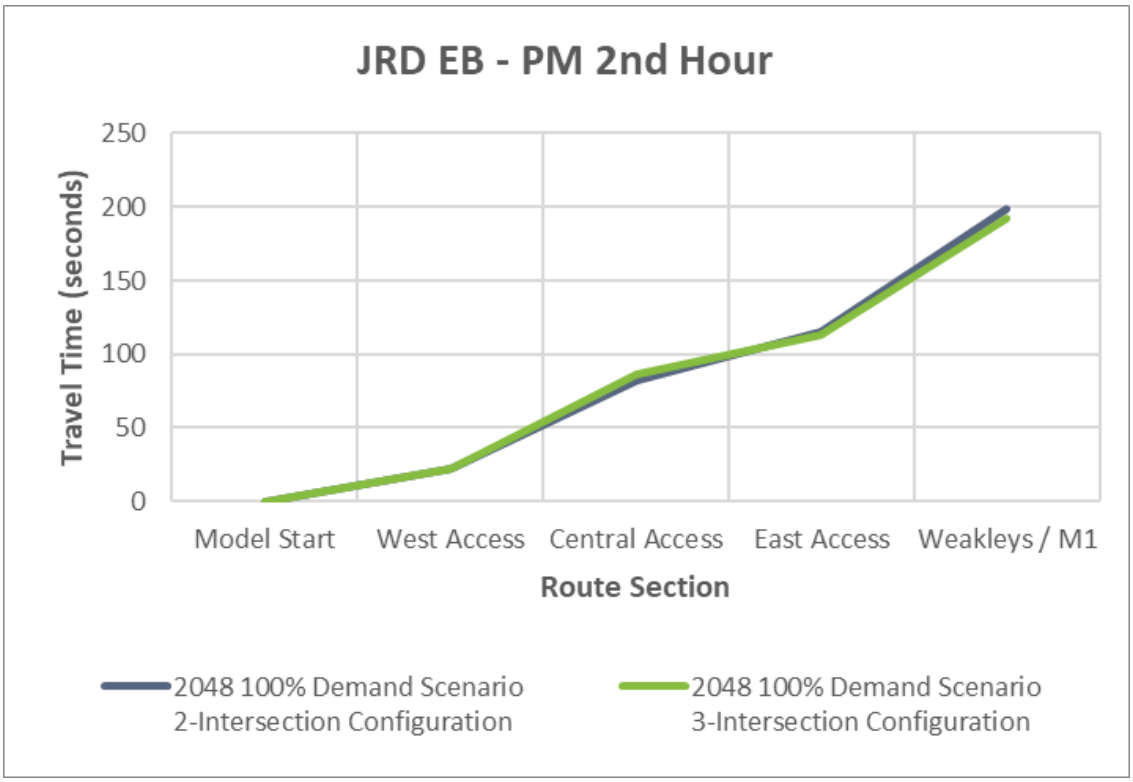
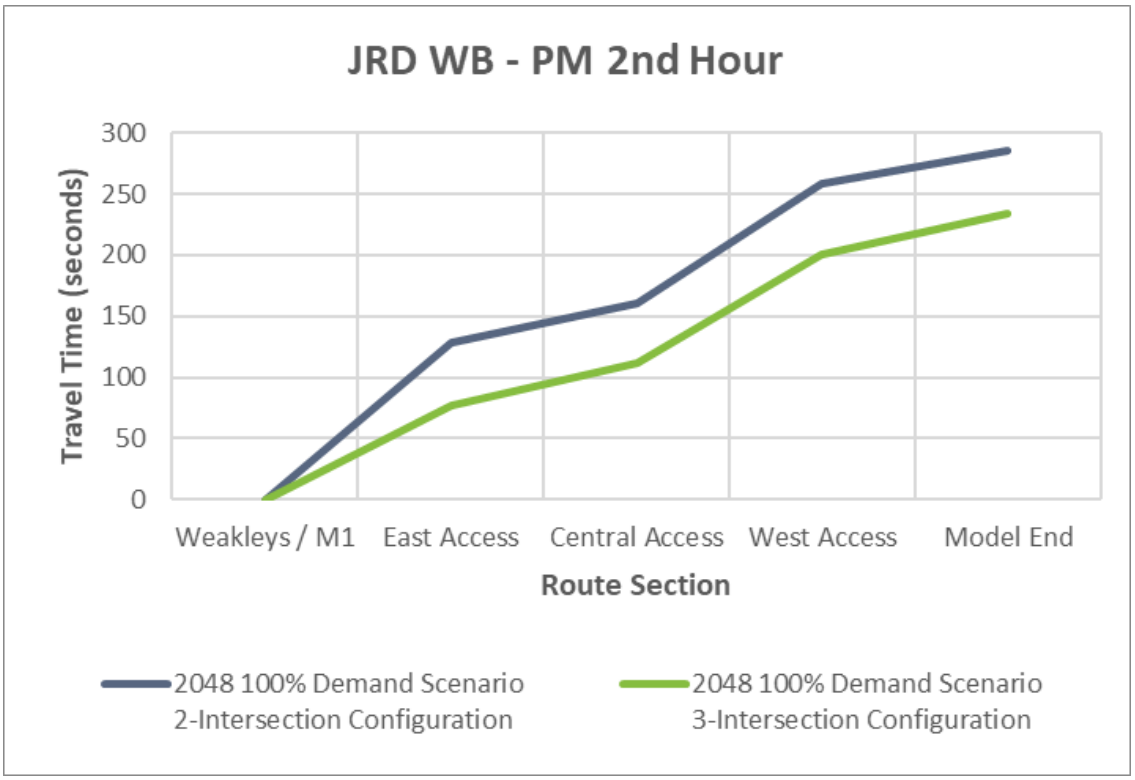


Figure 6.14:John Renshaw Drive westbound travel time (2nd hour) – PM peak



6.5.4. Intersection Performance

The performance of each intersection along John Renshaw Drive are summarised in Table 6.14 and Table 6.15. In general, each intersection demonstrates improved operation with the introduction an additional intersection due to the balancing and redistribution of site traffic demands across the various site access intersections (including the SMEC proposed M1 ramps south of the Precinct). In summary, these improvements include:

- AM Peak:
  - John Renshaw Drive/ Weakleys Drive/ M1 intersection expected to have a decrease in average delay of 8 seconds
  - John Renshaw Drive/ Eastern signalised intersection expected to have a decrease in average delay of 13 seconds
  - John Renshaw Drive/ Western signalised intersection expected to have a decrease in average delay of 14 seconds.
- PM Peak:
  - John Renshaw Drive/ Weakleys Drive/ M1 intersection expected to have a decrease in average delay of 5 seconds
  - John Renshaw Drive/ Eastern signalised intersection expected to have a decrease in average delay of 6 seconds
  - John Renshaw Drive/ Western signalised intersection expected to have a decrease in average delay of 13 seconds.

Table 6.14: Intersection Level of Service (LoS) – AM Peak

Intersection	Approach	Movement	2048 100% Demand Scenario 2-Intersection Configuration			2048 100% Demand Scenario 3-Intersection Configuration		
			AM (2nd hour)			AM (2nd hour)		
			Vehicles	Delay (s)	LoS	Vehicles	Delay (s)	LoS
John Renshaw Drive/ M1/ Weakleys Drive	Weakleys Dr North	Left	140	35	C	147	38	C
		Through	669	57	E	667	57	E
		Right	405	69	E	425	59	E
	JRD East	Left	603	1	A	604	1	A
		Through	897	47	D	804	40	C
		Right	180	70	E	275	74	F
	M1 South	Left	23	89	F	15	59	E
		Through	632	137	F	626	104	F
		Right	528	61	E	522	57	E
	JRD West	Left	509	14	B	400	4	A
		Through	1096	62	E	885	51	D
		Right	64	67	E	0	0	A
	Intersection		**5746**	**57**	**E**	**5370**	**49**	**D**

Intersection	Approach	Movement	2048 100% Demand Scenario 2-Intersection Configuration			2048 100% Demand Scenario 3-Intersection Configuration		
			AM (2nd hour)			AM (2nd hour)		
			Vehicles	Delay (s)	LoS	Vehicles	Delay (s)	LoS
John Renshaw Drive/ BHI Site Western Access	JRD East	Left	485	18	B	244	11	A
		Through	568	31	C	740	20	B
	Eastern Access South	Left	80	12	A	11	14	A
		Right	784	30	C	379	31	C
	JRD West	Through	881	24	B	922	6	A
		Right	257	59	E	147	36	C
	Intersection		**3055**	**29**	**C**	**2443**	**16**	**B**
John Renshaw Drive/ Site Eastern Access	JRD East	Left	Does not exist in this scenario			134	4	A
		Through				602	23	B
	Central Access South	Left				118	2	A
		Right				78	33	C
	JRD West	Through				988	5	A
		Right				243	43	D
	Intersection					**2163**	**15**	**B**
John Renshaw Drive/ Site Western Access	Donaldson Coal Access North	Left	0	0	A	0	0	A
		Through	0	0	A	0	0	A
		Right	0	0	A	0	0	A
	JRD East	Left	60	8	A	93	2	A
		Through	581	17	B	620	10	A
		Right	0	0	A	0	0	A
	Western Access South	Left	84	33	C	52	32	C
		Through	0	0	A	0	0	A
		Right	50	59	E	76	49	D
	JRD West	Left	0	0	A	0	0	A
		Through	1080	18	B	1156	3	A
		Right	284	72	F	210	57	E
	Intersection		**2139**	**26**	**B**	**2207**	**12**	**A**

Table 6.15: Intersection Level of Service (LoS) – PM Peak

Intersection	Approach	Movement	2048 100% Demand Scenario 2-Intersection Configuration			2048 100% Demand Scenario 3-Intersection Configuration		
			PM (2nd hour)			PM (2nd hour)		
			Vehicles	Delay (s)	LoS	Vehicles	Delay (s)	LoS
John Renshaw Drive/ M1/ Weakleys Drive	Weakleys Dr North	Left	41	33	C	41	24	B
		Through	899	48	D	899	45	D
		Right	505	101	F	473	50	D
	JRD East	Left	604	1	A	603	1	A
		Through	986	43	D	960	43	D
		Right	46	55	D	63	53	D
	M1 South	Left	3	10	A	4	7	A
		Through	428	35	C	427	30	C
		Right	835	205	F	839	206	F
	JRD West	Left	468	4	A	460	4	A
		Through	1042	43	D	898	41	C
		Right	6	59	E	0	0	A
	Intersection		**5863**	**64**	**E**	**5667**	**59**	**E**
John Renshaw Drive/ BHI Site Western Access	JRD East	Left	396	13	A	222	9	A
		Through	862	30	C	1010	20	B
	Eastern Access South	Left	143	15	B	21	19	B
		Right	948	27	B	596	28	C
	JRD West	Through	581	17	B	773	10	A
		Right	107	48	D	45	43	D
	Intersection		**3037**	**24**	**B**	**2667**	**18**	**B**
John Renshaw Drive/ Site Eastern Access	JRD East	Left	Does not exist in this scenario			135	4	A
		Through				884	14	B
	Central Access South	Left				197	5	A
		Right				152	34	C
	JRD West	Through				662	4	A
		Right				129	48	D
	Intersection					**2159**	**13**	**A**

Intersection	Approach	Movement	2048 100% Demand Scenario 2-Intersection Configuration			2048 100% Demand Scenario 3-Intersection Configuration		
			PM (2nd hour)			PM (2nd hour)		
			Vehicles	Delay (s)	LoS	Vehicles	Delay (s)	LoS
John Renshaw Drive/ Site Western Access	Donaldson Coal Access North	Left	0	0	A	0	0	A
		Through	0	0	A	0	0	A
		Right	0	0	A	0	0	A
	JRD East	Left	56	20	B	86	2	A
		Through	969	28	C	1000	8	A
		Right	0	0	A	0	0	A
	Western Access South	Left	175	42	D	108	42	D
		Through	0	0	A	0	0	A
		Right	103	68	E	144	47	D
	JRD West	Left	0	0	A	0	0	A
		Through	591	4	A	652	3	A
		Right	125	49	D	66	51	D
	Intersection		**2019**	**25**	**B**	**2056**	**12**	**A**

6.5.5. Summary

In summary, the introduction of the proposed third signalised intersection yields more favourable and comparable results with the SMEC 2048 100 per cent mitigation scenario. This is highlighted by the following:

- Overall network performance marginally improves in both AM and PM peaks, which is likely attributed to the introduction of the third access intersection which provides alternate precinct access and reduced queuing on the internal road network.
- John Renshaw Drive travel times are, as a minimum at least comparable though regularly slightly improved with the inclusion of the third set of traffic signals, indicating no negative impact as a result of the traffic signals.
- Overall, intersection results are also comparable and slightly improved on account of the improved distribution of site generated traffic across more signalised intersections associated with the Precinct.

6.6. Construction Traffic Impacts

Construction traffic associated with any of the road works required of this development would be insignificant compared to the operational traffic volumes generated by the fully developed subdivision. Likely peak hour traffic volumes would be in the order of 30 to 50 vehicle trips per hour which is clearly minor when considered against existing traffic volumes on John Renshaw Drive, Hunter Expressway and M1 Pacific Motorway. As such, it is not anticipated that construction works associated with the development proposal would have a noticeable impact on the operation of the surrounding road network. It is expected that a detailed construction traffic management plan would be prepared prior to construction works commencing and the cumulative impacts considered as appropriate.

7. CONCLUSION

07

CONCLUSION

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

1. This Transport Impact Assessment has been prepared for the proposed 40-lot subdivision of Lot 1 DP 1260203 along John Renshaw Drive in Black Hill, NSW, creating a total of 38 large industrial lots, one environmental conservation lot and one lot to be dedicated to Ausgrid for the purpose of a zone substation.
2. The subdivision plans indicate yields of 161.7 hectares of developable area which is expected to result in a GFA of around 420,420 square metres.
3. As an industrial subdivision, the development itself does not generate any on-site parking or loading demand. On-site parking and loading requirements will be investigated in detail as part of future development applications for the development of each individual allotment.
4. Two signalised intersections are proposed on John Renshaw Drive allowing for all movements in and out of the site. The adjacent BHI site has recently received approval for a new signalised intersection on John Renshaw Drive, with the proposed location of the eastern signalised intersection proposed about 370 metres west of the approved BHI signalised intersection. Traffic modelling has been completed to confirm the adequacy of the offset distance between these two intersections.
5. The proposed internal road network and road hierarchy has been designed to meet the minimum dimensional requirements outlined in Part D1 of Cessnock DCP 2010.
6. A review of the traffic generation characteristics of similar sized heavy industrial precincts in NSW indicates that traffic generation rates of 0.16 vehicle trips per 100 square metres GFA in the AM and PM peak hours is accurate to apply to the proposed development. However, in order to remain consistent with the TfNSW rates for the precinct as a whole, rather than considering each site in isolation, the conservatively high rates of 0.38 and 0.40 vehicle trips per 100 square metres GFA have been adopted for this assessment during the respective peak hours.
7. A review of previous transport studies for the site together with a recent Insights Report prepared by the University of Newcastle indicate that between 25 and 40 per cent of site generated traffic is expected to arrive and depart on John Renshaw Drive via the west. The remaining traffic would arrive and depart on John Renshaw Drive via the east. Notwithstanding, the TfNSW imposed split of 20 per cent via the west and 80 per cent via the east has been adopted for the purposes of this assessment.
8. Detailed SIDRA modelling demonstrates that with the identified additional upgrade works at the John Renshaw Drive/ M1/ Weakleys Drive intersection over and above the SMEC Stage 2 upgrades, practical intersection operation is expected in 2038. While the intersection is relatively close to capacity, all vehicle approach demand is demonstrated to be met. The other intersections along John Renshaw Drive providing access to the BHI site and the subject site are expected to operate well at a LOS C or better in any peak hour.
9. The SIDRA modelling also demonstrates that satisfactory intersection operation can be achieved for 50 per cent development of the Black Hill Precinct (Scenario 5b), with intersection performance similar to the Scenario 3 future base case and therefore demonstrating adequate mitigation measures
10. In relation to VISSIM modelling which completed for the project, the introduction of three signalised intersections on John Renshaw Drive (including the approved BHI site signalised intersection) yields more favourable and comparable results with the SMEC 2048 100 per cent mitigation scenario.
    - Overall network performance improved in both AM and PM peaks when compared with the two signalised intersections, and mostly attributed to improved distribution of precinct traffic and the

spread across three intersections rather than two. Less queuing is evident at all three intersections, including queuing internal to the precinct.

- John Renshaw Drive travel times are at least comparable and regularly slightly improved with the inclusion of the third set of traffic signals, indicating no negative impact as a result of the traffic signals.
- Overall, the intersection results are comparable and slightly improved on account of the improved distribution of site generated traffic across more signalised intersections associated with the Precinct.

11. Based on the above, the proposed development can be integrated within the broader surrounding road network without adverse impact on safety, efficiency or ongoing operation, and therefore complies with Clause 101(2)(b) of the Infrastructure SEPP. The proposed development can therefore be supported from a traffic and transport perspective.

A. STAGING AND INTERSECTION CONCEPT PLANS

A

239590-SSK-001(A)

Lot 82
D.P.627799

Lot 81
D.P.627799

Lot 119
D.P.1154904

Lot 1392
D.P.1126633

Lot 2
D.P.1260203

Lot 1
D.P.811514

Lot 13
D.P.1260203

Lot 4
D.P.847676

Lot 30
D.P.870411

LAND EXCLUDES MINERALS AND RESERVATIONS & CONDITIONS IN FAVOUR OF THE CROWN (EXCEPT LAND BELOW A DEPTH OF 30.48 METRES)

EASEMENT FOR TRANSMISSION LINE 45.72 WIDE VIDE GAZ. 18 MARCH 1966

LOT 119 D.P.1154904 (HWC)

EASEMENT FOR ENERGY TRANSMISSION LINE 60 WIDE AND VARIABLE (DP1136226)

PROPOSED EASEMENT TO DRAIN WATER (10 WIDE)

PROPOSED RIGHT OF ACCESS & EASEMENT FOR SERVICES (23 WIDE)

PROPOSED EASEMENT FOR ELECTRICAL SERVICES (30 WIDE)

SUBSTATION LOT

PROPOSED EASEMENT FOR ACCESS (6 WIDE)

PROPOSED CONNECTION TO ADJOINING SUBDIVISION (BY OTHERS)

PROPOSED SUBDIVISION APPROVED UNDER CITY OF NEWCASTLE DA 2020-01497-1

JOHN RENSHAW DRIVE

603	5.1Ha	
602	4.1Ha	
601	5.2Ha	
604	5.7Ha	
606	5.0Ha	
605	3.0Ha	
404	5.0Ha	
405	5.0Ha	
406	5.0Ha	
PT.701	(4.6 ha.)	
PT.701	(1.3 ha.)	
506	5.3Ha	
505	5.4Ha	
504	5.3Ha	
503	5.3Ha	
502	3.0Ha	
501	2.9Ha	
403	5.1Ha	
401	4.9Ha	
PT.701	(35.0 ha.) TOTAL 40.9 ha.	
402	5.1Ha	
306	3.0Ha	
305	3.2Ha	
303	6.2Ha	
20	34.7Ha	
302	6.4Ha	
307	1.2Ha	
301	5.2Ha	
304	4.6Ha	
204	4.9Ha	
205	3.6Ha	
208	3.3Ha	
206	2.8Ha	
207	2.7Ha	
103	2.0Ha	
104	2.1Ha	
105	1.9Ha	
106	2.6Ha	
203	3.7Ha	
202	3.7Ha	
201	3.7Ha	
102	3.7Ha	
101	5.8Ha	

LEGEND

- EXISTING LOT BOUNDARY
- PROPOSED LOT BOUNDARY
- STAGE 1 (6 LOTS)
- STAGE 2 (8 LOTS)
- STAGE 3 (6 LOTS + 1 SUBSTATION LOT)
- STAGE 4 (6 LOTS)
- STAGE 5 (6 LOTS)
- STAGE 6 (6 LOTS)
- ENVIRONMENTAL CONSERVATION LOT (E2 ZONED LAND WHOLLY CONTAINED WITHIN LOT 3)
- EXISTING EASEMENT
- PROPOSED EASEMENT

MGA

DIAL 1100 BEFORE YOU DIG

PLAN
SCALE 1:4000

FOR APPROVAL

100mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	06.08.2021	INITIAL ISSUE	A.M.	R.K.	Z.J.	R.K.
B	07.10.2021	STAGING AMENDMENTS	A.M.	R.K.	Z.J.	R.K.

DESIGN FILE N:\239590\Design\12D\

SCALES 0 100 200 A1 / A3 1:4000 / 1:8000

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

adw Johnson

Hunter Office
Unit 7/335 Hillsborough Rd
Warners Bay N.S.W. 2282
Phone: (02) 4978 5100
Fax: (02) 4978 5199
email:hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT
BROADEN MANAGEMENT PTY LTD

PROPERTY DESCRIPTION
BLACK HILL INDUSTRIAL SUBDIVISION
PROPOSED SUBDIVISION OF LOT 1 DP 1260203, JOHN RENSHAW DRIVE, BLACK HILL
DEVELOPMENT APPLICATION

SURVEYED: ADW Johnson
DATUM: A.H.D.

PROJECT: BLACK HILL CENG PLANS

PLAN TITLE: PROPOSED SUBDIVISION PLAN 38 INDUSTRIAL LOTS, 1 ENVIRONMENTAL LOT & 1 SUBSTATION LOT

PROJECT No.	DISCIPLINE	NUMBER	REV.
239590	CENG	004	B

Plotted By: anthonym Plot Date: 07/10/21 – 16:39 Cad File: N:\239590\Drawings\Engineering\Civil\CONCEPT\CENG\239590-SSK-001(A).dwg

CIVIL LEGEND

- EXISTING CADASTRAL BOUNDARY
- PROPOSED BOUNDARY
- LANE LINE
- CONTINUITY LINE

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

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PLOT BY	SCOTT HODGES

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-	1	16.06.21	PRELIMINARY ISSUE	-	-
-	2	29.06.21	UPDATE WATERMAIN ALIGNMENT AS CONSTRUCTED	-	-
-	3	06.07.21	PROPOSED WATERMAIN VALVE RELOCATIONS SHOWN	-	-
-	4	06.08.21	LIMIT OF WORKS REFINED	-	-
-					

SCALES ON A3 SIZE DRAWING

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HORIZONTAL SCALE 1:1000m

CO-ORDINATE SYSTEM: GDA94 MGA ZONE 56

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY

Hunter Office
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Warners Bay N.S.W. 2282
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ABN 62 129 445 398

TITLE	NAME	DATE
DRAWN	Z.JARVIE	02.06.21
DRG CHECK	R.KERR	04.06.21
DESIGN	Z.JARVIE	03.08.18
DESIGN CHECK	-	-
DESIGN MNGR	-	-
PROJECT MNGR	R.KERR	-

CLIENT: BROADEN MANAGEMENT PTY LTD

PREPARED FOR

CESSNOCK CITY COUNCIL
B68 - JOHN RENSHAW DRIVE
NEW SIGNALISED TEE INTERSECTION
FOR PROPOSED INDUSTRIAL SUBDIVISION
STRATEGIC INTERSECTION DESIGN
LAYOUT PLAN SHEET 1

A3

RMS REGISTRATION No. TBC

PART 1

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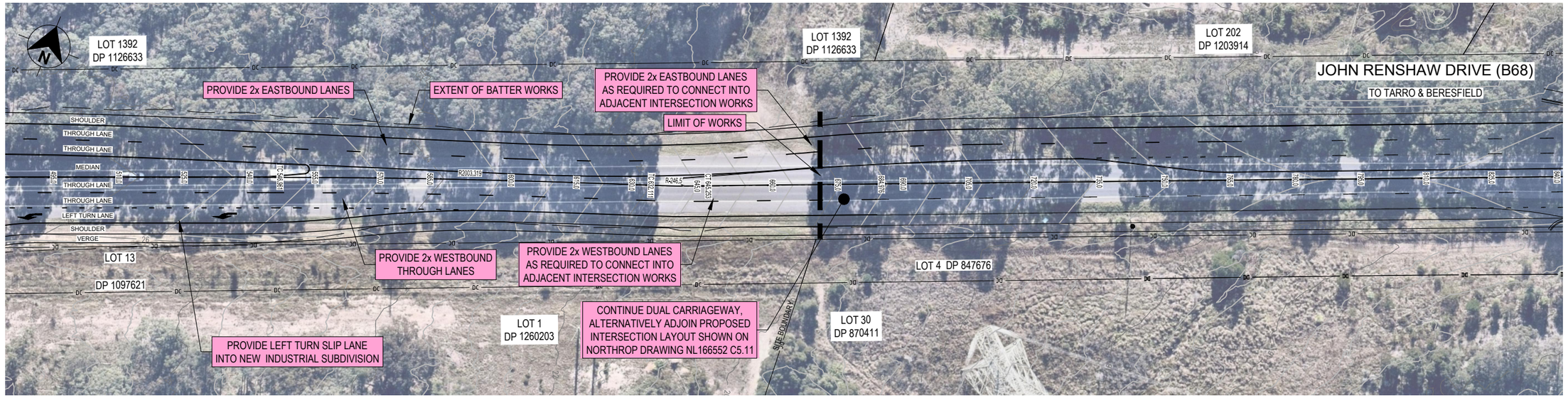

CIVIL LEGEND

- EXISTING CADASTRAL BOUNDARY
- PROPOSED BOUNDARY
- LANE LINE
- CONTINUITY LINE

NOT FOR CONSTRUCTION

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PLOT BY: SCOTT HODGES

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2	29.06.21	UPDATE WATERMAIN ALIGNMENT AS CONSTRUCTED	-	-
3	06.07.21	PROPOSED WATERMAIN VALVE RELOCATIONS SHOWN	-	-
4	06.08.21	LIMIT OF WORKS REFINED	-	-

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HORIZONTAL SCALE 1:1000m

CO-ORDINATE SYSTEM: GDA94 MGA ZONE 56
HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY
Hunter Office
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ABN 62 129 445 398

	NAME	DATE
DRAWN	Z.JARVIE	02.06.21
DRG CHECK	R.KERR	04.06.21
DESIGN	Z.JARVIE	03.08.18
DESIGN CHECK	-	-
DESIGN MNGR	-	-
PROJECT MNGR	R.KERR	-

CLIENT
BROADEN MANAGEMENT PTY LTD

PREPARED FOR

CESSNOCK CITY COUNCIL
B68 - JOHN RENSHAW DRIVE
NEW SIGNALISED TEE INTERSECTION
FOR PROPOSED INDUSTRIAL SUBDIVISION
STRATEGIC INTERSECTION DESIGN
LAYOUT PLAN SHEET 2

A3

RMS REGISTRATION No. TBC
PART 1

ISSUE STATUS: CONCEPT DESIGN
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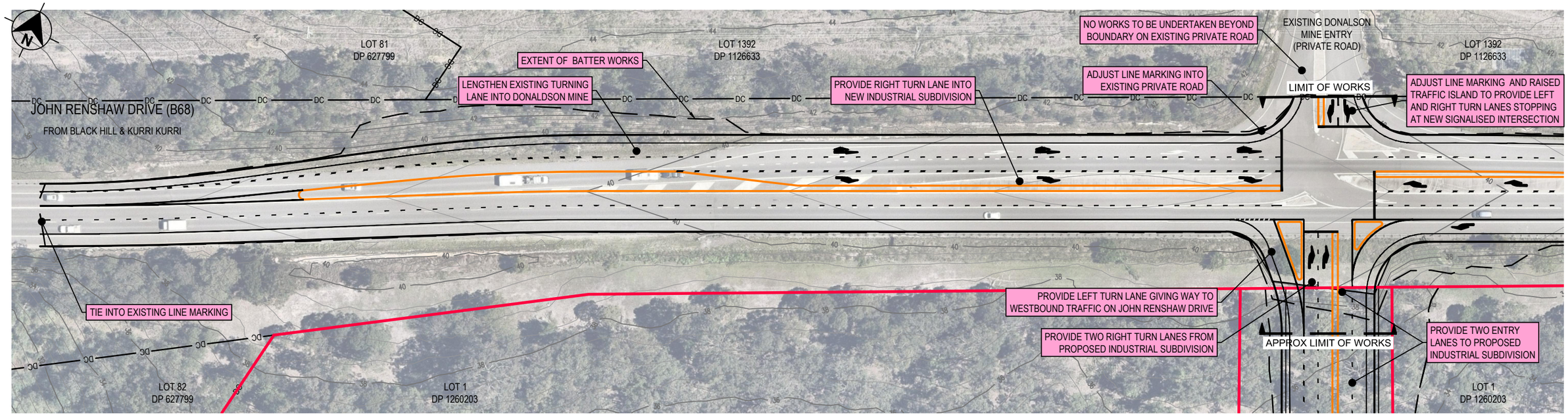
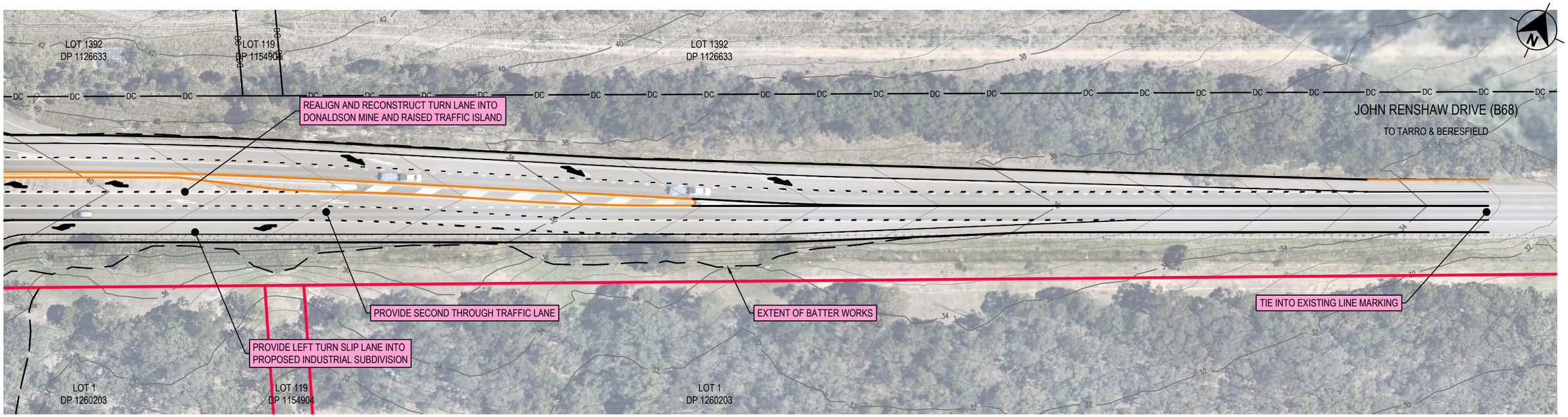
SHEET No.: RD-0502
ISSUE 4





LEGEND

DC — EXISTING BOUNDARY DCDB

SITE BOUNDARY

NOTES:

1. INTERSECTION LAYOUT AND LANE CONFIGURATION BASED ON FIGURE3-8 FROM HYDER TRAFFIC AND TRANSPORT REPORT DATED SEPTEMBER 2013.
2. THE REQUIREMENT FOR MEDIAN ISLANDS, INCLUDING WIDTHS, IS SUBJECT TO A TRAFFIC CONTROL SIGNAL (TCS) DESIGN TO CONFIRM THE LOCATION OF SIGNAL POSTS.
3. A DEDICATED ON ROAD CYCLEWAY HAS NOT BEEN PROVIDED AS THERE IS NO CYCLEWAY NETWORK ON THE EXISTING ROAD NETWORK.

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PREPARED FOR

NEWCASTLE CITY COUNCIL
B68 - JOHN RENSHAW DRIVE
UPGRADE TEE TO SIGNALISED CROSS INTERSECTION FOR PROPOSED INDUSTRIAL SUBDIVISION
STRATEGIC INTERSECTION DESIGN
PLAN

A3

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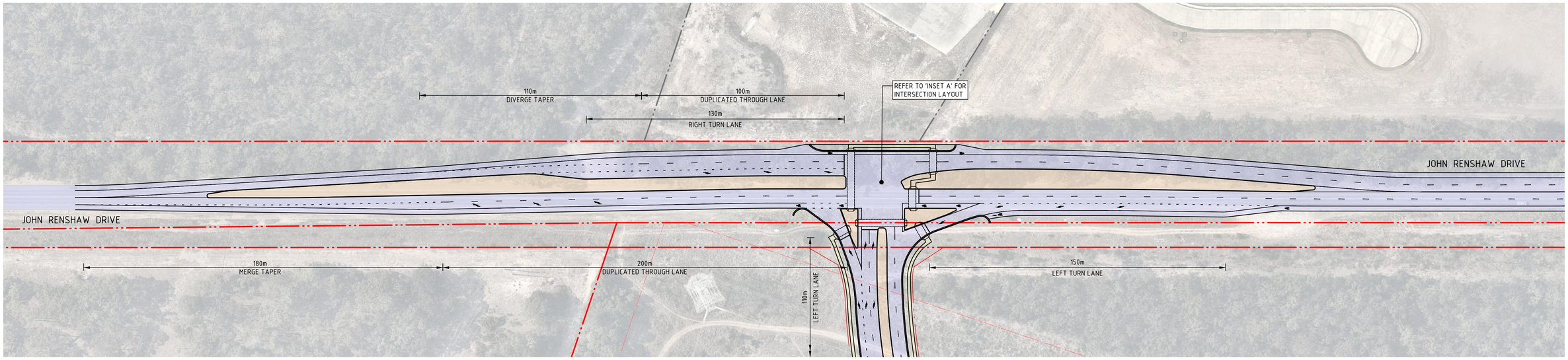

DETAIL PLAN

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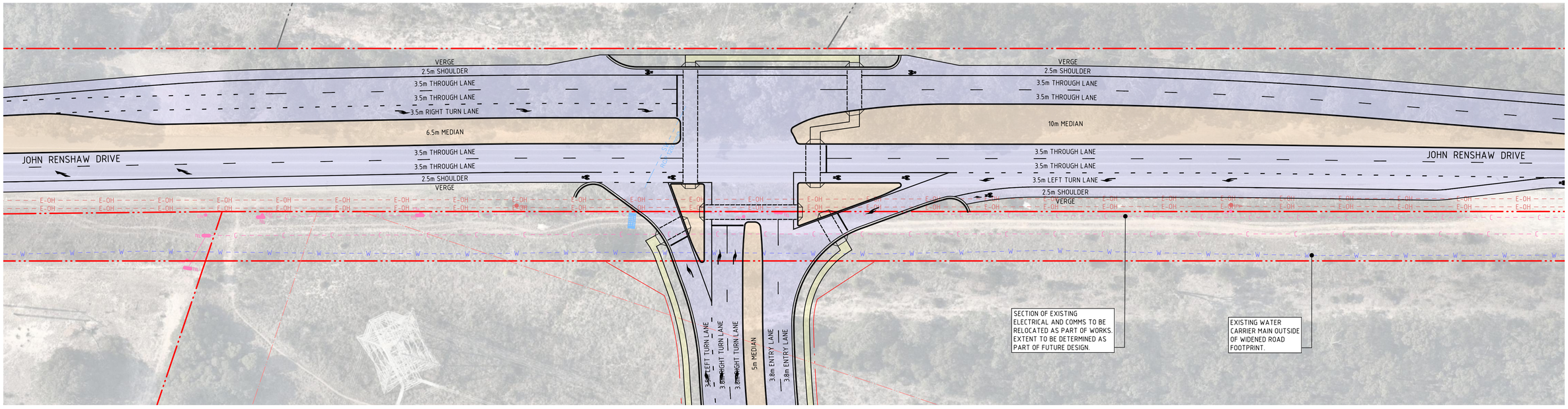

INTERSECTION PLAN - INSET A

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PROJECT
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JOHN RENSHAW DRIVE, BLACKHILL

INTERSECTION
STRATEGIC DESIGN

DRAWING TITLE
CIVIL ENGINEERING PACKAGE

DETAILED PLAN
STAGE 1

JOB NUMBER
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B. DISTRIBUTION INSIGHTS REPORT

B

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

HUNTER RESEARCH FOUNDATION CENTRE

John Renshaw Drive Black Hill – Proposed Industrial Site

Insights Report

Draft August 2021

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Executive summary

Barr Property and Planning have requested analysis of secondary data sources to ascertain the most likely commuting path of workers to a proposed industrial subdivision on John Renshaw Drive Blackhill and the direction they will approach the proposed site i.e. from east or west along John Renshaw Drive (F & F Properties subdivision Blackhill, Lot 1 Deposited Plan 1260203).

The site is expected to generate 1,546 jobs within two industry sectors: in the a) manufacturing sector and the b) transport, postal and warehousing sectors based on estimates conducted in an *Economic Impact Assessment (EIA)* prepared by Barr Property and Planning in March 2019.

Prior analysis of commuting patterns has assumed that workers will be drawn from six lower Hunter SA3s (Newcastle, Lake Macquarie East, Lake Macquarie West, Lower Hunter, Maitland and Port Stephens) in line with 2016 estimates of each SA3s share of overall manufacturing and transport, postal and warehousing workers living within the six SA3s.

This analysis seeks to refine this prior commuting catchment analysis, by utilising an SA2 level journey-to-work matrix drawn from the 2016 Census. This allows us to explore the existing commuting patterns of workers in each Hunter SA2 who are employed in manufacturing, transport, postal and warehousing sectors.

From this exploration we are able to use the 2016 commuting data to plausibly weight SA2s on the basis of being likely suppliers of workers to the site. We present two weighting schemas: a) near-by locations weighted more heavily on the basis that the site will draw more workers from SA3s/SA2s with greater accessibility and b) a weighting assumption that the site will draw more heavily from those SA2s whose workers will have their average commute reduced by accessing the site. The analysis finally incorporates projections of changes in residential and employment location since the 2016 Census.

KEY FINDINGS

- The top ten SA2s, ranked by numbers of jobs in that SA2, constitute 60% of manufacturing, transport, postal and warehousing jobs across the region. The top 10 SA2s ranked by residential population constitute only 36% of places of residence for workers in manufacturing, transport, postal and warehousing sectors. For manufacturing, transport, postal and warehousing sectors the residential population is more dispersed across the Hunter region compared to employment which is spatially concentrated in several key sites and skewed to the east of the region.
- 75% of employment in transport, postal and warehousing and manufacturing is located east of the site in 2016. 64% of workers in the sectors of interest also reside east of the site.
- Using journey-to-work data from the 2016 Census we estimate the average commute of workers in the manufacturing, transport, postal and warehousing sectors to be 14.3 kilometres (using straight-line distance or calculating distance as the crow flies). Workers living on the west commute on average loner to work (16.4 kilometres) compared to workers who reside east of the site, who have an average commute of 13.5 kilometres in 2016.
- The latest estimated resident population data at the more fine-grained SA2 level confirms that many SA2s west and north-west of the site have had strong population growth (in absolute numbers) over the period 2016 to 2020. These include locations such as: Maitland-West, Branxton Greta-Pokolbin, Cessnock, Kurri-Kurri Abermain, Maitland, Cessnock Region, Morisset-Cooranbong.
- Decades of research into journey to work patterns in both Australia and overseas has established that distance is an impediment to commuting. Using journey-to-work data from the 2016 Census we assume workers are drawn proportionately but only from SA2s which experience a reduction in commuting distance as a result of obtaining employment at the site

(W1). W2 assumes workers are drawn proportionately based on the site accessibility up to a 20km radius.

- Compared to the original method W1 has many fewer workers coming from Lake Macquarie – East and Lake Macquarie - West but many more coming from Maitland (more than three-fold). It has fewer workers coming from Newcastle, Port Stephens and the Lower Hunter SA3s.
- Compared to the original analysis W2 draws more workers from both Newcastle and Maitland but fewer workers from Port Stephens and Lake Macquarie-East and Lake Macquarie-West and many fewer from the Lower Hunter.
- We apply this previously calculated directional analysis to our catchment estimates to derive directional flows. In all combinations of defining the site's worker catchment – the east-west split is generally 60:40.
- Taking into account projected changes in population to 2021 and out to 2026 slightly more workers will be drawn from SA3s of Lower Hunter and Maitland, and fewer across the other SA3s (although changes out to 2026 are marginal).

1. Introduction

1.1. OVERVIEW AND METHOD

Barr Property and Planning have requested analysis of secondary data sources to support analysis of the commuting path of workers to a proposed industrial subdivision on John Renshaw Drive Blackhill. This research is to assist in determining the plausible residence of employees travelling to John Renshaw Drive Black Hill NSW and the direction they will approach the proposed site, that is whether from east or west along John Renshaw Drive (F & F Properties subdivision Blackhill, Lot 1 Deposited Plan 1260203).

The site is expected to generate 1,546 jobs within two industry sectors: in the a) manufacturing and the b) transport, postal and warehousing industries based on estimates conducted in an *Economic Impact Assessment (EIA)* prepared by Barr Property and Planning in March 2019.

Prior analysis of commuting patterns has assumed that workers would be drawn from six lower Hunter SA3s (Newcastle, Lake Macquarie East, Lake Macquarie West, Lower Hunter, Maitland and Port Stephens) in line with the 2016 estimated share of manufacturing, transport, postal and warehousing workers living within these six SA3s.

This analysis seeks to refine this prior commuting catchment analysis, and incorporate projections of changes in residential and employment location since the 2016 Census.

It does this by:

- Utilising a fine-grained 2016 Census data on journey-to-work patterns a) workplace or destination zones counts of workers in relevant industries b) a commuting matrix which provides counts by industry of origin (home residence) and destination (workplace). These data establish the length of commutes for closely located workers in relevant industries in 2016, and the likely location of residence of workers nearby.
- Defining a commuting catchment using more fine-grained data from the 2016 Census below the LGA/SA3 level and giving workers in nearby locations or who have their distance commuted cut by access to the proposed site more weighting (i.e. a gravity type model).
- Estimating based on the likely employment offered at the site (1,546), the number of workers travelling to the site and their location of residence at as fine a spatial scale as possible. In estimating the likely residence of the site's employees we use two sources of information: a) data provided by the 2016 Journey to Work (JTW) matrix which tells us about where manufacturing, transport, postal and warehousing actually live, work and commute in 2016. Decades of Australian and international research into journey to work patterns has also established that distance is an impediment to commuting (built on Tobler's first Law of Geography, 1970) [1]. Daily commutes are commonly estimated in the academic literature using a distance-decay function, where distance commuted has been shown to decline as workers accrue higher time, financial and other well-being costs (Haynes and Fotheringham, 1984; Zijpp and Heydecker, 1998; Veneables, 2004; de Vries, 2004; O'Kelly and Niedzielski, 2009; Cheng and Bertolini, 2013; Halas *et al.,* 2014; Pinheiro *et al.,* 2015; Bureau of Infrastructure, Transport and Regional Economics, 2015 and Ahlfeldt and Wendland, 2016; Ma and Ye, 2020). We apply this tested relationship in the assumption that workers will seek employment which is closer and will take a job which reduces their average commute, other things equal.
- Estimating how the pattern of employment may have changed since 2016 using SA4 Labour Force Survey data.

[1] Tobler's Law states that ''everything is related to everything else but near things are more related than distant things'' (Tobler, 1970, pp. 236).

- Synthesises this analysis with prior analysis by Barr Planning (Job No: 16NEW0055), for example Barr Property's analysis of the direction of possible commuting flows and future employment projections.

2. Key Findings

2.1. SPATIAL DISTRIBUTION OF MANUFACTURING, TRANSPORT, POSTAL AND WAREHOUSING WORKERS – DEFINING A COMMUTING CATCHMENT

Where do manufacturing, transport, postal and warehousing workers work within the Hunter region?

The analysis is restricted to two industry sectors of interest: transport, postal and warehousing, and manufacturing industries within the Hunter region.

The ten largest places of work (SA2) for manufacturing, transport, postal and warehousing jobs constitute 60% of total employment within the Hunter region (Table 1). Thus jobs within our sectors of interest are spatially concentrated in a relatively small number of key industrial sites. The top twenty SA2s, ranked by numbers of jobs in that SA2, constitute 80% of manufacturing, transport, postal and warehousing jobs across the region (see map in Figure 1).

Table 1 Hunter SA2s ranked by Manufacturing, Transport, Postal and Warehousing Jobs

Place of work (SA2)	Count of jobs
1. Newcastle Port - Kooragang	2,684
2. Raymond Terrace	2,590
3. Beresfield - Hexham	1,939
4. Glendale - Cardiff - Hillsborough	1,712
5. Mayfield - Warrabrook	1,599
6. Hamilton - Broadmeadow	1,115
7. Maitland - West	942
8. Williamtown - Medowie - Karuah	872
9. Thornton - Millers Forest	851
10. Branxton - Greta - Pokolbin	763

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

Figure 1 Manufacturing, transport and postal workers by place of work (SA2), 2016

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

Where do manufacturing, transport, postal and warehousing workers live within the Hunter region?

In contrast to where jobs are located, the ten largest places of residence (SA2s) constitute only 36% of total workers within the two industries of interest within the Hunter region. Thus the residential population in industries of interest is more dispersed across the region than jobs which are spatially concentrated in a number of key sites of shown in Figure 1. However the top 20 SA2s constitute 60% of places of residence for workers in manufacturing, transport, postal and warehousing. Key locations are within Maitland (east and west), Glendale-Cardiff-Hillsborough, as well as Charlestown-Dudley, Kurri Kurri – Abermain and Wallsend – Elermore Vale.

Table 2 Hunter SA2s ranked by Manufacturing, Transport, Postal and Warehousing Place of Residence

Place of Work (SA2)	Count of jobs
1. Maitland - East	1,303
2. Glendale - Cardiff - Hillsborough	1,145
3. Maitland - West	998
4. Charlestown - Dudley	954
5. Kurri Kurri - Abermain	881
6. Wallsend - Elermore Vale	799
7. Edgeworth - Cameron Park	795
8. Maryland - Fletcher - Minmi	784
9. Anna Bay	781
10. Raymond Terrace	762

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

Figure 2 Manufacturing, transport and postal workers by place of residence (SA2), 2016

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

What are the likely commuting patterns of workers in transport, postal, warehousing and manufacturing east and west of the site?

To commence analysis we divide the Hunter region's SA2 geography into two locations: east of the proposed site and locations west of the proposed site – see Figure 3 below. Blue shaded SA2s in the map are defined as locations east of the proposed Blackhill industrial site and those which are unshaded are deemed to be in the west.

Figure 3 Manufacturing, transport and postal workers by place of work (SA2), 2016

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

Based on this east-west division and using a SA2 journey to work matrix with origin (place of residence) and destination (place of work) of workers within the Hunter region, we observe:

1. 75% of employment in transport, postal and warehousing and manufacturing is located east of the site in 2016.
2. According to the 2016 Census 64% of workers in the sectors of interest also reside east of the site.
3. If SA2 level estimates of changes in the total residential population from 2016-2020 are applied to 2016 Census counts of workers in our two sectors of interest – we estimate 63% of workers in manufacturing, transport, postal and warehousing live in east of the site in 2020.
4. For workers in those suburbs east of the proposed site commuting predominately happens to places of work which are also in the east (see map in Figure 4 below). Those working in the two sectors who are living in the east nearly all commute to workplaces in the east according to journey-to-work data from the 2016 Census. Levels of eastern containment are on average 92% i.e. 92% of those living east of the site also commute to workplaces east of the site. Eastern commuting containment rates range from 83.5% (Seaham-Woodville) to 97.6% (Williamtown-Medowie-Karuah). These high levels of eastern containment suggest residents living in these suburbs and working in manufacturing, postal, transport and warehousing may be less likely to switch to the proposed Blackhill site in the west – travel to this site on average could lengthen their commute by 5km as the crow flies[2].

[2] Straight-line distance calculations are in many cases considerably shorter than drive time distances.

Figure 4 Manufacturing, transport and postal workers by place of work (SA2), 2016

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

5. The largest residential locations west of the site are in: Maitland East, Maitland West, Kurri-Kurri Abermain and Cessnock – together these represent the place of residence of 3,938 workers.

6. Using journey-to-work data from the 2016 Census we estimate the average commute of workers in the manufacturing, transport, postal and warehousing sectors to be 14.3 kilometres (using straight-line distance or as the crow flies)[3]. For workers living on the west their average commute is 16.4 kilometres. This is longer than those workers who reside east of the site, who have an average commute of 13.5 kilometres in 2016.

7. Table 3 below shows those SA2s where residents are predicted to experience a reduction in distance commuted (based on the difference between the commute to the site and their average commute in 2016) as a result of gaining employment at the site. It's important to consider whether the site will deliver a reduction in distance commuted given high levels of eastern containment (those who live east tend to commute to work in the east) in the journey-to-work 2016 dataset. Travelling to the proposed site would reduce distance commuted for those workers in a number of nearby locations in the west – particularly for very large concentrations of workers in relevant industries in Maitland East (ranked number one as an SA2-level residential location for the entire Hunter in Table 2) and Kurri Kurri-Abermain (ranked number five in Table

[3] Using the 2016 Census, the Australian Housing and Urban Research Institute (2020), note that the average distance travelled by Australian's in 2016 was 15.9 kilometres but the median distance travelled is 9.9 kilometres. Bureau of Infrastructure, Transport and Regional Economics (2015) had earlier estimated, using 2011 Census data, that Australia's average commuting distance was 15.6 kilometres and the average commute specifically for Newcastle and Lake Macquarie residents was 15.3 kilometres.

2). It would also reduce commuting distances for workers in fast growing suburbs of Maryland-Fletcher-Minmi and Beresfield-Hexham and Thornton-Millers Forest. The % weight applied to estimate workers supplied is based on the particular SA2's share of manufacturing, transport, postal and warehousing workers in total from Table 3.

Table 3 Catchment defined by a reduction in average distance commuted as a result of access to employment at the proposed site

SA2	Reduction in kms commuted (straight-line distance) from accessing the Blackhill site	% Weight	Resident workers supplied from SA2	SA3
Maitland - East	7.0	18%	273	Maitland
Maitland	6.1	15%	234	Maitland
Kurri Kurri - Abermain	4.8	12%	184	Lower Hunter
Maryland - Fletcher - Minmi	4.6	12%	178	Newcastle
Beresfield - Hexham	4.2	10%	162	Newcastle
Thornton - Millers Forest	3.8	10%	148	Maitland
Seaham - Woodville	3.6	9%	141	Port Stephens
Edgeworth - Cameron Park	2.2	5%	83	Lake Macquarie West
Maitland - North	1.7	4%	66	Maitland
West Wallsend - Barnsley - Killingworth	1.1	3%	44	Lake Macquarie West
Wallsend - Elermore Vale	0.9	2%	33	Newcastle

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

8. Table 4 below presents SA2s which represent the Blackhill Drive industrial site's catchment of workers based on a different weighting schema - where workers are drawn proportionately based on their proximity to the site up to a commuting distance, straight-line distance, of 20 kilometres. We assume 80% of the 1,546 workers needed are drawn proportionately (based on their 2016 employment share of workers in manufacturing, transport, postal and warehousing services) from SA2s within 15 kilometres of the site, straight-line distance. 15 kilometres is chosen as cut off point for 80% of the catchment given that we know the average commute of manufacturing, transport, postal and warehousing workers in 2016 is 14.3 kilometres, using straight line distance. The remaining 20% of workers are drawn from SA2s within a 15 to 20 kilometre radius of the site, proportional again to their residential employment shares in our sectors of interest in 2016. The estimated number of workers supplied by each SA2 are shown below.

Table 4 Catchment defined by accessibility to the proposed site

SA2	Commuting distance to site	% Weight	Number of workers supplied by SA2	SA3
Beresfield - Hexham	4.1	5%	67	Newcastle
Maryland - Fletcher - Minmi	6.0	7%	84	Newcastle
Maitland - East	8.0	11%	140	Maitland
Thornton - Millers Forest	8.5	6%	77	Maitland
Wallsend - Elermore Vale	9.5	7%	86	Newcastle
Shortland - Jesmond	9.8	3%	42	Newcastle
Edgeworth - Cameron Park	9.9	7%	85	Lake Macquarie - West
Maitland	10.2	3%	34	Maitland

SA2	Commuting distance to site	% Weight	Number of workers supplied by SA2	SA3
West Wallsend - Barnsley - Killingworth	12.8	3%	43	Newcastle
Waratah - North Lambton	12.9	4%	51	Newcastle
Newcastle Port - Kooragang	13.0	0%	0	Lake Macquarie - East
Mayfield - Warabrook	13.0	6%	68	Newcastle
Glendale - Cardiff - Hillsborough	13.6	10%	123	Port Stephens
Lambton - New Lambton	13.8	5%	62	Lower Hunter
Raymond Terrace	14.5	7%	82	Lake Macquarie - West
Kurri Kurri - Abermain	14.8	8%	95	Lake Macquarie - East
Bolton Point - Teralba	15.3	3%	40	Newcastle
Warners Bay - Boolaroo	15.5	5%	58	Newcastle
Adamstown - Kotara	16.0	10%	31	Newcastle
Hamilton - Broadmeadow	16.0	7%	22	Newcastle
Wickham - Carrington - Tighes Hill	16.2	5%	16	Newcastle
Maitland - North	16.8	6%	18	Maitland
Merewether - The Junction	18.1	7%	23	Newcastle
Charlestown - Dudley	18.8	17%	52	Lake Macquarie - East
Newcastle - Cooks Hill	18.9	5%	16	Newcastle
Mount Hutton - Windale	19.1	5%	16	Lake Macquarie - East
Stockton - Fullerton Cove	19.8	5%	16	Newcastle
Maitland - West	19.9	18%	55	Maitland
Valentine - Eleebana	20.1	8%	25	Lake Macquarie - East
Seaham - Woodville	20.3	6%	19	Port Stephens

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

2.2. EMPLOYMENT AND POPULATION CHANGES SINCE THE 2016 CENSUS

Changes in residential population current and projected

Using data from the Australian Bureau of Statistics on estimated residential population at the LGA level, those LGAs which had the greatest population growth from 2016-20 were to the north and west of the proposed Blackhill site in the LGAs of Maitland (north-west), Dungog (north) and Cessnock (west).

Table 5: LGA Estimated resident population, 2016-2020

LGA	2016	2017	2018	2019	2020	% 2019-20	% 2016-20
Cessnock	56,720	57,561	59,029	59,978	61,256	2.1	8.0
Dungog	9,101	9,193	9,336	9,422	9,664	2.6	6.2
Lake Macquarie	202,332	20,3502	20,4694	205,875	207,775	0.9	2.7
Maitland	79,063	8,1049	83,104	85,155	87,395	2.6	10.5
Muswellbrook	16,462	16,445	16,364	16,375	16,355	-0.1	-0.6
Newcastle	160,707	16,2477	16,3943	165,541	167,363	1.1	4.1

LGA	2016	2017	2018	2019	2020	% 2019-20	% 2016-20
Port Stephens	71,115	71,772	72,630	73,472	74,506	1.4	4.8
Singleton	23,576	23,499	23,397	23,457	23,380	-0.3	-0.8
Upper Hunter Shire	14,344	14,274	14,208	14,178	14,167	-0.1	-1.2

Source: Australian Bureau of Statistics (ABS), Estimated Resident Population by LGA, 2016-20.

The latest estimated resident population data at the more fine-grained SA2 level confirms that many SA2s west and north-west of the site have had strong population growth (in absolute numbers) over the period 2016 to 2020. These include locations such as: Maitland-West, Branxton Greta-Pokolbin, Cessnock, Kurri-Kurri Abermain, Maitland, Cessnock Region, Morisset-Cooranbong. Many of these SA2s also continued to have strong population growth in the most recent year of available data, 2019-20, namely Thornton-Millers Forest, Kurri Kurri-Abermain, Maitland-West and Shortland-Jesmond and Williamtown-Medowie-Karuah.

Table 6: Top ranked Hunter SA2s by Change Estimated Resident Population, 2016-2020.

Hunter SA2s	Population growth 2016-20
Thornton - Millers Forest	3,034
Maitland - West	2,160
Maryland - Fletcher - Minmi	2,057
Shortland - Jesmond	1,747
Kurri Kurri - Abermain	1,575
Edgeworth - Cameron Park	1,409
Cessnock	1,382
Newcastle - Cooks Hill	1,355
Maitland	1,332
Morisset - Cooranbong	1,305

Source: Australian Bureau of Statistics (ABS), Estimated Resident Population, 2016-20.

Table 7: Top ranked Hunter SA2s by Change Estimated Resident Population, 2019-2020.

Hunter SA2s	Population growth 2019-20
Thornton - Millers Forest	921
Kurri Kurri - Abermain	710
Maitland - West	515
Shortland - Jesmond	451
Williamtown - Medowie - Karuah	422
Maryland - Fletcher - Minmi	417
Newcastle - Cooks Hill	414
Maitland	377
Edgeworth - Cameron Park	368
Charlestown - Dudley	330

Source: Australian Bureau of Statistics (ABS), Estimated Resident Population, 2019-20.

Figure 5 below maps these trends in estimated population growth since 2016 at an SA2 level. We can see a cluster of high growth SA2s in the Maitland and eastern parts of the Lower Hunter SA3, and population growth in Williamtown-Medowie-Karuah and also Morisset-Cooranbong.

Figure 5 Estimated resident population growth by SA2, 2016-20.

Source: 2016 Census of Population and Housing; 2016 Census Working Population Profile.

Looking at population projections at the LGA level – these predict strongest growth in Cessnock (west of the site) and Maitland LGAs (north-west) over the period 2021-26 and 2026-31. This very high population growth continues for Cessnock for the period from 2026 to 2036 but slows down in Maitland from 2026 to 36. In 2031-36 all Hunter LGAs are growing at a lower rate than previous five year intervals however.

Table 8: Population Growth and Projected Growth 2016-36

Hunter LGAs	2016	2021	2026	2031	2036	2041	% 2016-21	% 2021-26	% 2026-31	% 2031-36
Lake Macquarie	202,332	210,005	214,506	220,912	225,184	232,689	3.8	2.1	3.0	1.9
Port Stephens	71,115	72,816	75,462	77,531	79,164	82,068	2.4	3.6	2.7	2.1
Maitland	79,063	84,892	91,052	96,982	101,042	104,717	7.4	7.3	6.5	4.2
Singleton	23,576	23,779	23,868	23,829	23,667	23,383	0.9	0.4	-0.2	-0.7
Muswellbrook	16,462	17,082	17,578	17,938	18,186	18,338	3.8	2.9	2.0	1.4
Upper Hunter Shire	14,344	14,194	13,948	13,615	13,200	12,712	-1.0	-1.7	-2.4	-3.0
Dungog	9,101	9,243	9,348	9,412	9,435	9,421	1.6	1.1	0.7	0.2
Cessnock	56,720	60,064	65,536	71,996	77,291	80,036	5.9	9.1	9.9	7.4
Newcastle	160,707	172,523	179,189	186,909	192,809	199,680	7.4	3.9	4.3	3.2

Source: NSW Government, NSW 2019 Population Projections – LGA projected population (totals).

Changes in distribution of employment

Travel Zone level employment projections for 2019 (with estimates of employment by 2 digit industry sector from 2016) are available from Transport NSW. These predict very little change in the distribution of employment for manufacturing, transport, postal and warehousing workers between 2016, 2021 and 2026 within the Hunter. See Figures 6-8. Data available at the SA4 level from the ABS Labour Force survey employment by sector confirms that in Newcastle and Lake Macquarie there has been no substantial change (less than 1%) in the share of employment in our sectors of interest since August 2016 (month of last Census). In the rest of the Hunter there has however been growth in manufacturing 28%, while employment in the transport, postal and warehousing sector has shrunk 18 per cent.

Figure 6 Employment in Manufacturing, Transport, Postal and Warehousing by Travel Zone, 2016

Source: Transport for NSW, Travel Zone Projections 2019 (TZP19).

Figure 7 Employment in Manufacturing, Transport, Postal and Warehousing by Travel Zone to 2021

Source: Transport for NSW, Travel Zone Projections 2019 (TZP19).

Figure 8 Employment in Manufacturing, Transport, Postal and Warehousing by Travel Zone to 2026

Source: Transport for NSW, Travel Zone Projections 2019 (TZP19).

2.3. IMPLICATIONS FOR DIRECTIONAL ANALYSIS COMMUTING FLOWS

Including the original catchment analysis and two methods outlined above, the likely draw of workers on an SA3 basis, is estimated in various ways below. The original estimate prepared in Job Number - 16NEW0055 is also shown in column 1 below. This assumes a proportionate draw as per the 2016 distribution of workers across the six SA3s. W1 assumes workers are drawn proportionately based on the size of their workforce but only from SA2s which experience a reduction in distance commuted as a result of obtaining employment at the site. W2 assumes workers are drawn based on the site accessibility up to 20 km radius (80% within a 15km radius and the reaming 20% from a 15-20 km radius). The draw from each SA2 is again proportional to the size relevant workforce.

Compared to the original method W1 has many fewer workers coming from Lake Macquarie – East and Lake Macquarie - West but many more coming from Maitland (more than three-fold). It has fewer workers coming from Newcastle, Port Stephens and the Lower Hunter. W2 draws more workers from Newcastle and Maitland but fewer workers from Port Stephens and Lake Macquarie-East and Lake Macquarie-West and many fewer from the Lower Hunter[4].

Table 9: Estimated number of employees from each statistical area, collated by author.

Statistical Area	Number of employees expected from SA3 (original)*	Number of employees expected from SA3 (W1)[a]	Number of employees expected from SA3 (W2)[b]
Newcastle (SA3)	400	373	663
Lake Macquarie – East (SA3)	298	0	188
Lake Macquarie – West (SA3)	214	127	167
Lower Hunter (SA3)	218	184	62
Maitland (SA3)	222	721	324
Port Stephens (SA3)	193	141	142
Total	1,546	1,546	1,546

*Source: *Barr Property and Planning Pty Ltd (*Job Number - *16NEW0055); [ab] Author's calculations.*

[4] Although we have applied decision rules supported by the data and empirical research to generate these two weights schemes, the behavioural information available from the Hunter region 2016 journey to work matrix shows a preference for those working in manufacturing, transport, postal and warehousing and living in the east to travel to workplaces in the east. This may reflect the sub-sector distribution of employment in certain specialised occupations, not being picked up in our 1-digit industry analysis. Thus while the analysis assumes it would be logical/beneficial for workers from the east to travel west to the site where there commutes are shortened they may not do so in practice. If this is the case our estimates of east-west journeys to the proposed site may be overly generous.

The original Barr Property and Planning analysis presented directional analysis for the site, devised from Google Maps drive-time data:

Table 10: Direction of approach to site, Google Maps, collated by author (Table 3, p.4 Job Number - *16NEW0055*)

Statistical Area	Direction of approach	Number of trips approaching from the East	Number of trips approaching from the West
Newcastle (SA3)	75% East, 25% West	300	100
Lake Macquarie – East (SA3)	50% East, 50% West	149	149
Lake Macquarie – West (SA3)	50% East, 50% West	107	107
Lower Hunter (SA3)	20% East, 80% West	44	175
Maitland (SA3)	50% East, 50% West	111	111
Port Stephens (SA3)	100% East	193	0
Total		904	642

*Source: *Barr Property and Planning Pty Ltd (*Job Number - *16NEW0055); [ab] Author's calculations.*

We apply this previously calculated directional analysis to our catchment analysis to derive directional flows. The second weighting method (W1, which assumes workers are drawn proportionately but only from SA2s which experience a reduction in distance commuted) estimates that there will be slightly more commutes coming from the west as opposed to the east. The third weighting method (W2, which assumes workers are drawn proportionately based on the site accessibility up to 20 km radius) estimates that proportionately more commutes will come from east (65%). In all combinations of defining the site's commuting catchment – the east west split is generally 60:40.

Table 11: Estimated number of employees from each statistical area, collated by author.

Statistical Area	Number of employees expected from statistical area*		Number of employees expected from statistical area (W1)[a]		Number of employees expected from statistical area (W2)[b]	
	East	West	East	West	East	West
Newcastle (SA3)	300	100	280	93	497	166
Lake Macquarie – East (SA3)	149	149	0	0	94	94
Lake Macquarie – West (SA3)	107	107	64	64	84	84
Lower Hunter (SA3)	44	174	37	147	12	50
Maitland (SA3)	111	111	361	361	162	162
Port Stephens (SA3)	193	0	141	0	142	0
Total	904	641	882	664	991	555
% Split	58	42	57	43	64	36

*Source: *Barr Property and Planning Pty Ltd (*Job Number - *16NEW0055); [ab] Author's calculations.*

From the estimates of residential population beyond 2016 we also note:

1. Since the 2016 Census the residential population has grown particularly in the region's north, west and north-west, particularly in Cessnock, Dungog and Maitland LGAs while transport, postal and warehousing and manufacturing employment has stayed stable (and skewed east).

2. As a result of population growth in Maitland and Cessnock there may be a larger pool of potential workers at SA2s such Maitland and Lower Hunter SA3s (and these were already residences of a large share of manufacturing, transport, postal and warehousing workers in 2016), and as well at Williamtown-Medowie-Karuah and also Morisset-Cooranbong following population growth who will benefit from more readily accessible employment at the proposed site.

Incorporating relative changes in the LGA population distribution using NSW Government LGA-level projections but keeping the total pool of workers unchanged at 1,546, we estimate that the distribution across the SA3s will change as below, for 2021 and 2026:

Table 12 Catchment Analysis Projected to 2021

Statistical Area	Number of employees expected from statistical area*		Number of employees expected from statistical area (W1)[a]		Number of employees expected from statistical area (W2)[b]	
	East	West	East	West	East	West
Newcastle (SA3)	306	102	283	94	504	168
Lake Macquarie – East (SA3)	147	147	0	0	92	92
Lake Macquarie – West (SA3)	106	105	62	62	82	82
Lower Hunter (SA3)	44	175	37	146	12	49
Maitland (SA3)	113	113	364	363	164	164
Port Stephens (SA3)	188	0	136	0	137	0
Total	951	677	937	709	1051	589

Table 13 Catchment Analysis Projected to 2026

Statistical Area	Number of employees expected from statistical area*		Number of employees expected from statistical area (W1)[a]		Number of employees expected from statistical area (W2)[b]	
	East	West	East	West	East	West
Newcastle (SA3)	300	99	276	91	496	164
Lake Macquarie – East (SA3)	146	145	0	0	92	92
Lake Macquarie – West (SA3)	105	104	62	61	82	81
Lower Hunter (SA3)	46	181	38	150	13	52
Maitland (SA3)	115	113	367	362	167	166
Port Stephens (SA3)	192	0	139	0	141	0
Total	951	677	937	709	1051	589

Assumptions and limitations

- Distances are calculated using ARC GIS and R-Language (Geosphere package) based on the latitude and longitude of SA2 centroids. This calculates straight-line (straight-line distance) distance between locations, in the absence of drive-time data. The location of residence and work is taken as the centroid of the relevant SA2.

The analysis incorporates a number of stylised assumptions about journey to work, and employer and employee preferences:

- Assumes commuting patterns in sectors of interest have not changed between 2016 and 2021.
- Does not break down commuting patterns below the two 1-digit industry sector for manufacturing, transport, postal and warehousing workers. A 2-digit breakdown may be beneficial as travel zone data suggests many locations are employment sites for very specific sub-industry sectors (e.g. the wine and viticulture industry within Cessnock and a number of district hospitals across the region).
- Assumes workers view jobs closer as more desirable than jobs further away, and that other things remain equal in the decision regarding where to work.
- Associated with the above, it assumes workers see jobs offered at different sites as direct substitutes – this assumes pay, quality of work and non-financial remuneration are more or less constant across the different sites.
- Assumes workers within the two industry sectors living in different locations are of equal skill, productivity and pay level and thus employers also view workers as direct substitutes for each other, all other things equal.

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C. SIDRA MODELLING OUTPUTS

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 1 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 AM (Site Folder: Scenario 1)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	798	20.1	798	20.1	0.989	97.8	LOS F	38.2	312.3	1.00	1.30	1.46	17.0
2	T1	460	11.9	460	11.9	* 0.989	86.0	LOS F	38.2	312.3	1.00	1.29	1.60	25.0
3	R2	427	11.8	427	11.8	0.602	49.7	LOS D	6.7	51.5	0.96	0.82	0.96	33.2
Approach		1685	15.7	1685	15.7	0.989	82.4	LOS F	38.2	312.3	0.99	1.17	1.37	23.4
East: John Renshaw Drive														
4	L2	488	34.1	488	34.1	0.323	6.1	LOS A	0.0	0.0	0.00	0.51	0.00	53.6
5	T1	893	18.6	893	18.6	* 1.010	91.0	LOS F	17.1	138.5	0.99	1.22	1.57	16.1
6	R2	287	8.1	287	8.1	0.685	59.0	LOS E	4.8	36.0	1.00	0.84	1.08	30.5
Approach		1668	21.3	1668	21.3	1.010	60.6	LOS E	17.1	138.5	0.70	0.95	1.02	26.2
North: Weakleys Drive														
7	L2	81	53.2	81	53.2	0.583	38.6	LOS C	6.0	50.4	0.90	0.89	0.90	37.6
8	T1	667	11.2	667	11.2	0.583	39.6	LOS C	7.0	53.7	0.94	0.82	0.94	36.7
9	R2	676	21.5	676	21.5	* 1.038	123.7	LOS F	18.7	154.8	1.00	1.30	1.90	12.1
Approach		1424	18.5	1424	18.5	1.038	79.4	LOS F	18.7	154.8	0.96	1.05	1.39	22.4
West: John Renshaw Drive														
10	L2	415	20.1	415	20.1	0.253	6.5	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	961	13.8	961	13.8	0.722	42.3	LOS C	9.6	75.5	0.95	0.83	0.97	41.5
12	R2	302	15.0	302	15.0	* 1.032	113.0	LOS F	15.6	123.1	1.00	1.22	1.79	27.0
Approach		1678	15.6	1678	15.6	1.032	46.2	LOS D	15.6	123.1	0.72	0.82	0.88	40.2
All Vehicles		6456	17.7	6456	17.7	1.038	66.7	LOS E	38.2	312.3	0.84	1.00	1.16	28.8

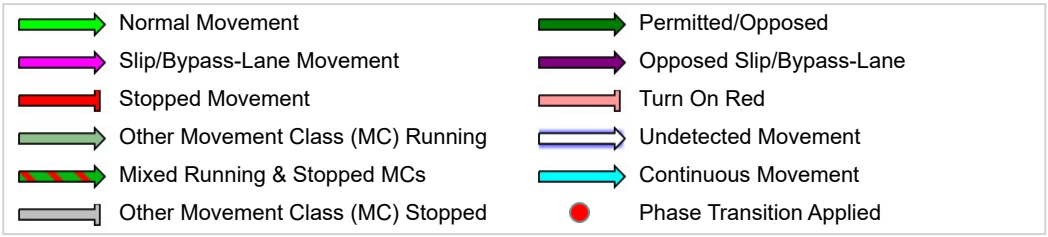
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G
Phase Change Time (sec)	55	85	104	0	27
Green Time (sec)	24	13	***	21	22
Phase Time (sec)	30	19	6	27	28
Phase Split	27%	17%	5%	25%	25%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 AM (Site Folder: Scenario 1)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	114	20.4	114	20.4	0.162	25.3	LOS B	2.3	18.7	0.65	0.70	0.65	30.0
3	R2	456	20.1	456	20.1	* 0.898	68.6	LOS E	8.8	72.4	1.00	1.04	1.40	17.7
Approach		569	20.1	569	20.1	0.898	60.0	LOS E	8.8	72.4	0.93	0.97	1.25	19.3
East: John Renshaw Drive														
4	L2	482	20.1	476	20.1	0.290	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	76.7
5	T1	1461	20.0	1442	19.9	* 0.899	24.9	LOS B	22.8	187.1	0.82	0.81	0.92	60.7
Approach		1943	20.0	1917 N1	20.0	0.899	21.0	LOS B	22.8	187.1	0.62	0.77	0.69	65.2
West: John Renshaw Drive														
11	T1	1223	13.9	1223	13.9	0.503	9.0	LOS A	8.5	66.7	0.46	0.42	0.46	60.9
12	R2	226	20.0	226	20.0	* 0.892	71.4	LOS F	8.7	71.4	1.00	0.95	1.38	26.3
Approach		1449	14.9	1449	14.9	0.892	18.8	LOS B	8.7	71.4	0.55	0.50	0.61	43.8
All Vehicles		3962	18.1	3936 N1	18.3	0.899	25.8	LOS B	22.8	187.1	0.64	0.70	0.74	49.5

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

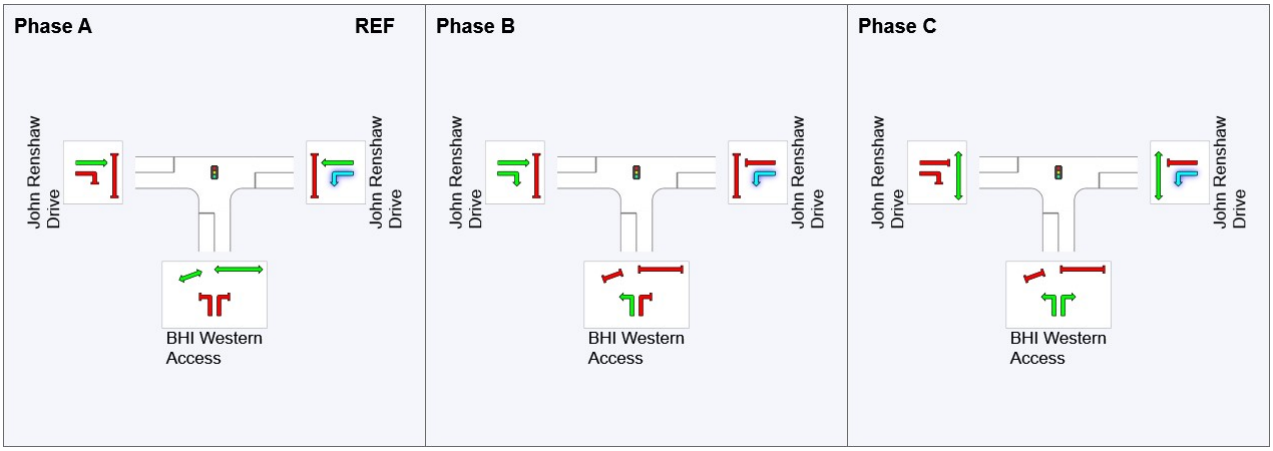
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	217.0	218.0	1.00
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	206.6	204.5	0.99

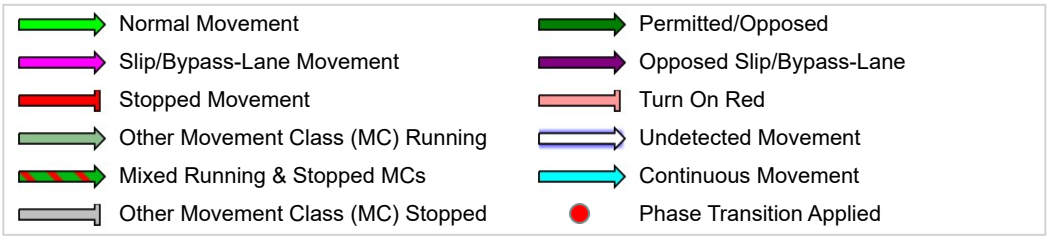
East: John Renshaw Drive										
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.5	221.3	1.01
West: John Renshaw Drive										
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.7	221.5	1.01
All Pedestrians		211	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.3	1.00

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	99	12
Green Time (sec)	51	17	24
Phase Time (sec)	57	23	30
Phase Split	52%	21%	27%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 AM (Site Folder: Scenario 1)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	54	19.6	54	19.6	0.097	31.4	LOS C	1.2	9.8	0.72	0.69	0.72	27.3
3	R2	214	20.2	214	20.2	* 0.597	57.7	LOS E	3.5	29.0	1.00	0.80	1.02	19.7
Approach		267	20.1	267	20.1	0.597	52.4	LOS D	3.5	29.0	0.94	0.78	0.96	20.9
East: John Renshaw Drive														
4	L2	421	20.0	416	20.0	0.253	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	65.3
5	T1	1155	19.9	1141	19.9	* 0.589	4.0	LOS A	3.6	29.2	0.15	0.14	0.15	85.0
Approach		1576	19.9	1556 N1	19.9	0.589	5.5	LOS A	3.6	29.2	0.11	0.27	0.11	74.7
West: John Renshaw Drive														
11	T1	1235	14.0	1235	14.0	0.476	7.0	LOS A	8.5	66.9	0.46	0.42	0.46	86.7
12	R2	105	20.0	105	20.0	* 0.588	61.4	LOS E	3.5	28.4	1.00	0.79	1.02	44.4
Approach		1340	14.5	1340	14.5	0.588	11.3	LOS A	8.5	66.9	0.51	0.45	0.51	78.8
All Vehicles		3183	17.6	3164 N1	17.7	0.597	11.9	LOS A	8.5	66.9	0.35	0.39	0.35	68.0

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

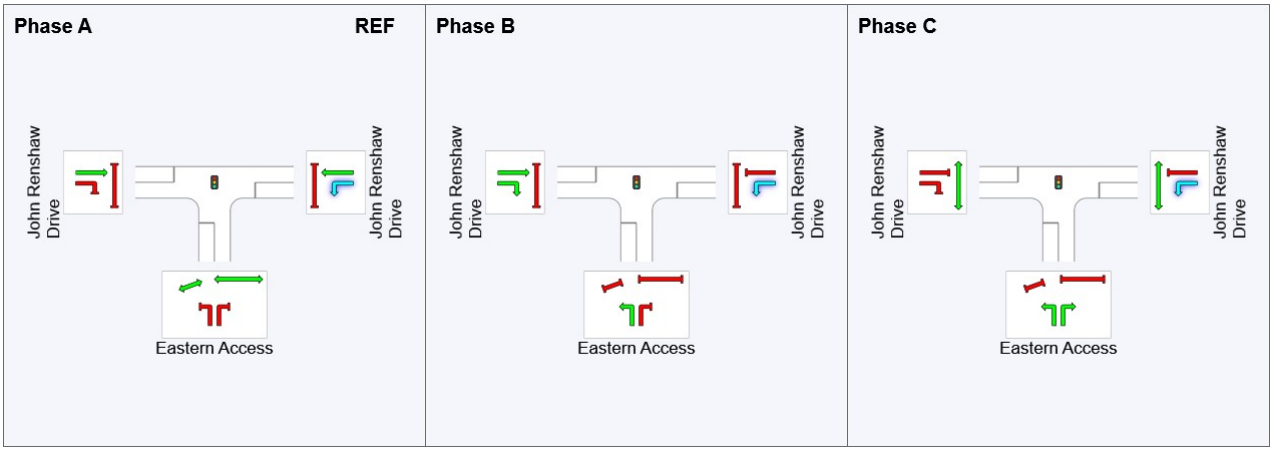
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	217.0	218.0	1.00
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	206.6	204.5	0.99

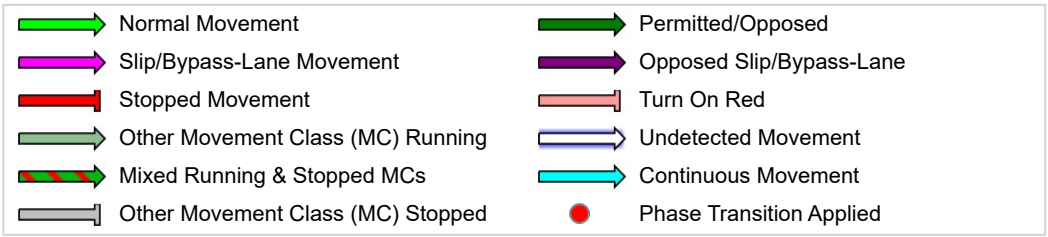
East: John Renshaw Drive										
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	218.9	220.5	1.01
West: John Renshaw Drive										
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.7	221.5	1.01
All Pedestrians		211	49.3	LOS E	0.2	0.2	0.95	0.95	215.5	216.1	1.00

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	14	32
Green Time (sec)	61	12	19
Phase Time (sec)	67	18	25
Phase Split	61%	16%	23%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 AM (Site Folder: Scenario 1)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

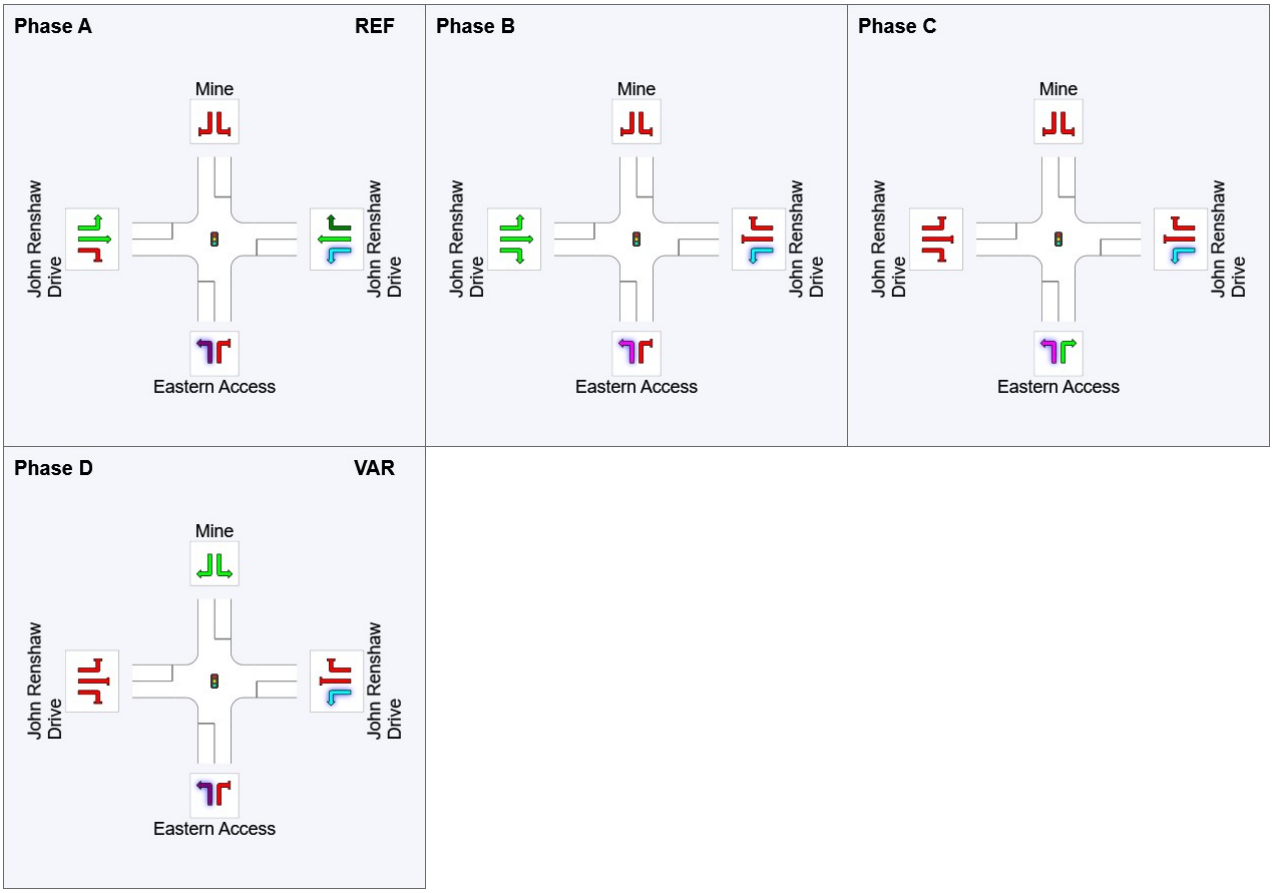
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	60	19.3	60	19.3	0.040	5.0	LOS A	0.1	1.0	0.10	0.52	0.10	53.0
3	R2	239	19.8	239	19.8	* 0.528	43.2	LOS D	2.8	23.0	0.98	0.79	0.98	23.9
Approach		299	19.7	299	19.7	0.528	35.5	LOS C	2.8	23.0	0.80	0.73	0.80	29.2
East: John Renshaw Drive														
4	L2	472	20.1	466	20.1	0.284	9.5	LOS A	0.0	0.0	0.00	0.63	0.00	78.8
5	T1	737	19.9	728	19.8	* 0.371	10.4	LOS A	4.8	39.3	0.59	0.52	0.59	86.0
6	R2	1	0.0	1	0.0	0.004	20.5	LOS B	0.0	0.1	0.55	0.65	0.55	61.9
Approach		1209	19.9	1195 N1	19.9	0.371	10.1	LOS A	4.8	39.3	0.36	0.56	0.36	83.0
North: Mine														
7	L2	1	0.0	1	0.0	0.045	57.9	LOS E	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	55.9	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.398	11.3	LOS A	4.4	34.6	0.37	0.33	0.37	62.4
11	T1	1101	13.2	1101	13.2	0.398	5.4	LOS A	4.4	34.6	0.37	0.33	0.37	84.4
12	R2	118	19.6	118	19.6	* 0.573	46.5	LOS D	2.8	23.2	0.99	0.80	1.01	36.2
Approach		1220	13.8	1220	13.8	0.573	9.4	LOS A	4.4	34.6	0.43	0.38	0.43	68.6
All Vehicles		2731	17.2	2716 N1	17.2	0.573	12.6	LOS A	4.8	39.3	0.44	0.50	0.44	71.3

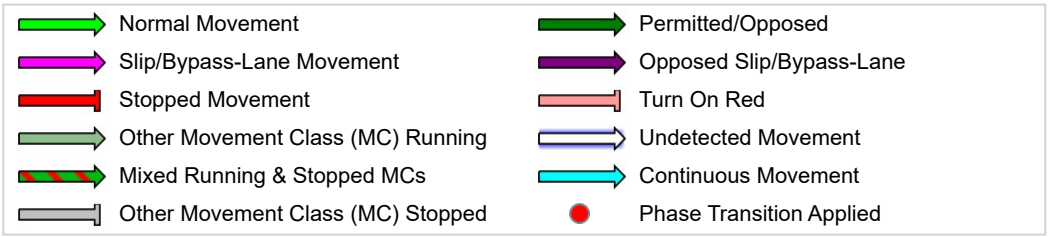
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	46	62	79
Green Time (sec)	45	10	11	1
Phase Time (sec)	51	16	11	2
Phase Split	64%	20%	14%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 1 (Stage 2 mitigation, 100% development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 1.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 1 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 PM (Site Folder: Scenario 1)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	341	15.4	341	15.4	0.907	65.1	LOS E	19.3	149.4	1.00	1.21	1.23	20.7
2	T1	474	7.3	474	7.3	0.907	63.4	LOS E	19.3	149.4	1.00	1.13	1.30	29.3
3	R2	926	20.2	926	20.2	* 1.377	401.4	LOS F	52.3	429.8	1.00	2.06	3.28	7.8
Approach		1741	15.8	1741	15.8	1.377	243.6	LOS F	52.3	429.8	1.00	1.64	2.34	10.9
East: John Renshaw Drive														
4	L2	564	13.8	564	13.8	0.330	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	54.3
5	T1	956	11.3	956	11.3	* 1.318	276.8	LOS F	36.9	283.5	1.00	1.84	2.62	6.0
6	R2	75	26.8	75	26.8	0.474	70.8	LOS F	1.4	12.2	1.00	0.73	1.00	27.7
Approach		1595	12.9	1595	12.9	1.318	171.3	LOS F	36.9	283.5	0.65	1.32	1.62	11.9
North: Weakleys Drive														
7	L2	41	20.5	41	20.5	1.288	304.4	LOS F	27.0	200.0	1.00	1.59	2.98	9.2
8	T1	807	4.7	807	4.7	* 1.290	313.6	LOS F	27.0	200.0	1.00	1.78	2.98	9.3
9	R2	528	15.9	528	15.9	0.990	102.4	LOS F	13.4	106.3	1.00	1.17	1.66	14.2
Approach		1377	9.5	1377	9.5	1.290	232.3	LOS F	27.0	200.0	1.00	1.54	2.48	10.2
West: John Renshaw Drive														
10	L2	595	15.4	595	15.4	0.352	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	1183	16.1	1183	16.1	0.501	25.6	LOS B	9.5	75.6	0.72	0.64	0.72	47.2
12	R2	652	15.0	652	15.0	* 1.382	406.3	LOS F	73.3	578.9	1.00	1.99	3.28	11.0
Approach		2429	15.6	2429	15.6	1.382	123.1	LOS F	73.3	578.9	0.62	0.97	1.23	25.7
All Vehicles		7142	13.9	7142	13.9	1.382	184.3	LOS F	73.3	578.9	0.79	1.32	1.83	15.3

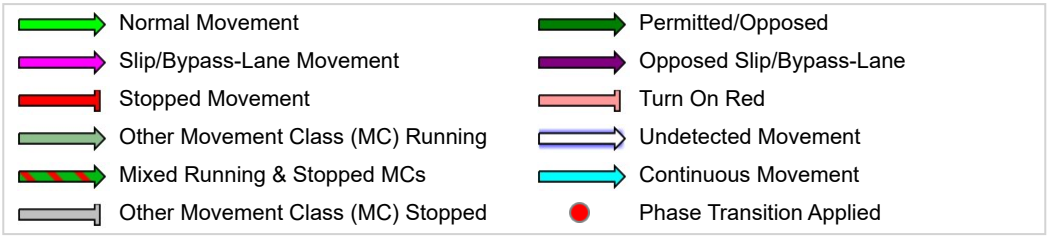
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G	G2
Phase Change Time (sec)	54	73	85	0	24	49
Green Time (sec)	13	6	29	18	19	***
Phase Time (sec)	19	12	35	24	25	5
Phase Split	16%	10%	29%	20%	21%	4%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 PM (Site Folder: Scenario 1)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	238	15.5	238	15.5	0.268	21.3	LOS B	4.6	36.9	0.59	0.70	0.59	32.0
3	R2	954	15.5	954	15.5	* 0.879	56.5	LOS D	19.4	154.1	0.99	0.98	1.18	19.9
Approach		1192	15.5	1192	15.5	0.879	49.5	LOS D	19.4	154.1	0.91	0.92	1.07	21.6
East: John Renshaw Drive														
4	L2	258	15.5	233	15.8	0.138	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	77.8
5	T1	1344	12.7	1215	12.9	* 0.891	15.0	LOS B	17.9	139.5	0.71	0.66	0.76	71.9
Approach		1602	13.1	1448 N1	13.4	0.891	14.1	LOS A	17.9	139.5	0.59	0.66	0.64	73.1
West: John Renshaw Drive														
11	T1	1477	15.7	1477	15.7	0.850	22.1	LOS B	21.7	172.1	0.75	0.72	0.80	38.9
12	R2	120	15.8	120	15.8	* 0.854	73.8	LOS F	4.6	36.9	1.00	0.85	1.20	25.8
Approach		1597	15.7	1597	15.7	0.854	26.0	LOS B	21.7	172.1	0.77	0.73	0.83	36.0
All Vehicles		4391	14.7	4237 N1	15.2	0.891	28.5	LOS C	21.7	172.1	0.75	0.76	0.83	42.2

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

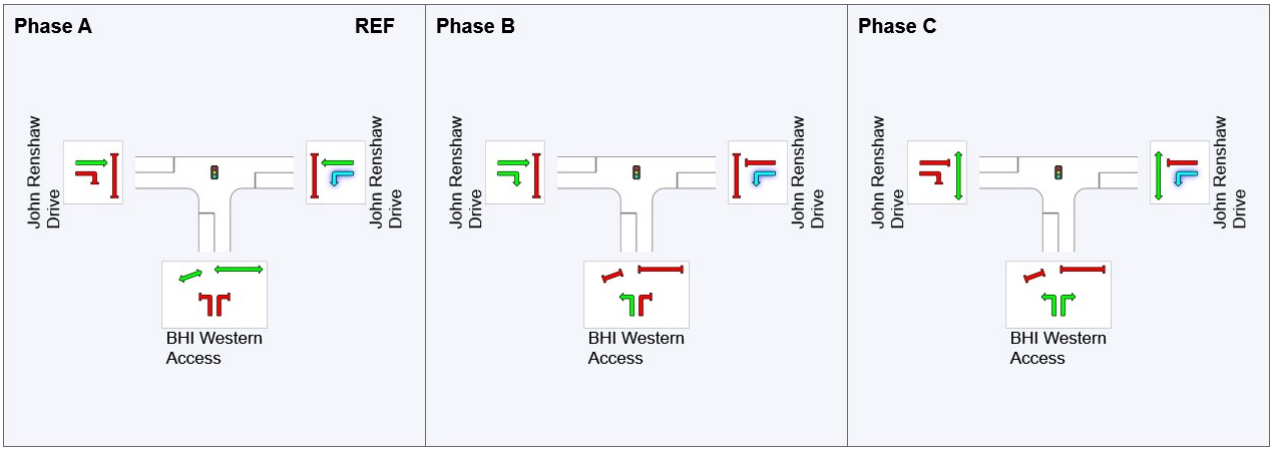
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	222.0	218.0	0.98
P1B	Slip/ Bypass	53	54.3	LOS E	0.2	0.2	0.95	0.95	211.6	204.5	0.97

East: John Renshaw Drive										
P2	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.5	221.3	0.99
West: John Renshaw Drive										
P4	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.7	221.5	0.99
All Pedestrians		211	54.3	LOS E	0.2	0.2	0.95	0.95	220.7	216.3	0.98

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	93	109
Green Time (sec)	45	10	47
Phase Time (sec)	51	16	53
Phase Split	43%	13%	44%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 PM (Site Folder: Scenario 1)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 120 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	106	15.8	106	15.8	0.172	32.0	LOS C	2.6	20.3	0.71	0.72	0.71	27.1
3	R2	425	15.6	425	15.6	* 0.630	52.9	LOS D	7.1	56.5	0.97	0.82	0.97	20.7
Approach		532	15.6	532	15.6	0.630	48.7	LOS D	7.1	56.5	0.92	0.80	0.92	21.8
East: John Renshaw Drive														
4	L2	242	15.7	222	15.9	0.132	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	66.6
5	T1	1340	12.6	1231	12.9	* 0.634	6.9	LOS A	7.0	54.8	0.26	0.24	0.26	74.3
Approach		1582	13.1	1453 N1	13.3	0.634	7.3	LOS A	7.0	54.8	0.22	0.30	0.22	71.8
West: John Renshaw Drive														
11	T1	1172	15.7	1172	15.7	0.511	12.1	LOS A	11.0	87.5	0.58	0.52	0.58	79.1
12	R2	61	15.5	61	15.5	* 0.619	72.9	LOS F	2.3	18.4	1.00	0.78	1.09	41.1
Approach		1233	15.7	1233	15.7	0.619	15.1	LOS B	11.0	87.5	0.60	0.53	0.60	74.4
All Vehicles		3346	14.5	3217 N1	15.1	0.634	17.1	LOS B	11.0	87.5	0.48	0.47	0.48	58.5

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

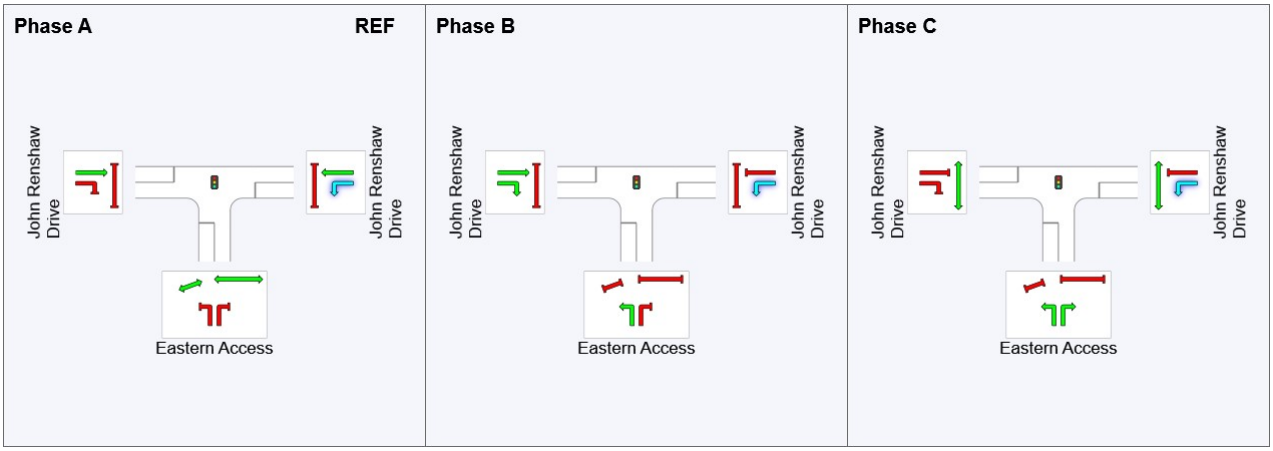
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	222.0	218.0	0.98
P1B	Slip/ Bypass	53	54.3	LOS E	0.2	0.2	0.95	0.95	211.6	204.5	0.97

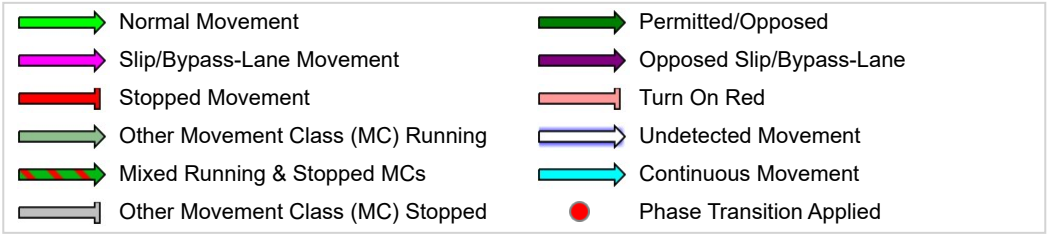
East: John Renshaw Drive										
P2	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	223.9	220.5	0.98
West: John Renshaw Drive										
P4	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	224.7	221.5	0.99
All Pedestrians		211	54.3	LOS E	0.2	0.2	0.95	0.95	220.5	216.1	0.98

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	58	8	21
Green Time (sec)	64	7	31
Phase Time (sec)	70	13	37
Phase Split	58%	11%	31%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 PM (Site Folder: Scenario 1)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 1)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

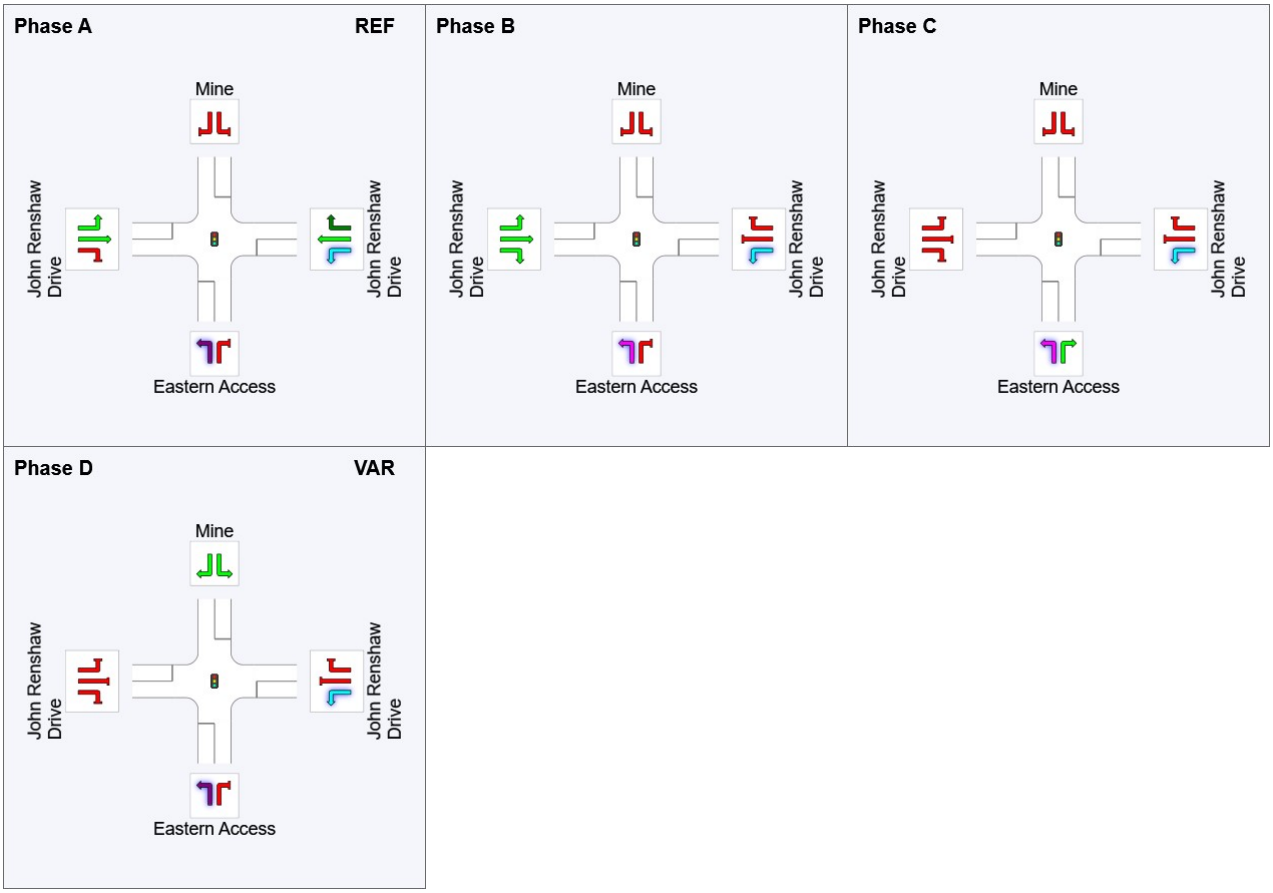
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	119	15.9	119	15.9	0.077	5.0	LOS A	0.3	2.1	0.10	0.52	0.10	53.6
3	R2	477	15.5	477	15.5	* 0.594	36.3	LOS C	5.2	41.4	0.94	0.82	0.94	26.1
Approach		596	15.5	596	15.5	0.594	30.0	LOS C	5.2	41.4	0.77	0.76	0.77	31.3
East: John Renshaw Drive														
4	L2	272	15.5	251	15.7	0.149	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	79.7
5	T1	1175	12.3	1086	12.5	* 0.582	14.6	LOS B	9.0	70.0	0.75	0.66	0.75	81.4
6	R2	1	0.0	1	0.0	0.003	22.1	LOS B	0.0	0.1	0.59	0.64	0.59	60.9
Approach		1447	12.9	1338 N1	13.1	0.582	13.6	LOS A	9.0	70.0	0.61	0.66	0.61	81.0
North: Mine														
7	L2	1	0.0	1	0.0	0.045	57.0	LOS E	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	55.5	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.320	14.0	LOS A	3.8	30.5	0.46	0.40	0.46	59.6
11	T1	756	15.9	756	15.9	0.320	7.7	LOS A	3.8	30.5	0.46	0.40	0.46	75.2
12	R2	67	15.6	67	15.6	* 0.532	50.4	LOS D	1.7	13.5	1.00	0.77	1.03	34.8
Approach		824	15.8	824	15.8	0.532	11.2	LOS A	3.8	30.5	0.50	0.43	0.51	64.2
All Vehicles		2869	14.3	2760 N1	14.8	0.594	16.5	LOS B	9.0	70.0	0.61	0.61	0.61	66.3

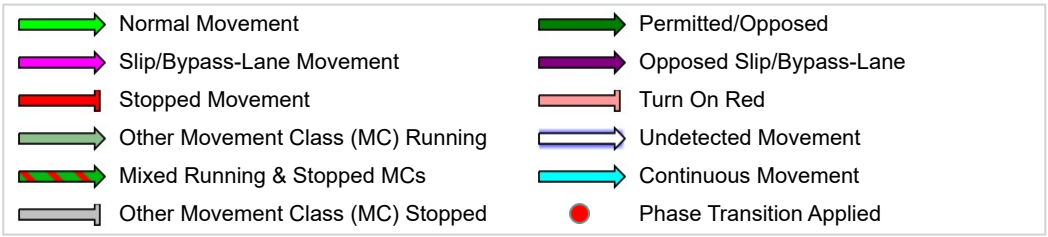
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	42	54	79
Green Time (sec)	41	6	19	1
Phase Time (sec)	47	12	19	2
Phase Split	59%	15%	24%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 1 (Stage 2 mitigation, 100% development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 1.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 2 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 AM (Site Folder: Scenario 2)]

Network: 28 [2038 AM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	798	20.1	798	20.1	0.932	89.6	LOS F	25.2	206.7	1.00	1.19	1.28	22.7
2	T1	460	11.9	460	11.9	*0.932	59.4	LOS E	25.2	206.7	1.00	1.16	1.41	30.6
3	R2	427	11.8	427	11.8	0.547	43.7	LOS D	5.9	45.6	0.94	0.81	0.94	35.1
Approach		1685	15.7	1685	15.7	0.932	69.7	LOS E	25.2	206.7	0.98	1.08	1.23	28.7
East: John Renshaw Drive														
4	L2	488	34.1	488	34.1	0.323	6.1	LOS A	0.0	0.0	0.00	0.51	0.00	53.6
5	T1	893	18.6	893	18.6	*0.941	78.6	LOS F	11.5	93.0	1.00	1.17	1.53	19.5
6	R2	287	8.1	287	8.1	0.900	67.3	LOS E	5.1	38.0	1.00	1.03	1.52	28.5
Approach		1668	21.3	1668	21.3	0.941	55.4	LOS D	11.5	93.0	0.71	0.95	1.08	28.9
North: Weakleys Drive														
7	L2	81	53.2	81	53.2	0.492	30.9	LOS C	5.0	41.8	0.83	0.82	0.83	40.8
8	T1	667	11.2	667	11.2	0.492	31.8	LOS C	6.0	46.3	0.88	0.77	0.88	39.7
9	R2	676	21.5	676	21.5	*0.944	72.5	LOS F	13.3	110.5	1.00	1.12	1.52	18.4
Approach		1424	18.5	1424	18.5	0.944	51.1	LOS D	13.3	110.5	0.93	0.94	1.18	29.1
West: John Renshaw Drive														
10	L2	415	20.1	415	20.1	0.253	6.3	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	961	13.8	961	13.8	0.933	59.2	LOS E	11.5	90.4	1.00	1.09	1.39	36.9
12	R2	302	15.0	302	15.0	*0.891	58.8	LOS E	5.0	39.5	1.00	0.93	1.28	36.7
Approach		1678	15.6	1678	15.6	0.933	46.1	LOS D	11.5	90.4	0.75	0.92	1.03	40.3
All Vehicles		6456	17.7	6456	17.7	0.944	55.8	LOS D	25.2	206.7	0.84	0.98	1.13	32.7

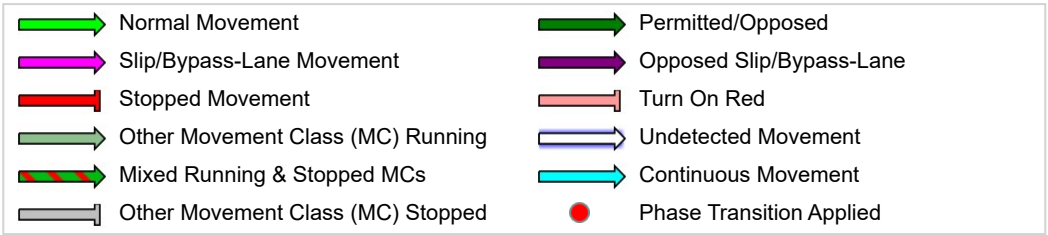
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G
Phase Change Time (sec)	52	84	99	0	24
Green Time (sec)	26	9	***	18	22
Phase Time (sec)	32	15	1	24	28
Phase Split	32%	15%	1%	24%	28%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 AM (Site Folder: Scenario 2)]

Network: 28 [2038 AM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	114	20.4	114	20.4	0.161	23.3	LOS B	2.1	17.0	0.65	0.70	0.65	31.0
3	R2	456	20.1	456	20.1	* 0.926	69.0	LOS E	8.5	69.9	1.00	1.10	1.53	17.6
Approach		569	20.1	569	20.1	0.926	59.9	LOS E	8.5	69.9	0.93	1.02	1.35	19.3
East: John Renshaw Drive														
4	L2	482	20.1	482	20.1	0.294	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	76.7
5	T1	1461	20.0	1461	20.0	* 0.939	31.6	LOS C	24.0	196.8	0.93	0.96	1.12	55.0
Approach		1943	20.0	1943	20.0	0.939	26.0	LOS B	24.0	196.8	0.70	0.87	0.84	60.6
West: John Renshaw Drive														
11	T1	1223	13.9	1223	13.9	0.513	9.1	LOS A	8.2	64.5	0.49	0.45	0.49	60.7
12	R2	226	20.0	226	20.0	* 0.919	71.5	LOS F	8.4	68.6	1.00	0.98	1.51	26.3
Approach		1449	14.9	1449	14.9	0.919	18.8	LOS B	8.4	68.6	0.57	0.53	0.65	43.8
All Vehicles		3962	18.1	3962	18.1	0.939	28.3	LOS B	24.0	196.8	0.68	0.77	0.85	47.7

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

* Critical Movement (Signal Timing)

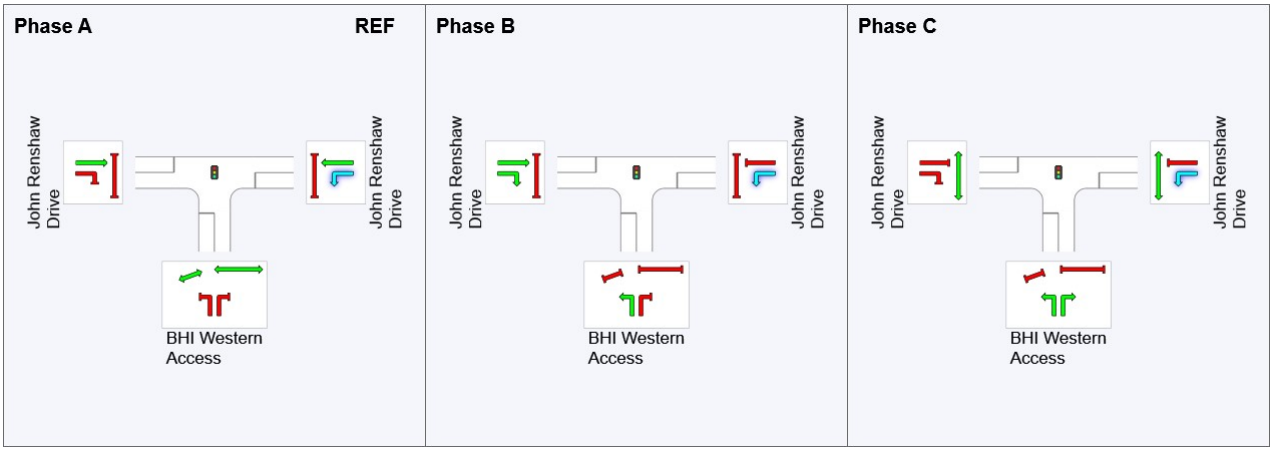
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

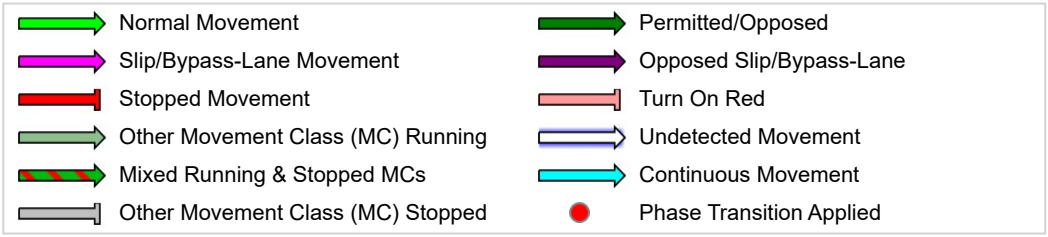
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	93	14
Green Time (sec)	45	15	22
Phase Time (sec)	51	21	28
Phase Split	51%	21%	28%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 AM (Site Folder: Scenario 2)]

Network: 28 [2038 AM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	54	19.6	54	19.6	0.096	28.8	LOS C	1.1	8.9	0.71	0.69	0.71	28.4
3	R2	214	20.2	214	20.2	* 0.592	53.1	LOS D	3.2	26.5	1.00	0.80	1.03	20.7
Approach		267	20.1	267	20.1	0.592	48.2	LOS D	3.2	26.5	0.94	0.78	0.96	21.9
East: John Renshaw Drive														
4	L2	421	20.0	421	20.0	0.256	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	65.3
5	T1	1155	19.9	1155	19.9	* 0.613	4.3	LOS A	3.9	31.9	0.18	0.16	0.18	84.0
Approach		1576	19.9	1576	19.9	0.613	5.7	LOS A	3.9	31.9	0.13	0.29	0.13	74.3
West: John Renshaw Drive														
11	T1	1235	14.0	1235	14.0	0.488	7.3	LOS A	8.3	65.0	0.49	0.45	0.49	86.3
12	R2	105	20.0	105	20.0	* 0.641	58.7	LOS E	3.2	26.6	1.00	0.81	1.08	45.3
Approach		1340	14.5	1340	14.5	0.641	11.3	LOS A	8.3	65.0	0.53	0.47	0.54	78.8
All Vehicles		3183	17.6	3183	17.6	0.641	11.6	LOS A	8.3	65.0	0.37	0.41	0.37	68.4

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

* Critical Movement (Signal Timing)

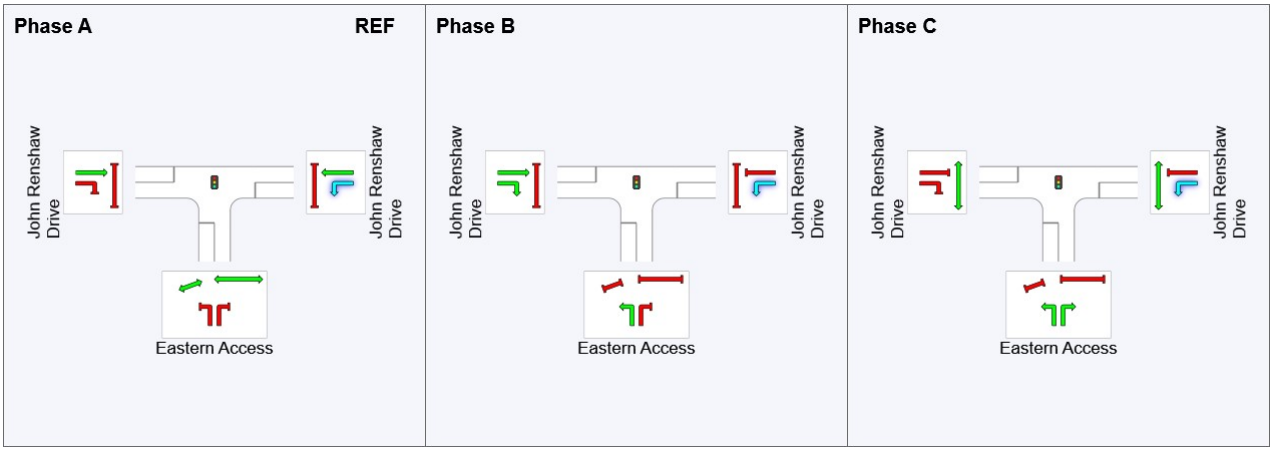
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

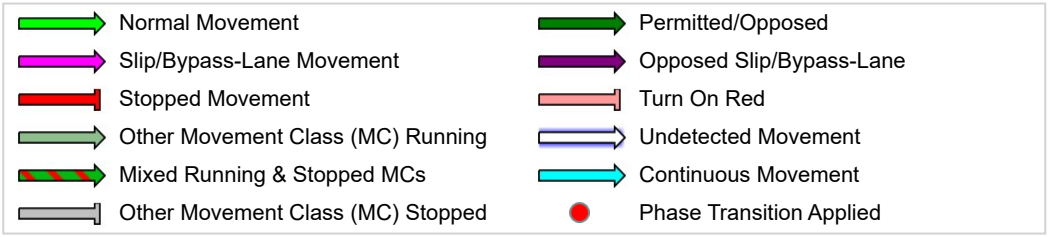
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive										
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	17	33
Green Time (sec)	54	10	18
Phase Time (sec)	60	16	24
Phase Split	60%	16%	24%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 AM (Site Folder: Scenario 2)]

Network: 28 [2038 AM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

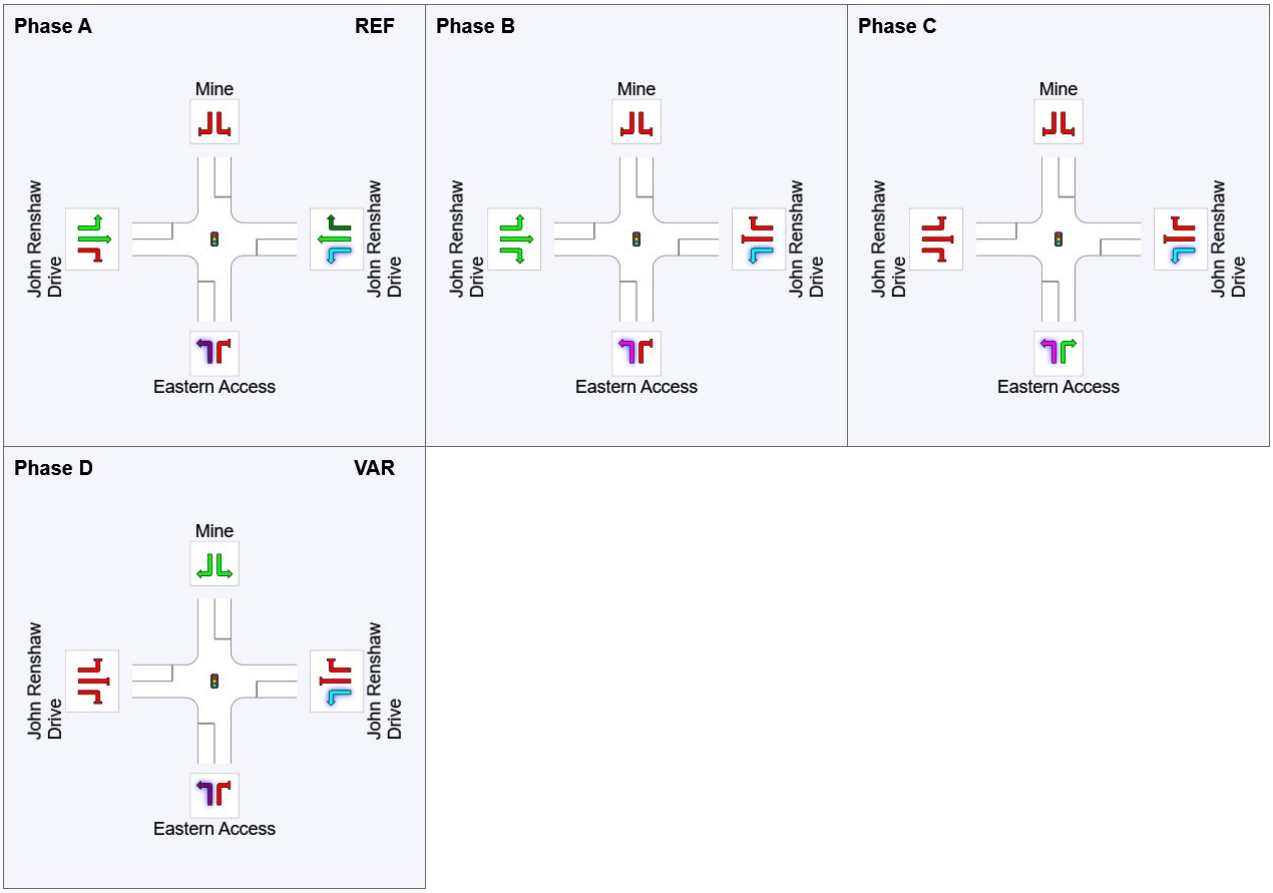
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	60	19.3	60	19.3	0.040	5.0	LOS A	0.1	1.0	0.10	0.52	0.10	53.0
3	R2	239	19.8	239	19.8	* 0.528	43.2	LOS D	2.8	23.0	0.98	0.79	0.98	23.9
Approach		299	19.7	299	19.7	0.528	35.5	LOS C	2.8	23.0	0.80	0.73	0.80	29.2
East: John Renshaw Drive														
4	L2	472	20.1	472	20.1	0.287	9.5	LOS A	0.0	0.0	0.00	0.63	0.00	78.8
5	T1	737	19.9	737	19.9	* 0.375	10.4	LOS A	4.9	39.9	0.59	0.52	0.59	86.0
6	R2	1	0.0	1	0.0	0.004	20.5	LOS B	0.0	0.1	0.55	0.65	0.55	61.9
Approach		1209	19.9	1209	19.9	0.375	10.1	LOS A	4.9	39.9	0.36	0.56	0.36	83.0
North: Mine														
7	L2	1	0.0	1	0.0	0.045	57.9	LOS E	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	55.9	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.398	11.3	LOS A	4.4	34.6	0.37	0.33	0.37	62.4
11	T1	1101	13.2	1101	13.2	0.398	5.4	LOS A	4.4	34.6	0.37	0.33	0.37	84.4
12	R2	118	19.6	118	19.6	* 0.573	46.5	LOS D	2.8	23.2	0.99	0.80	1.01	36.2
Approach		1220	13.8	1220	13.8	0.573	9.4	LOS A	4.4	34.6	0.43	0.38	0.43	68.6
All Vehicles		2731	17.2	2731	17.2	0.573	12.6	LOS A	4.9	39.9	0.44	0.50	0.44	71.4

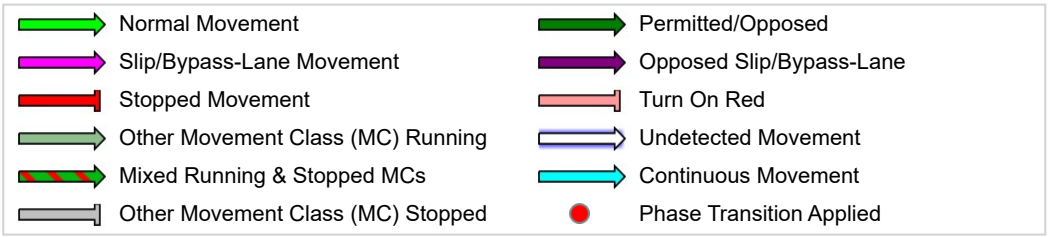
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	46	62	79
Green Time (sec)	45	10	11	1
Phase Time (sec)	51	16	11	2
Phase Split	64%	20%	14%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 2 (additional mitigation, 100% development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 2.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 2 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 PM (Site Folder: Scenario 2)]

Network: 27 [2038 PM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	341	15.4	341	15.4	0.692	33.6	LOS C	11.3	87.7	0.85	0.95	0.85	31.7
2	T1	474	7.3	474	7.3	0.692	36.2	LOS C	11.3	87.7	0.93	0.89	0.94	37.3
3	R2	926	20.2	926	20.2	* 1.010	104.3	LOS F	24.4	200.8	1.00	1.24	1.69	22.2
Approach		1741	15.8	1741	15.8	1.010	71.9	LOS F	24.4	200.8	0.95	1.09	1.32	26.3
East: John Renshaw Drive														
4	L2	564	13.8	564	13.8	0.330	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	54.3
5	T1	956	11.3	956	11.3	* 1.005	98.4	LOS F	15.7	120.4	1.00	1.31	1.74	14.8
6	R2	75	26.8	75	26.8	0.435	64.8	LOS E	1.3	11.1	1.00	0.73	1.00	28.9
Approach		1595	12.9	1595	12.9	1.005	64.1	LOS E	15.7	120.4	0.65	1.00	1.09	24.4
North: Weakleys Drive														
7	L2	41	20.5	41	20.5	0.970	95.4	LOS F	13.3	98.6	1.00	1.30	1.60	24.2
8	T1	807	4.7	807	4.7	* 0.971	84.6	LOS F	13.3	98.6	1.00	1.23	1.61	25.4
9	R2	528	15.9	528	15.9	0.750	52.9	LOS D	8.6	68.8	1.00	0.89	1.08	22.6
Approach		1377	9.5	1377	9.5	0.971	72.7	LOS F	13.3	98.6	1.00	1.10	1.41	24.6
West: John Renshaw Drive														
10	L2	595	15.4	595	15.4	0.352	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	1183	16.1	1183	16.1	0.733	37.2	LOS C	11.8	93.8	0.92	0.81	0.94	43.1
12	R2	652	15.0	652	15.0	* 1.027	116.7	LOS F	17.3	137.0	1.00	1.26	1.85	26.5
Approach		2429	15.6	2429	15.6	1.027	51.0	LOS D	17.3	137.0	0.72	0.86	0.95	38.8
All Vehicles		7142	13.9	7142	13.9	1.027	63.2	LOS E	24.4	200.8	0.81	0.99	1.16	30.5

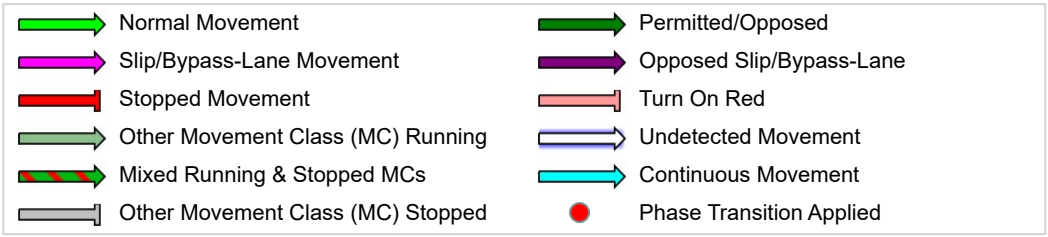
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G	G2
Phase Change Time (sec)	61	83	95	0	25	54
Green Time (sec)	16	6	9	19	23	1
Phase Time (sec)	22	12	15	25	29	7
Phase Split	20%	11%	14%	23%	26%	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%.

Site: 101 [John Renshaw Drive/ BHI western access 2038 PM (Site Folder: Scenario 2)]

Network: 27 [2038 PM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	238	15.5	238	15.5	0.282	21.7	LOS B	4.5	35.7	0.62	0.71	0.62	31.8
3	R2	954	15.5	954	15.5	* 0.969	81.3	LOS F	22.6	178.9	1.00	1.14	1.51	15.8
Approach		1192	15.5	1192	15.5	0.969	69.4	LOS E	22.6	178.9	0.92	1.05	1.33	17.6
East: John Renshaw Drive														
4	L2	258	14.7	257	14.7	0.151	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	78.0
5	T1	1344	12.7	1341	12.7	* 0.942	19.8	LOS B	21.5	166.7	0.87	0.84	0.98	66.1
Approach		1602	13.0	1598 N1	13.0	0.942	18.0	LOS B	21.5	166.7	0.73	0.81	0.82	68.4
West: John Renshaw Drive														
11	T1	1477	15.7	1477	15.7	0.818	18.0	LOS B	18.2	144.7	0.72	0.67	0.74	43.9
12	R2	120	15.8	120	15.8	* 0.870	69.6	LOS E	4.3	34.4	1.00	0.86	1.25	26.7
Approach		1597	15.7	1597	15.7	0.870	21.8	LOS B	18.2	144.7	0.74	0.68	0.78	39.9
All Vehicles		4391	14.6	4386 N1	14.7	0.969	33.4	LOS C	22.6	178.9	0.78	0.83	0.94	39.6

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

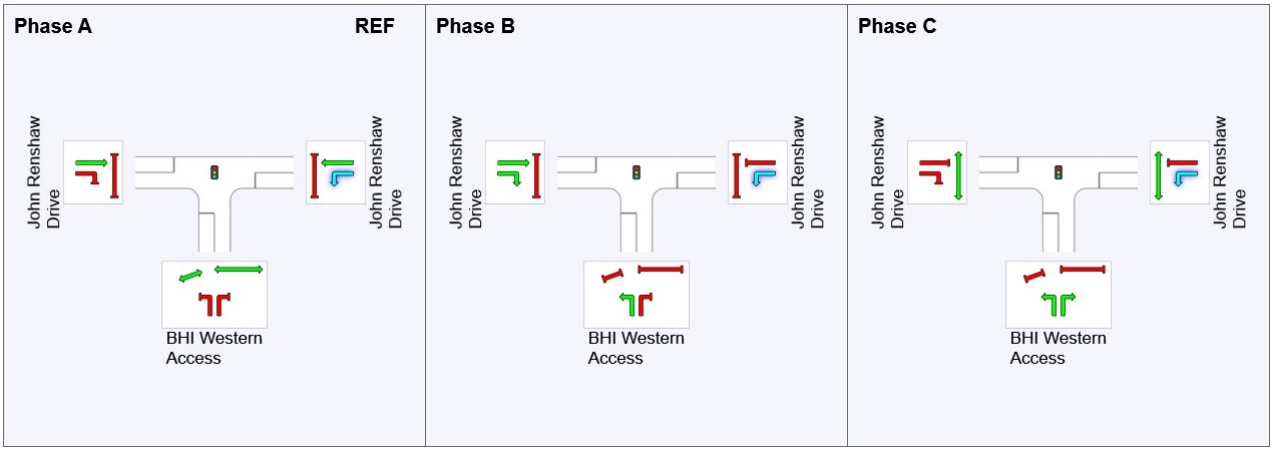
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	217.0	218.0	1.00
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	206.6	204.5	0.99

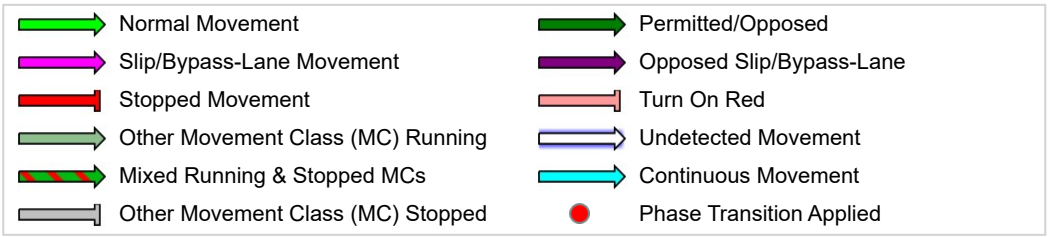
East: John Renshaw Drive										
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.5	221.3	1.01
West: John Renshaw Drive										
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.7	221.5	1.01
All Pedestrians		211	49.3	LOS E	0.2	0.2	0.95	0.95	215.7	216.3	1.00

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	91	106
Green Time (sec)	43	9	40
Phase Time (sec)	49	15	46
Phase Split	45%	14%	42%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 PM (Site Folder: Scenario 2)]

Network: 27 [2038 PM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	106	15.8	106	15.8	0.178	30.8	LOS C	2.4	19.1	0.73	0.72	0.73	27.6
3	R2	425	15.6	425	15.6	* 0.693	52.2	LOS D	6.8	54.3	0.99	0.85	1.04	20.9
Approach		532	15.6	532	15.6	0.693	47.9	LOS D	6.8	54.3	0.94	0.83	0.98	22.0
East: John Renshaw Drive														
4	L2	242	15.7	242	15.7	0.143	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	66.6
5	T1	1340	12.6	1337	12.7	* 0.685	6.8	LOS A	7.6	58.9	0.26	0.23	0.26	77.6
Approach		1582	13.1	1578 N1	13.1	0.685	7.2	LOS A	7.6	58.9	0.22	0.29	0.22	74.0
West: John Renshaw Drive														
11	T1	1172	15.7	1172	15.7	0.508	10.9	LOS A	10.0	79.5	0.57	0.51	0.57	80.8
12	R2	61	15.5	61	15.5	* 0.662	69.1	LOS E	2.2	17.2	1.00	0.79	1.15	42.2
Approach		1233	15.7	1233	15.7	0.662	13.8	LOS A	10.0	79.5	0.59	0.53	0.60	76.1
All Vehicles		3346	14.5	3343 N1	14.5	0.693	16.1	LOS B	10.0	79.5	0.47	0.47	0.48	60.0

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

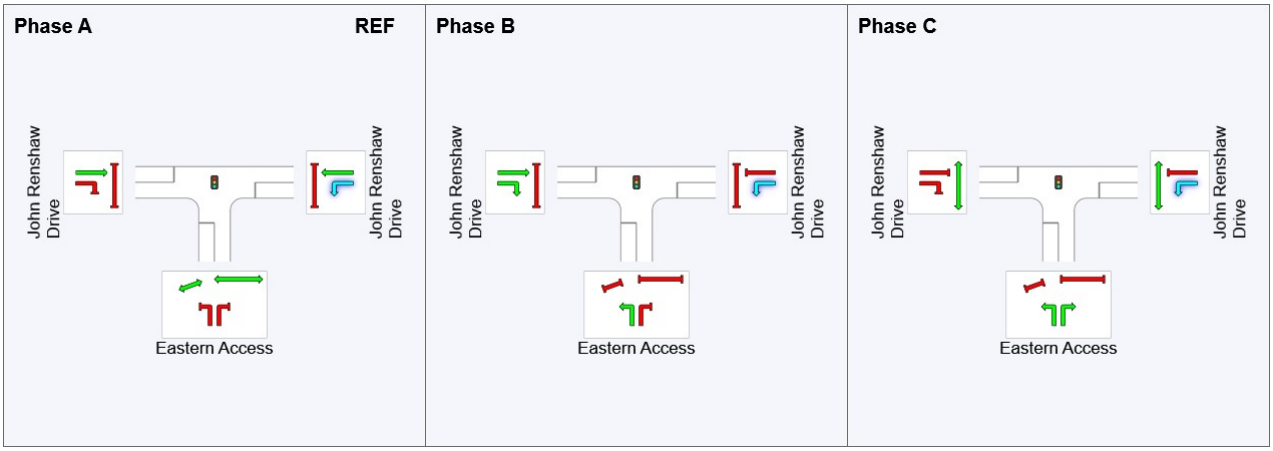
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	217.0	218.0	1.00
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	206.6	204.5	0.99

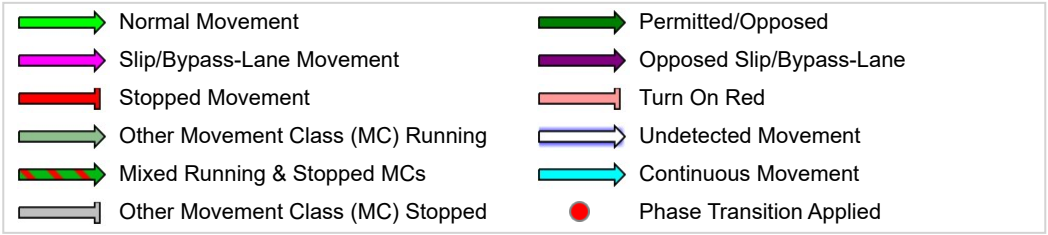
East: John Renshaw Drive										
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	218.9	220.5	1.01
West: John Renshaw Drive										
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	219.7	221.5	1.01
All Pedestrians		211	49.3	LOS E	0.2	0.2	0.95	0.95	215.5	216.1	1.00

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	12	24
Green Time (sec)	59	6	27
Phase Time (sec)	65	12	33
Phase Split	59%	11%	30%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 PM (Site Folder: Scenario 2)]

Network: 27 [2038 PM with Dev & BHI (Network Folder: Scenario 2)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

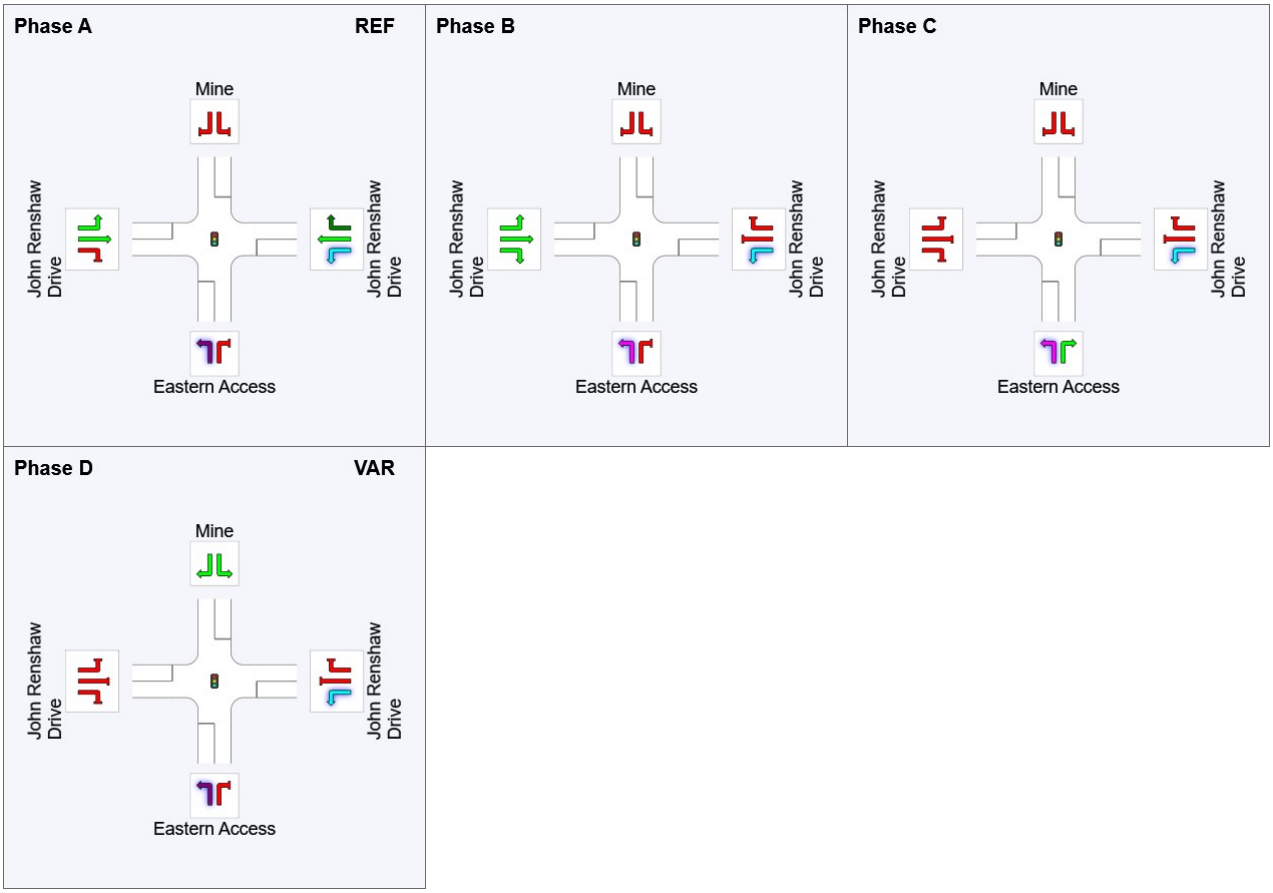
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	119	15.9	119	15.9	0.077	5.0	LOS A	0.3	2.1	0.10	0.52	0.10	53.6
3	R2	477	15.5	477	15.5	* 0.627	37.5	LOS C	5.3	42.3	0.96	0.83	0.97	25.6
Approach		596	15.5	596	15.5	0.627	31.0	LOS C	5.3	42.3	0.78	0.76	0.79	30.9
East: John Renshaw Drive														
4	L2	272	15.5	271	15.5	0.160	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	79.8
5	T1	1175	12.3	1172	12.3	* 0.612	14.3	LOS A	9.8	76.1	0.75	0.67	0.75	81.7
6	R2	1	0.0	1	0.0	0.003	20.9	LOS B	0.0	0.1	0.56	0.64	0.56	61.6
Approach		1447	12.9	1444 N1	12.9	0.612	13.4	LOS A	9.8	76.1	0.61	0.66	0.61	81.3
North: Mine														
7	L2	1	0.0	1	0.0	0.045	57.0	LOS E	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	55.5	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.314	13.6	LOS A	3.7	29.4	0.44	0.39	0.44	60.0
11	T1	756	15.9	756	15.9	0.314	7.3	LOS A	3.7	29.4	0.44	0.39	0.44	76.6
12	R2	67	15.6	67	15.6	* 0.532	50.4	LOS D	1.7	13.5	1.00	0.77	1.03	34.8
Approach		824	15.8	824	15.8	0.532	10.8	LOS A	3.7	29.4	0.49	0.42	0.49	65.0
All Vehicles		2869	14.3	2866 N1	14.3	0.627	16.3	LOS B	9.8	76.1	0.61	0.61	0.61	67.0

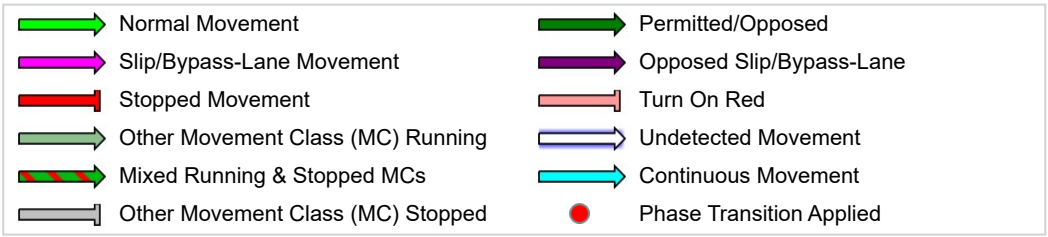
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	43	55	79
Green Time (sec)	42	6	18	1
Phase Time (sec)	48	12	18	2
Phase Split	60%	15%	23%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 2 (additional mitigation, 100% development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 2.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 3 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 AM (Site Folder: Scenario 3)]

Network: 30 [2038 AM with BHI Stage 1 (Network Folder: Scenario 3)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D1*, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

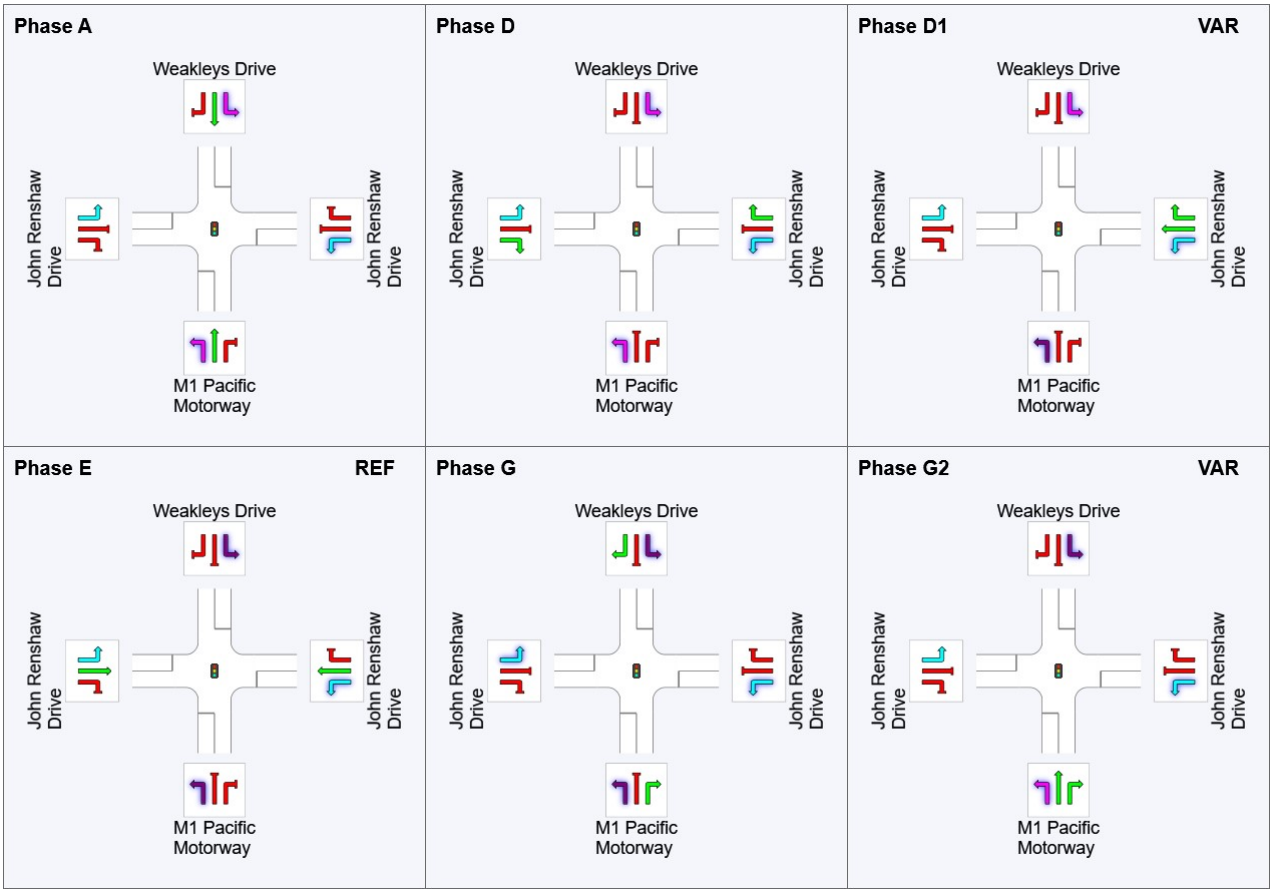
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	131	21.0	131	21.0	0.497	23.1	LOS B	5.0	39.2	0.79	0.77	0.79	37.9
2	T1	460	11.9	460	11.9	0.497	25.6	LOS B	6.3	48.3	0.85	0.76	0.85	42.0
3	R2	427	11.8	427	11.8	*0.573	44.8	LOS D	6.0	46.3	0.95	0.81	0.95	34.8
Approach		1018	13.0	1018	13.0	0.573	33.3	LOS C	6.3	48.3	0.88	0.78	0.88	38.2
East: John Renshaw Drive														
4	L2	488	34.1	488	34.1	0.323	6.1	LOS A	0.0	0.0	0.00	0.51	0.00	53.6
5	T1	416	17.2	416	17.2	0.469	39.5	LOS C	4.3	34.5	0.93	0.75	0.93	26.9
6	R2	287	8.1	287	8.1	*0.578	50.7	LOS D	4.2	31.3	0.98	0.80	0.98	32.7
Approach		1192	21.9	1192	21.9	0.578	28.5	LOS B	4.3	34.5	0.56	0.66	0.56	38.3
North: Weakleys Drive														
7	L2	81	53.2	81	53.2	0.551	32.1	LOS C	5.1	42.8	0.88	0.85	0.88	40.3
8	T1	667	11.2	667	11.2	*0.551	34.2	LOS C	6.2	47.9	0.92	0.80	0.92	38.7
9	R2	294	23.3	294	23.3	0.537	48.1	LOS D	4.2	34.9	0.96	0.80	0.96	23.9
Approach		1042	17.9	1042	17.9	0.551	37.9	LOS C	6.2	47.9	0.93	0.80	0.93	35.2
West: John Renshaw Drive														
10	L2	222	19.9	222	19.9	0.135	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	56.1
11	T1	577	9.7	577	9.7	*0.576	31.7	LOS C	4.7	35.7	0.84	0.69	0.84	45.0
12	R2	109	6.7	109	6.7	0.470	50.8	LOS D	3.1	23.2	0.97	0.78	0.97	38.8
Approach		908	11.8	908	11.8	0.576	27.9	LOS B	4.7	35.7	0.65	0.66	0.65	46.3
All Vehicles		4160	16.5	4160	16.5	0.578	31.9	LOS C	6.3	48.3	0.75	0.73	0.75	39.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

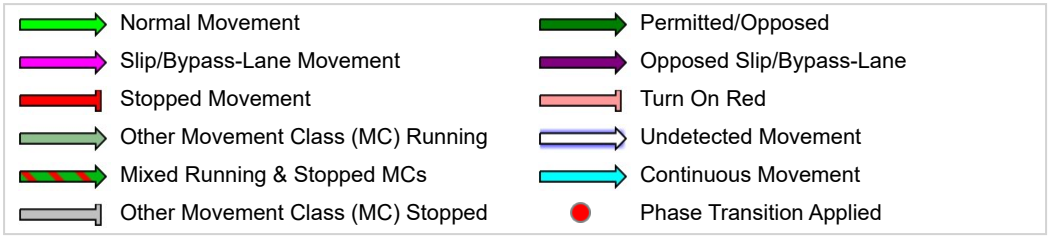
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D1	E	G	G2
Phase Change Time (sec)	51	80	99	0	24	47
Green Time (sec)	23	13	***	18	17	***
Phase Time (sec)	29	19	1	24	23	4
Phase Split	29%	19%	1%	24%	23%	4%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 AM (Site Folder: Scenario 3)]

Network: 30 [2038 AM with BHI Stage 1 (Network Folder: Scenario 3)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	35	21.2	35	21.2	0.055	25.6	LOS B	0.6	5.3	0.65	0.66	0.65	38.5
3	R2	139	19.7	139	19.7	* 0.325	48.9	LOS D	2.0	16.1	0.95	0.76	0.95	21.7
Approach		174	20.0	174	20.0	0.325	44.3	LOS D	2.0	16.1	0.89	0.74	0.89	25.0
East: John Renshaw Drive														
4	L2	271	19.8	271	19.8	0.165	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	76.8
5	T1	569	19.8	569	19.8	* 0.333	5.2	LOS A	2.4	19.5	0.22	0.19	0.22	91.4
Approach		840	19.8	840	19.8	0.333	6.5	LOS A	2.4	19.5	0.15	0.33	0.15	85.8
West: John Renshaw Drive														
11	T1	769	10.3	769	10.3	0.306	6.8	LOS A	4.6	34.8	0.43	0.38	0.43	67.3
12	R2	67	20.3	67	20.3	* 0.316	52.8	LOS D	1.9	15.6	0.95	0.76	0.95	31.1
Approach		837	11.1	837	11.1	0.316	10.5	LOS A	4.6	34.8	0.48	0.41	0.48	56.4
All Vehicles		1851	15.9	1851	15.9	0.333	11.9	LOS A	4.6	34.8	0.37	0.41	0.37	68.3

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

* Critical Movement (Signal Timing)

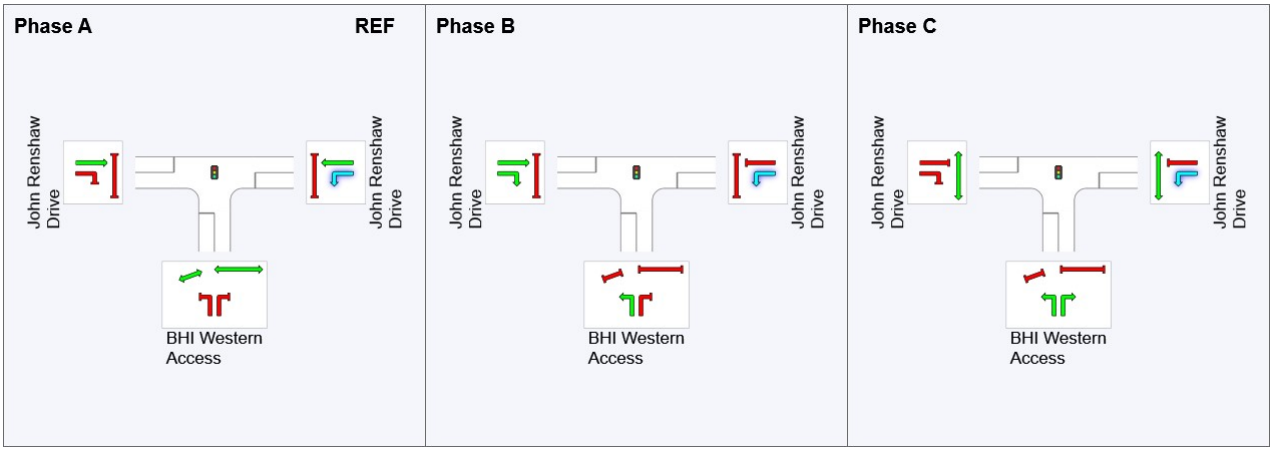
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

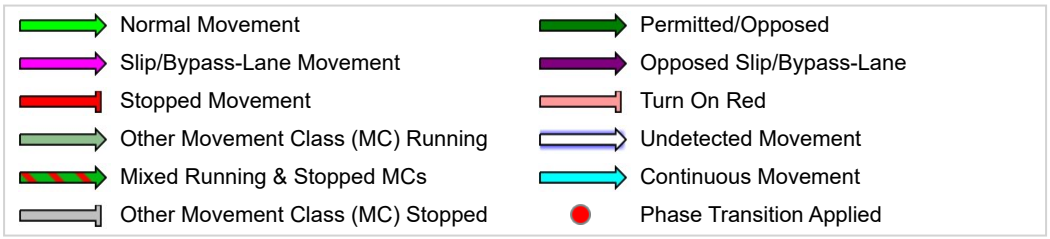
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	41	96	15
Green Time (sec)	49	13	20
Phase Time (sec)	55	19	26
Phase Split	55%	19%	26%

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%.

\Scenario 3 (without development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 3.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 3 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 PM (Site Folder: Scenario 3)]

Network: 29 [2038 PM with BHI Stage 1 (Network Folder: Scenario 3)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	65	14.5	65	14.5	0.415	26.8	LOS B	4.7	35.3	0.77	0.74	0.77	36.0
2	T1	474	7.3	474	7.3	0.415	24.7	LOS B	5.9	43.7	0.80	0.72	0.80	42.6
3	R2	926	20.2	926	20.2	*0.787	40.5	LOS C	13.6	111.5	0.96	0.91	1.04	36.1
Approach		1465	15.8	1465	15.8	0.787	34.8	LOS C	13.6	111.5	0.90	0.84	0.95	38.0
East: John Renshaw Drive														
4	L2	564	13.8	564	13.8	0.330	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	54.3
5	T1	595	8.7	595	8.7	*0.807	48.6	LOS D	7.2	54.1	0.99	0.90	1.15	23.8
6	R2	75	26.8	75	26.8	0.395	58.8	LOS E	1.2	10.1	1.00	0.73	1.00	30.4
Approach		1234	12.1	1234	12.1	0.807	29.7	LOS C	7.2	54.1	0.54	0.72	0.61	36.8
North: Weakleys Drive														
7	L2	41	20.5	41	20.5	0.749	50.1	LOS D	8.3	61.2	0.99	0.98	1.07	34.2
8	T1	807	4.7	807	4.7	*0.749	44.7	LOS D	8.3	61.2	1.00	0.92	1.09	35.0
9	R2	317	16.3	317	16.3	0.428	42.7	LOS D	4.2	33.2	0.91	0.79	0.91	25.6
Approach		1165	8.4	1165	8.4	0.749	44.4	LOS D	8.3	61.2	0.97	0.89	1.04	33.0
West: John Renshaw Drive														
10	L2	203	15.0	203	15.0	0.120	6.4	LOS A	0.0	0.0	0.00	0.52	0.00	56.2
11	T1	567	16.7	567	16.7	0.665	36.2	LOS C	5.1	40.9	0.91	0.76	0.94	43.4
12	R2	91	12.8	91	12.8	*0.752	60.8	LOS E	3.0	22.9	1.00	0.87	1.25	36.3
Approach		861	15.9	861	15.9	0.752	31.8	LOS C	5.1	40.9	0.71	0.72	0.75	44.9
All Vehicles		4725	13.0	4725	13.0	0.807	35.3	LOS C	13.6	111.5	0.79	0.80	0.85	38.2

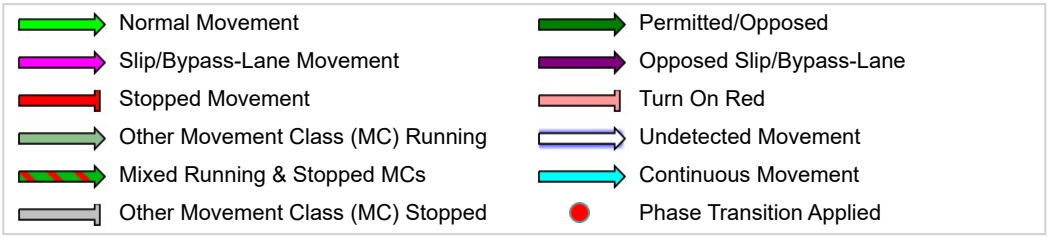
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G	G2
Phase Change Time (sec)	62	87	99	0	21	49
Green Time (sec)	19	6	***	15	22	7
Phase Time (sec)	25	12	1	21	28	13
Phase Split	25%	12%	1%	21%	28%	13%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 PM (Site Folder: Scenario 3)]

Network: 29 [2038 PM with BHI Stage 1 (Network Folder: Scenario 3)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	72	16.2	72	16.2	0.112	27.4	LOS B	1.4	11.0	0.68	0.69	0.68	38.3
3	R2	286	15.4	286	15.4	* 0.446	44.3	LOS D	3.9	30.8	0.93	0.79	0.93	22.9
Approach		358	15.6	358	15.6	0.446	40.9	LOS C	3.9	30.8	0.88	0.77	0.88	26.1
East: John Renshaw Drive														
4	L2	146	15.8	146	15.8	0.087	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	77.8
5	T1	831	10.9	831	10.9	* 0.451	3.6	LOS A	2.7	20.5	0.15	0.14	0.15	94.6
Approach		977	11.6	977	11.6	0.451	4.4	LOS A	2.7	20.5	0.13	0.21	0.13	91.4
West: John Renshaw Drive														
11	T1	575	16.1	575	16.1	0.260	9.1	LOS A	3.8	30.5	0.48	0.42	0.48	60.7
12	R2	37	14.3	37	14.3	* 0.361	60.9	LOS E	1.1	9.0	1.00	0.73	1.00	28.8
Approach		612	16.0	612	16.0	0.361	12.2	LOS A	3.8	30.5	0.51	0.44	0.51	53.2
All Vehicles		1946	13.7	1946	13.7	0.451	13.6	LOS A	3.9	30.8	0.39	0.38	0.39	66.3

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

* Critical Movement (Signal Timing)

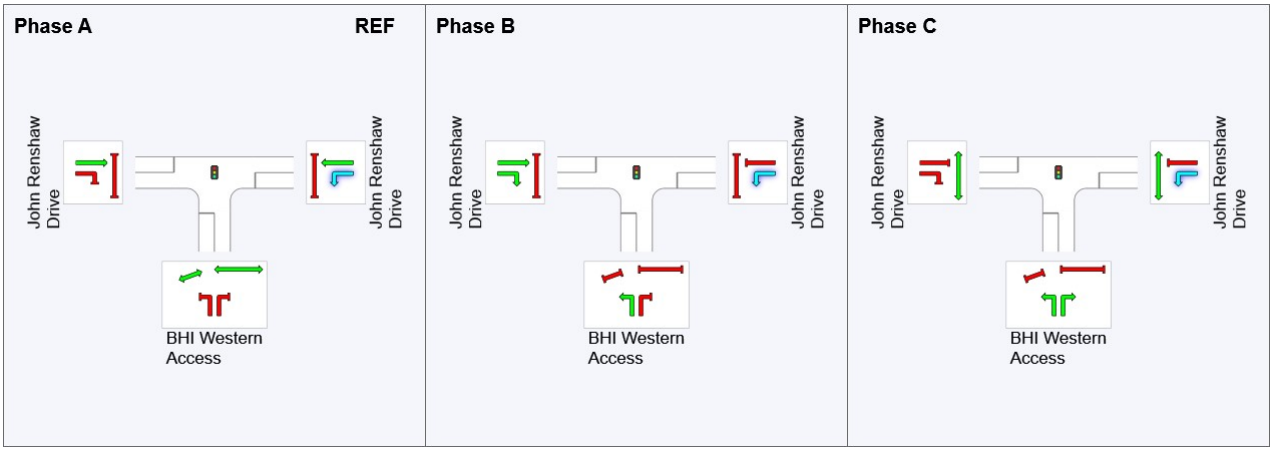
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

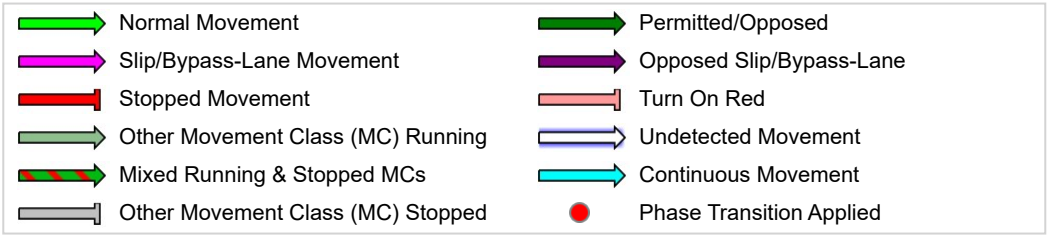
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	41	97	9
Green Time (sec)	50	6	26
Phase Time (sec)	56	12	32
Phase Split	56%	12%	32%

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%.

\Scenario 3 (without development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 3.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 4 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 AM (Site Folder: Scenario 4)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D1*, E, G, G1*
(* Variable Phase)

Vehicle Movement Performance

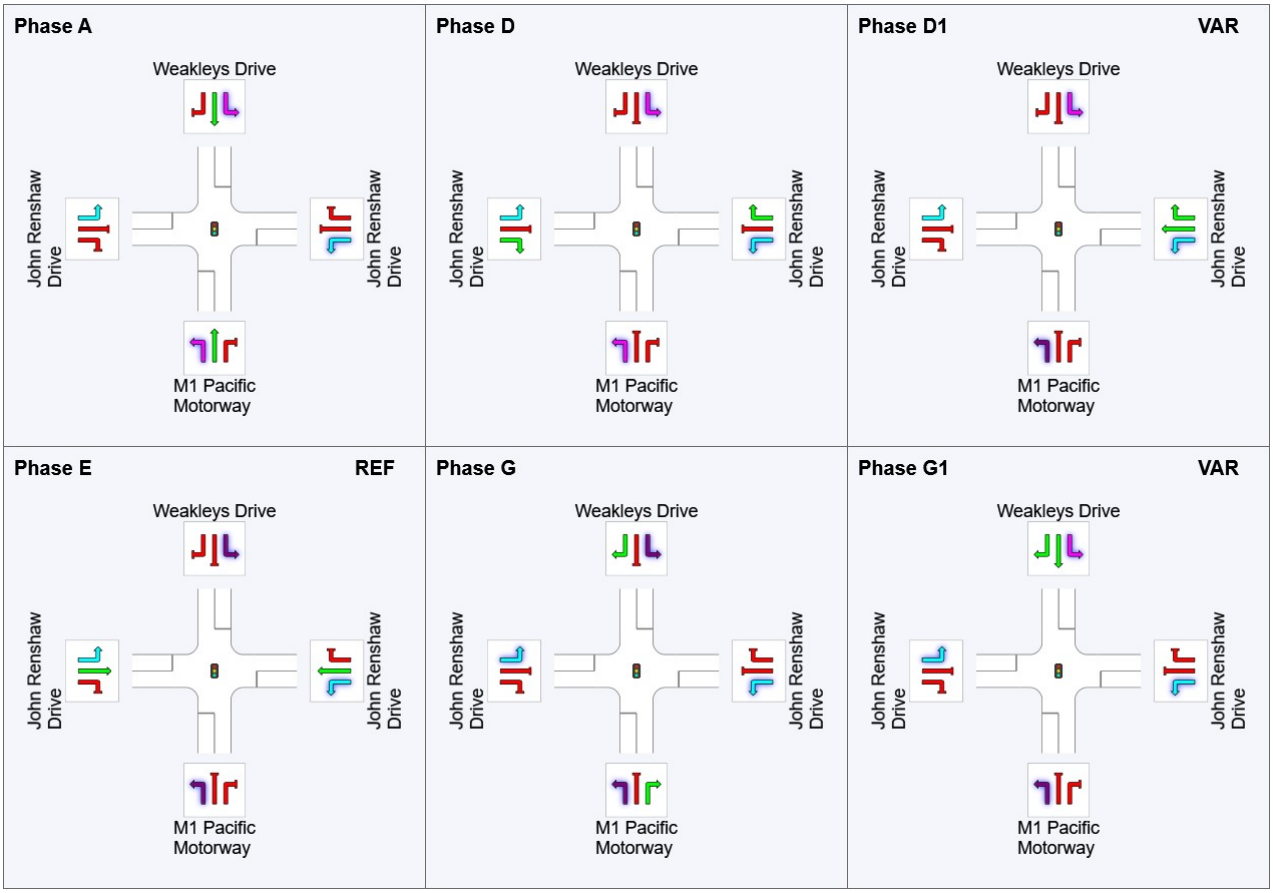
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	13	25.0	13	25.0	0.784	61.9	LOS E	7.3	56.6	1.00	0.99	1.16	22.3
2	T1	460	11.9	460	11.9	*0.784	51.1	LOS D	7.3	56.6	1.00	0.96	1.16	32.9
3	R2	427	11.8	427	11.8	0.602	45.9	LOS D	6.1	47.0	0.96	0.82	0.96	34.4
Approach		900	12.0	900	12.0	0.784	48.8	LOS D	7.3	56.6	0.98	0.89	1.07	33.5
East: John Renshaw Drive														
4	L2	488	34.1	488	34.1	0.323	6.1	LOS A	0.0	0.0	0.00	0.51	0.00	53.6
5	T1	893	18.6	893	18.6	0.688	35.0	LOS C	9.2	74.8	0.93	0.80	0.94	28.8
6	R2	287	8.1	287	8.1	*0.736	56.5	LOS D	4.5	33.8	1.00	0.88	1.16	31.1
Approach		1668	21.3	1668	21.3	0.736	30.2	LOS C	9.2	74.8	0.67	0.73	0.70	36.0
North: Weakleys Drive														
7	L2	81	53.2	81	53.2	0.573	34.6	LOS C	5.3	44.6	0.89	0.87	0.89	39.2
8	T1	667	11.2	667	11.2	0.574	35.6	LOS C	6.3	48.4	0.93	0.81	0.93	38.2
9	R2	676	21.5	676	21.5	*0.799	48.1	LOS D	10.4	85.9	1.00	0.93	1.13	23.9
Approach		1424	18.5	1424	18.5	0.799	41.5	LOS C	10.4	85.9	0.96	0.87	1.02	32.2
West: John Renshaw Drive														
10	L2	415	20.1	415	20.1	0.253	6.9	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	961	13.8	961	13.8	*0.770	41.6	LOS C	9.2	72.2	0.97	0.88	1.04	41.7
12	R2	75	0.0	75	0.0	0.664	57.4	LOS E	2.3	16.4	1.00	0.79	1.07	37.2
Approach		1451	14.9	1451	14.9	0.770	32.5	LOS C	9.2	72.2	0.69	0.77	0.75	44.7
All Vehicles		5443	17.3	5443	17.3	0.799	36.9	LOS C	10.4	85.9	0.80	0.80	0.86	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

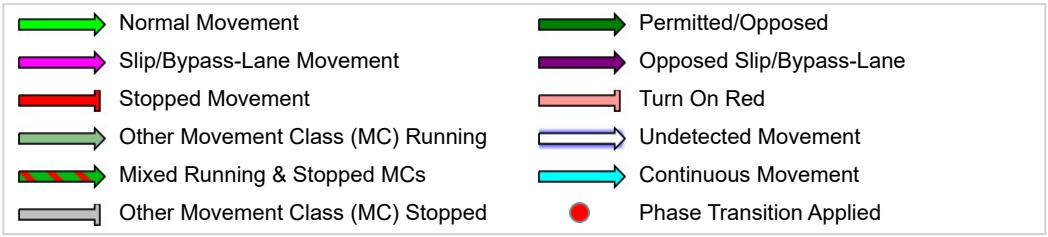
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D1	E	G	G1
Phase Change Time (sec)	61	83	95	0	29	55
Green Time (sec)	16	6	***	23	20	***
Phase Time (sec)	22	12	5	29	26	6
Phase Split	22%	12%	5%	29%	26%	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%.

*** 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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 AM (Site Folder: Scenario 4)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	114	20.4	114	20.4	0.151	21.4	LOS B	2.0	16.1	0.61	0.69	0.61	32.0
3	R2	342	20.0	342	20.0	* 0.744	53.5	LOS D	5.3	43.7	1.00	0.89	1.15	20.6
Approach		456	20.1	456	20.1	0.744	45.5	LOS D	5.3	43.7	0.90	0.84	1.02	22.6
East: John Renshaw Drive														
4	L2	351	20.1	351	20.1	0.214	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	76.7
5	T1	1072	19.8	1072	19.8	* 0.731	14.1	LOS A	10.6	87.2	0.67	0.60	0.67	73.2
Approach		1422	19.9	1422	19.9	0.731	12.9	LOS A	10.6	87.2	0.51	0.61	0.51	74.3
West: John Renshaw Drive														
11	T1	1109	13.3	1109	13.3	0.457	8.3	LOS A	7.0	54.8	0.46	0.42	0.46	62.8
12	R2	226	20.0	226	20.0	* 0.725	52.6	LOS D	6.8	56.0	1.00	0.86	1.09	31.1
Approach		1336	14.4	1336	14.4	0.725	15.8	LOS B	7.0	56.0	0.55	0.49	0.57	47.5
All Vehicles		3214	17.7	3214	17.7	0.744	18.7	LOS B	10.6	87.2	0.58	0.59	0.61	55.1

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

* Critical Movement (Signal Timing)

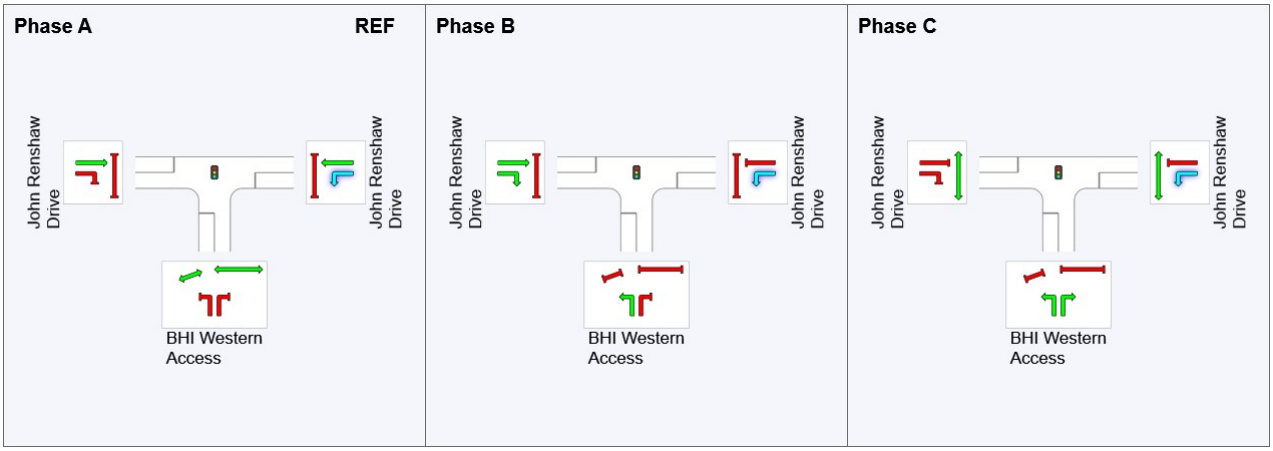
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

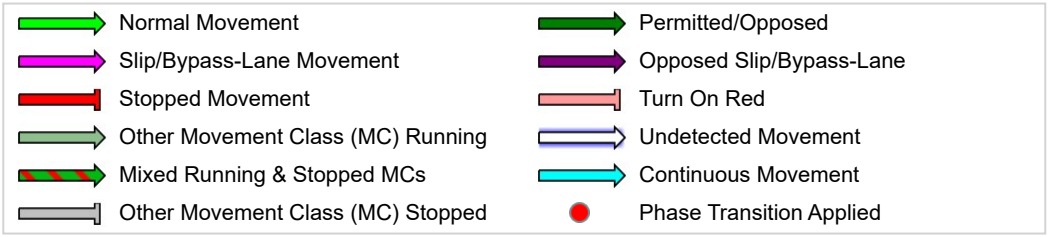
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	37	85	10
Green Time (sec)	42	19	21
Phase Time (sec)	48	25	27
Phase Split	48%	25%	27%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 AM (Site Folder: Scenario 4)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	54	19.6	54	19.6	0.093	28.0	LOS B	1.1	8.8	0.70	0.69	0.70	28.7
3	R2	160	19.7	160	19.7	* 0.486	53.2	LOS D	2.4	19.6	0.99	0.77	0.99	20.7
Approach		214	19.7	214	19.7	0.486	46.9	LOS D	2.4	19.6	0.92	0.75	0.92	22.3
East: John Renshaw Drive														
4	L2	237	20.0	237	20.0	0.144	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
5	T1	948	19.9	948	19.9	* 0.513	3.6	LOS A	2.7	22.0	0.16	0.14	0.16	84.2
Approach		1185	19.9	1185	19.9	0.513	4.8	LOS A	2.7	22.0	0.12	0.24	0.12	76.2
West: John Renshaw Drive														
11	T1	1176	13.7	1176	13.7	0.458	6.6	LOS A	7.4	58.2	0.46	0.42	0.46	87.4
12	R2	105	20.0	105	20.0	* 0.534	55.3	LOS D	3.1	25.5	0.99	0.79	0.99	46.4
Approach		1281	14.2	1281	14.2	0.534	10.6	LOS A	7.4	58.2	0.51	0.45	0.51	79.6
All Vehicles		2680	17.2	2680	17.2	0.534	10.9	LOS A	7.4	58.2	0.37	0.38	0.37	70.3

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

* Critical Movement (Signal Timing)

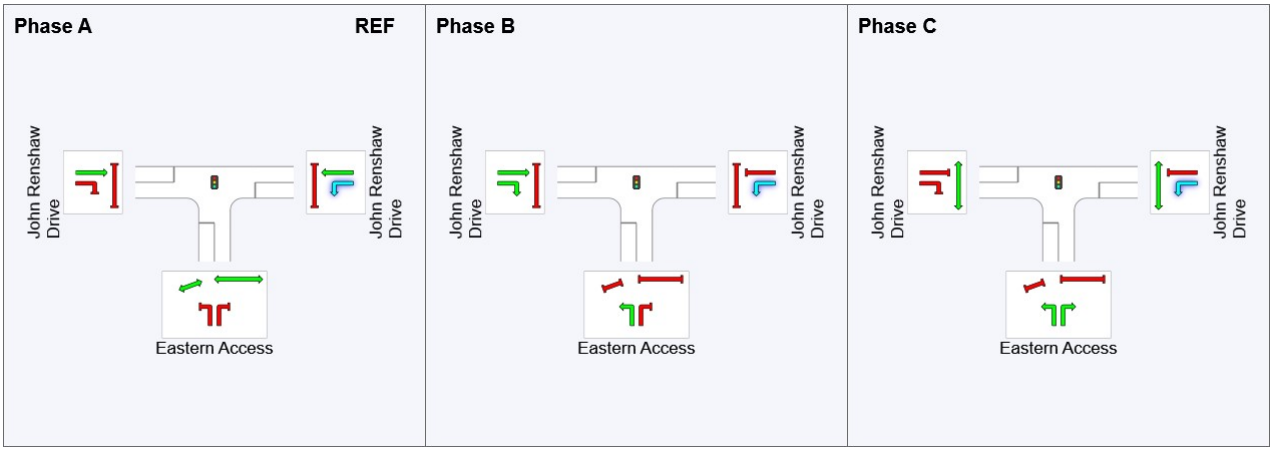
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

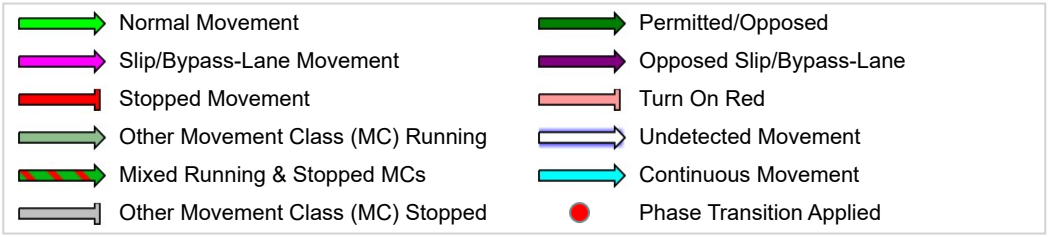
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	52	11	29
Green Time (sec)	53	12	17
Phase Time (sec)	59	18	23
Phase Split	59%	18%	23%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 AM (Site Folder: Scenario 4)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

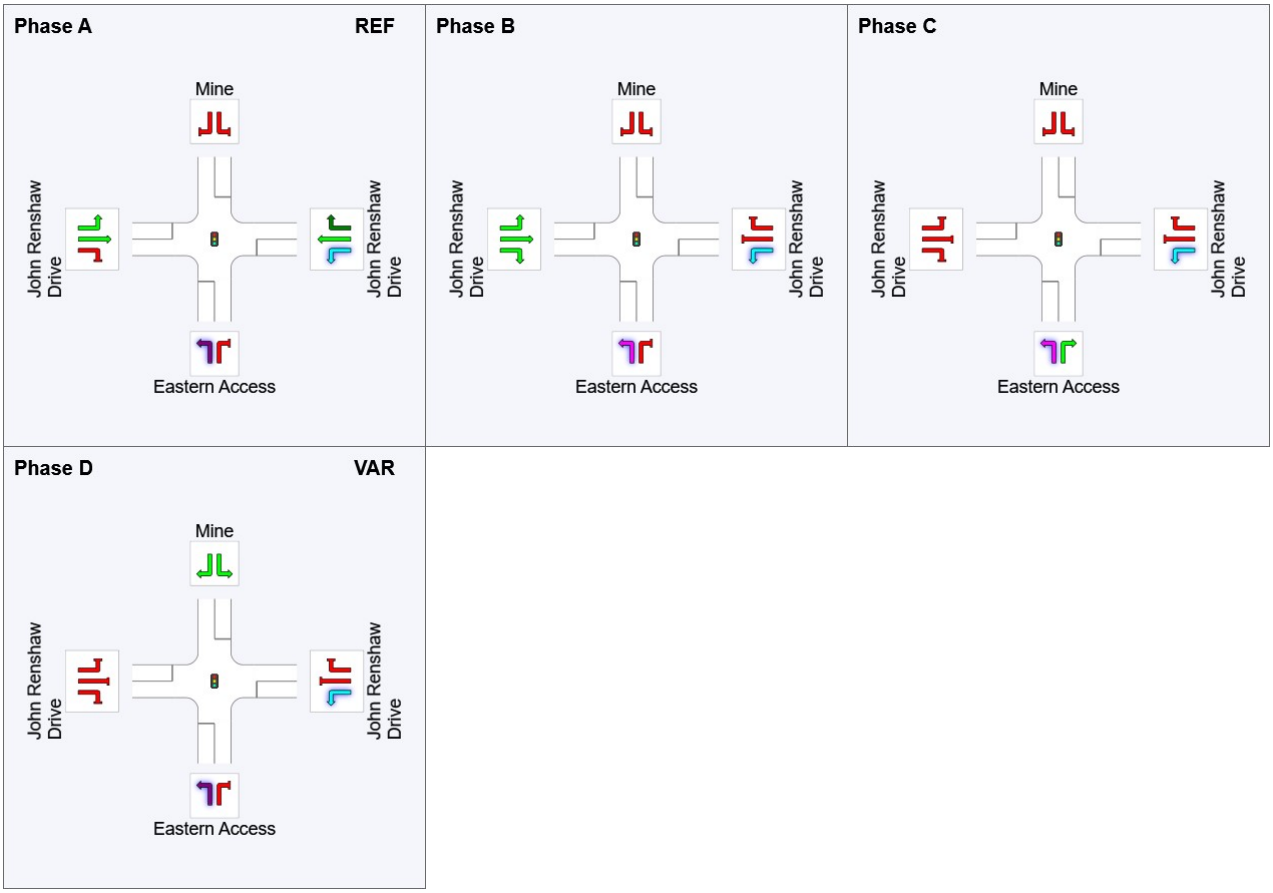
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	60	19.3	60	19.3	0.040	5.0	LOS A	0.1	1.0	0.10	0.52	0.10	53.0
3	R2	180	19.9	180	19.9	* 0.487	44.7	LOS D	2.2	17.7	0.98	0.77	0.98	23.4
Approach		240	19.7	240	19.7	0.487	34.7	LOS C	2.2	17.7	0.76	0.71	0.76	30.0
East: John Renshaw Drive														
4	L2	265	19.8	265	19.8	0.161	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	78.9
5	T1	737	19.9	737	19.9	* 0.375	10.4	LOS A	4.9	39.9	0.59	0.52	0.59	86.0
6	R2	1	0.0	1	0.0	0.004	19.9	LOS B	0.0	0.1	0.54	0.65	0.54	62.2
Approach		1003	19.8	1003	19.8	0.375	10.2	LOS A	4.9	39.9	0.44	0.55	0.44	83.9
North: Mine														
7	L2	1	0.0	1	0.0	0.045	57.4	LOS E	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	55.6	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.386	10.6	LOS A	4.0	30.9	0.33	0.30	0.33	63.1
11	T1	1101	13.2	1101	13.2	0.386	4.5	LOS A	4.0	30.9	0.33	0.30	0.33	87.1
12	R2	118	19.6	118	19.6	* 0.478	43.8	LOS D	2.7	22.2	0.96	0.79	0.96	37.2
Approach		1220	13.8	1220	13.8	0.478	8.3	LOS A	4.0	31.0	0.39	0.34	0.39	70.7
All Vehicles		2465	16.8	2465	16.8	0.487	11.7	LOS A	4.9	39.9	0.45	0.46	0.45	72.5

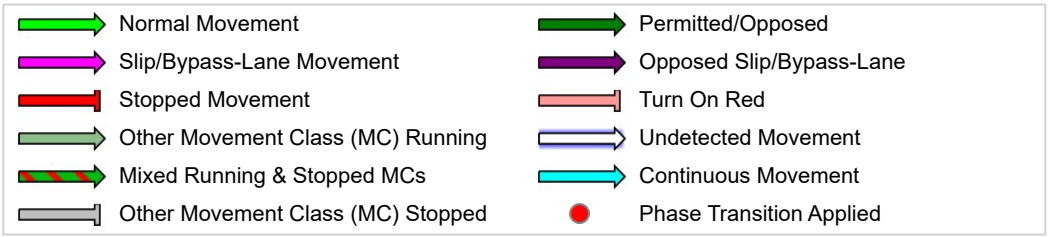
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	46	64	79
Green Time (sec)	45	12	9	1
Phase Time (sec)	51	18	9	2
Phase Split	64%	23%	11%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 4 (with black hill ramps, 100% development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 4.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 4 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 PM (Site Folder: Scenario 4)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

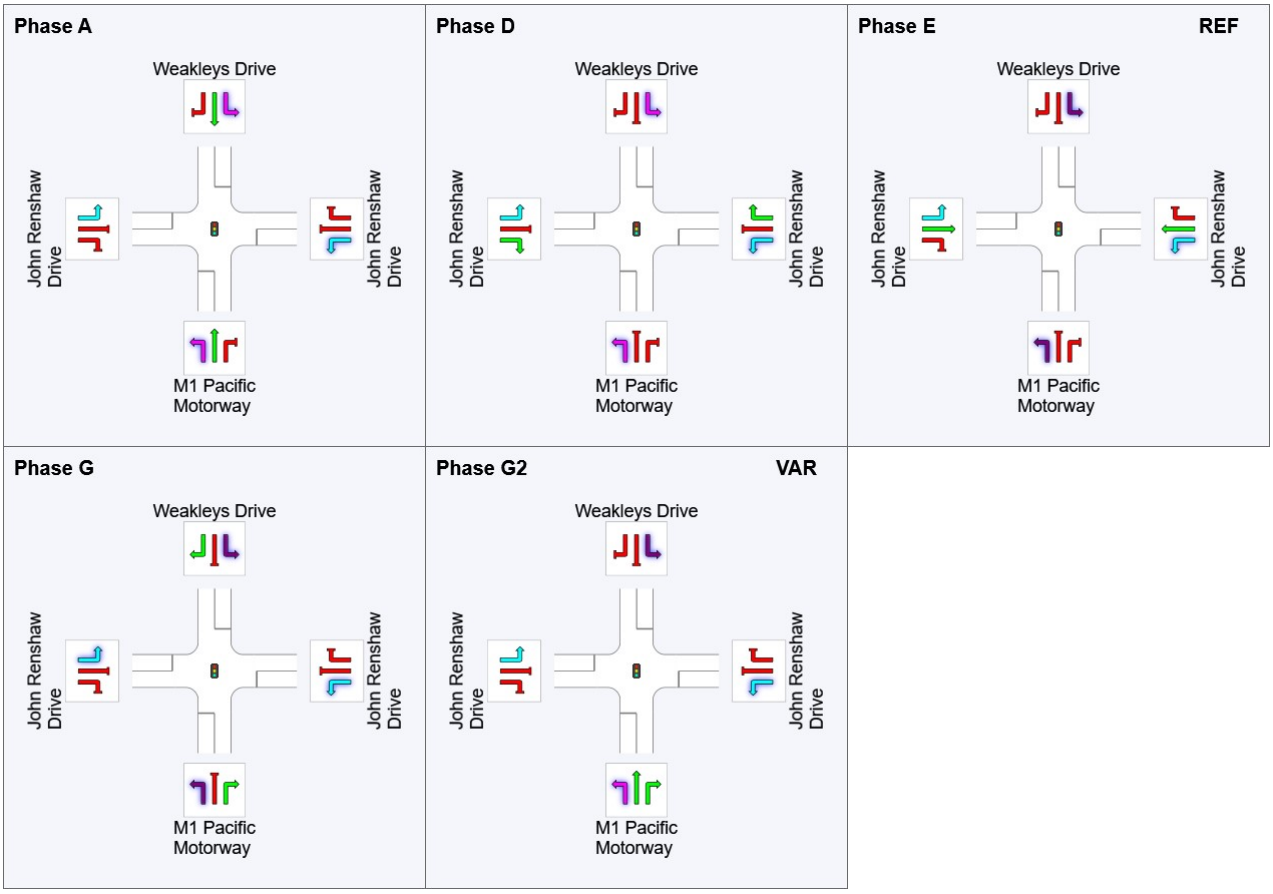
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	1	0.0	1	0.0	0.600	55.6	LOS D	6.5	48.3	0.95	0.82	0.95	23.9
2	T1	474	7.3	474	7.3	0.600	43.7	LOS D	6.5	48.6	0.95	0.81	0.95	35.2
3	R2	926	20.2	926	20.2	*0.918	61.1	LOS E	17.5	143.8	1.00	1.06	1.36	30.1
Approach		1401	15.9	1401	15.9	0.918	55.2	LOS D	17.5	143.8	0.98	0.98	1.22	31.6
East: John Renshaw Drive														
4	L2	564	13.8	564	13.8	0.330	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	54.3
5	T1	956	11.3	956	11.3	0.824	43.1	LOS D	11.4	87.5	0.98	0.92	1.11	25.7
6	R2	75	26.8	75	26.8	*0.395	58.8	LOS E	1.2	10.1	1.00	0.73	1.00	30.4
Approach		1595	12.9	1595	12.9	0.824	30.6	LOS C	11.4	87.5	0.63	0.77	0.71	35.3
North: Weakleys Drive														
7	L2	41	20.5	41	20.5	0.882	66.4	LOS E	10.0	73.7	1.00	1.15	1.33	29.8
8	T1	807	4.7	807	4.7	*0.883	57.6	LOS E	10.0	73.7	1.00	1.07	1.34	31.2
9	R2	528	15.9	528	15.9	0.627	42.4	LOS C	7.2	57.0	0.94	0.83	0.94	25.7
Approach		1377	9.5	1377	9.5	0.883	52.0	LOS D	10.0	73.7	0.98	0.98	1.19	29.6
West: John Renshaw Drive														
10	L2	595	15.4	595	15.4	0.352	6.8	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	1183	16.1	1183	16.1	*0.924	55.2	LOS D	14.1	112.0	1.00	1.09	1.33	37.9
12	R2	19	0.0	19	0.0	0.168	54.9	LOS D	0.6	3.9	0.95	0.69	0.95	37.8
Approach		1797	15.7	1797	15.7	0.924	39.2	LOS C	14.1	112.0	0.67	0.90	0.88	42.5
All Vehicles		6169	13.6	6169	13.6	0.924	43.5	LOS D	17.5	143.8	0.80	0.90	0.98	35.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

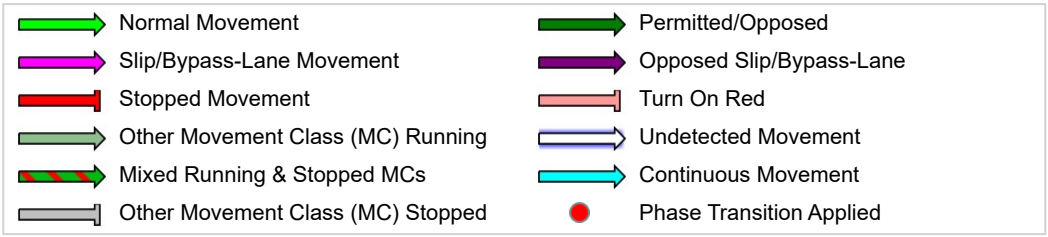
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	E	G	G2
Phase Change Time (sec)	66	88	0	30	61
Green Time (sec)	16	6	24	25	***
Phase Time (sec)	22	12	30	31	5
Phase Split	22%	12%	30%	31%	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%.

*** 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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 PM (Site Folder: Scenario 4)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	238	15.5	238	15.5	0.293	21.4	LOS B	4.3	33.9	0.64	0.72	0.64	31.9
3	R2	716	15.4	716	15.4	* 0.814	47.8	LOS D	11.1	88.2	1.00	0.94	1.15	22.0
Approach		954	15.5	954	15.5	0.814	41.3	LOS C	11.1	88.2	0.91	0.89	1.03	23.8
East: John Renshaw Drive														
4	L2	187	15.7	187	15.7	0.111	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	77.8
5	T1	1216	12.4	1216	12.4	* 0.833	10.2	LOS A	11.6	89.8	0.61	0.56	0.64	79.0
Approach		1403	12.8	1403	12.8	0.833	10.1	LOS A	11.6	89.8	0.53	0.57	0.56	78.8
West: John Renshaw Drive														
11	T1	1082	15.8	1082	15.8	0.550	14.3	LOS A	8.9	71.0	0.60	0.54	0.60	49.6
12	R2	120	15.8	120	15.8	* 0.791	63.0	LOS E	3.9	31.3	1.00	0.87	1.28	28.3
Approach		1202	15.8	1202	15.8	0.791	19.2	LOS B	8.9	71.0	0.64	0.57	0.67	43.1
All Vehicles		3559	14.5	3559	14.5	0.833	21.5	LOS B	11.6	89.8	0.67	0.66	0.72	49.1

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

* Critical Movement (Signal Timing)

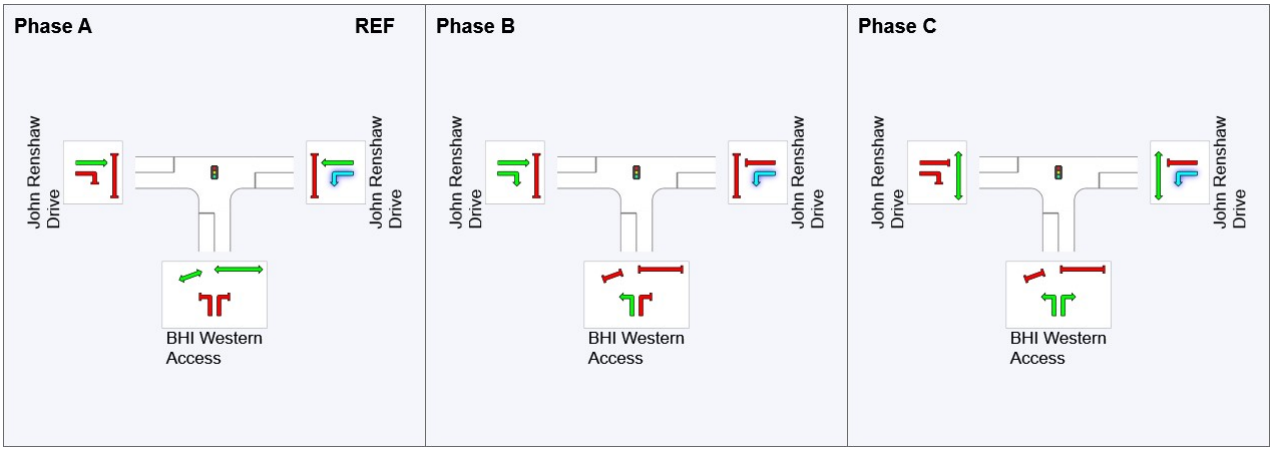
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

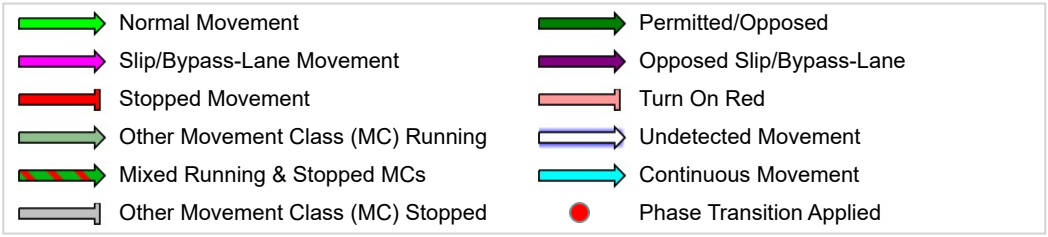
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	41	87	2
Green Time (sec)	40	9	33
Phase Time (sec)	46	15	39
Phase Split	46%	15%	39%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 PM (Site Folder: Scenario 4)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	106	15.8	106	15.8	0.203	32.1	LOS C	2.3	18.7	0.78	0.73	0.78	27.1
3	R2	239	15.4	239	15.4	* 0.589	51.9	LOS D	3.6	28.2	0.99	0.80	1.01	21.0
Approach		345	15.5	345	15.5	0.589	45.8	LOS D	3.6	28.2	0.93	0.78	0.94	22.6
East: John Renshaw Drive														
4	L2	182	15.6	182	15.6	0.108	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	66.7
5	T1	1272	12.5	1272	12.5	* 0.612	6.1	LOS A	5.6	43.3	0.26	0.23	0.26	78.6
Approach		1454	12.9	1454	12.9	0.612	6.5	LOS A	5.6	43.3	0.22	0.28	0.22	75.3
West: John Renshaw Drive														
11	T1	963	15.8	963	15.8	0.391	7.0	LOS A	6.0	47.8	0.46	0.41	0.46	86.8
12	R2	61	15.5	61	15.5	* 0.602	62.6	LOS E	2.0	15.5	1.00	0.78	1.09	44.1
Approach		1024	15.8	1024	15.8	0.602	10.3	LOS A	6.0	47.8	0.49	0.43	0.49	80.5
All Vehicles		2823	14.3	2823	14.3	0.612	12.7	LOS A	6.0	47.8	0.41	0.40	0.41	65.2

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

* Critical Movement (Signal Timing)

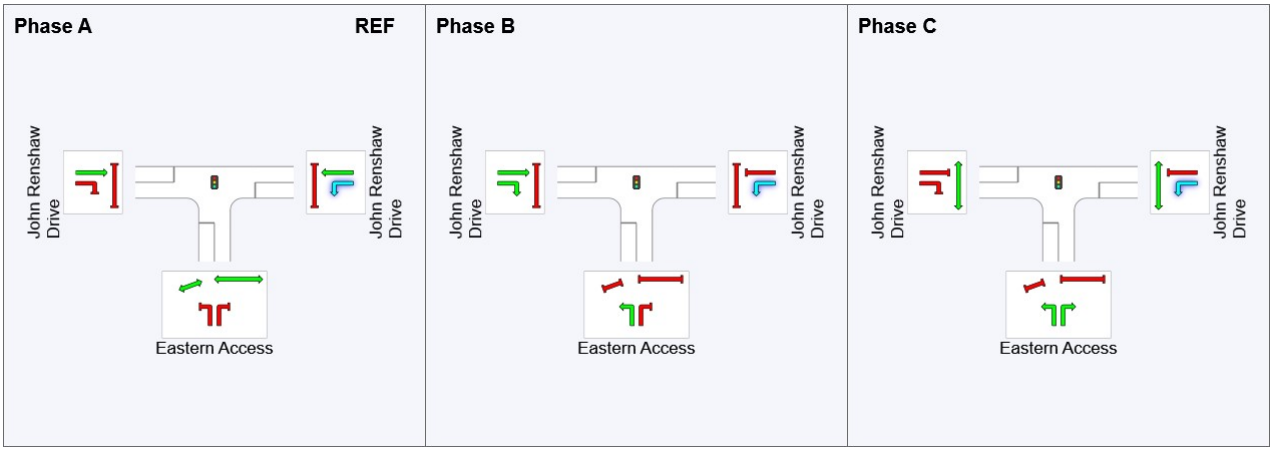
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

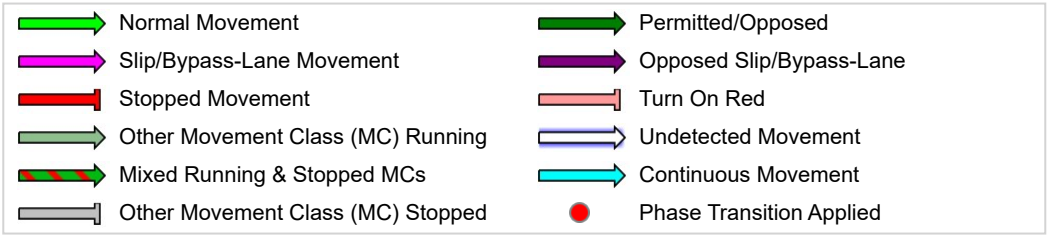
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	20	32
Green Time (sec)	57	6	19
Phase Time (sec)	63	12	25
Phase Split	63%	12%	25%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 PM (Site Folder: Scenario 4)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 4)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

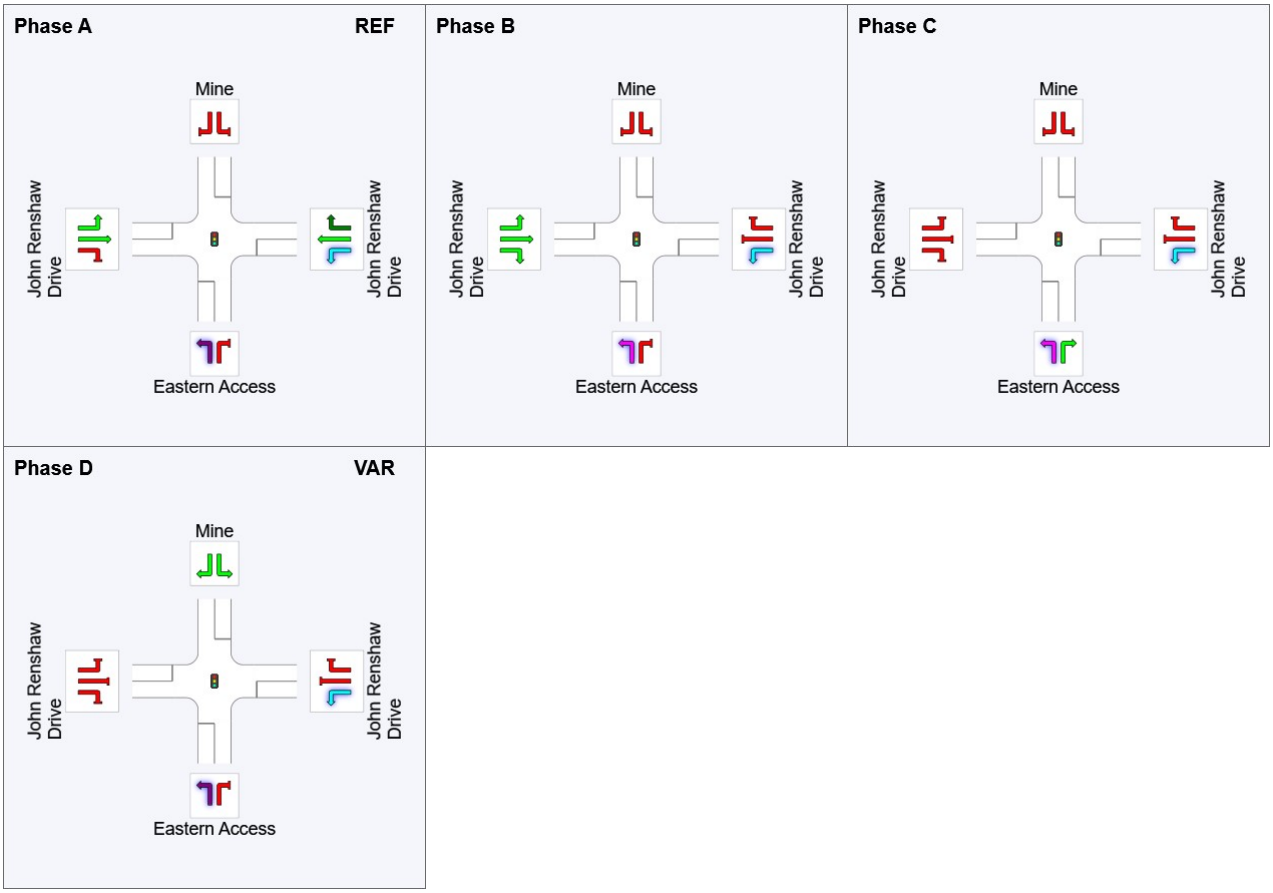
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	119	15.9	119	15.9	0.078	5.0	LOS A	0.3	2.1	0.11	0.53	0.11	53.6
3	R2	268	15.3	268	15.3	* 0.555	37.6	LOS C	2.8	22.0	0.98	0.79	0.98	25.4
Approach		387	15.5	387	15.5	0.555	27.6	LOS B	2.8	22.0	0.71	0.71	0.72	33.6
East: John Renshaw Drive														
4	L2	203	15.5	203	15.5	0.120	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	79.8
5	T1	1175	12.3	1175	12.3	* 0.563	10.2	LOS A	7.8	60.3	0.68	0.61	0.68	86.2
6	R2	1	0.0	1	0.0	0.003	16.8	LOS B	0.0	0.1	0.50	0.64	0.50	64.2
Approach		1379	12.7	1379	12.7	0.563	10.1	LOS A	7.8	60.3	0.58	0.61	0.58	85.1
North: Mine														
7	L2	1	0.0	1	0.0	0.040	49.5	LOS D	0.0	0.2	1.00	0.57	1.00	21.9
9	R2	1	0.0	1	0.0	* 0.040	47.6	LOS D	0.0	0.2	1.00	0.57	1.00	34.3
Approach		2	0.0	2	0.0	0.040	48.5	LOS D	0.0	0.2	1.00	0.57	1.00	28.8
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.285	11.0	LOS A	2.6	20.4	0.35	0.31	0.35	62.7
11	T1	756	15.9	756	15.9	0.285	4.1	LOS A	2.6	20.4	0.35	0.31	0.35	85.6
12	R2	67	15.6	67	15.6	* 0.466	44.2	LOS D	1.5	11.6	0.99	0.76	0.99	37.0
Approach		824	15.8	824	15.8	0.466	7.4	LOS A	2.6	20.4	0.40	0.34	0.40	71.6
All Vehicles		2593	14.1	2593	14.1	0.563	11.9	LOS A	7.8	60.3	0.54	0.54	0.54	73.7

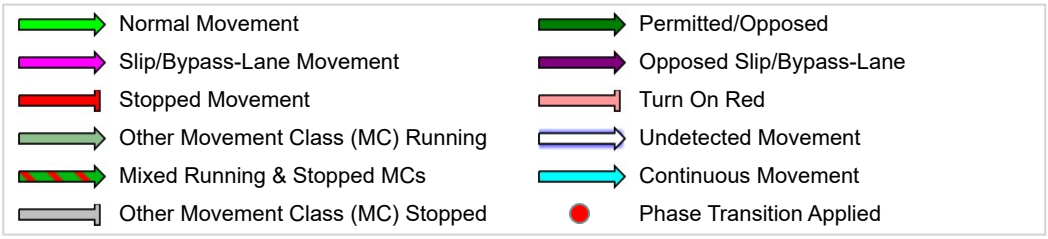
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	41	53	69
Green Time (sec)	40	6	10	1
Phase Time (sec)	46	12	10	2
Phase Split	66%	17%	14%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 4 (with black hill ramps, 100% development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 4.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 AM (Site Folder: Scenario 5)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, E, G
(* Variable Phase)

Vehicle Movement Performance

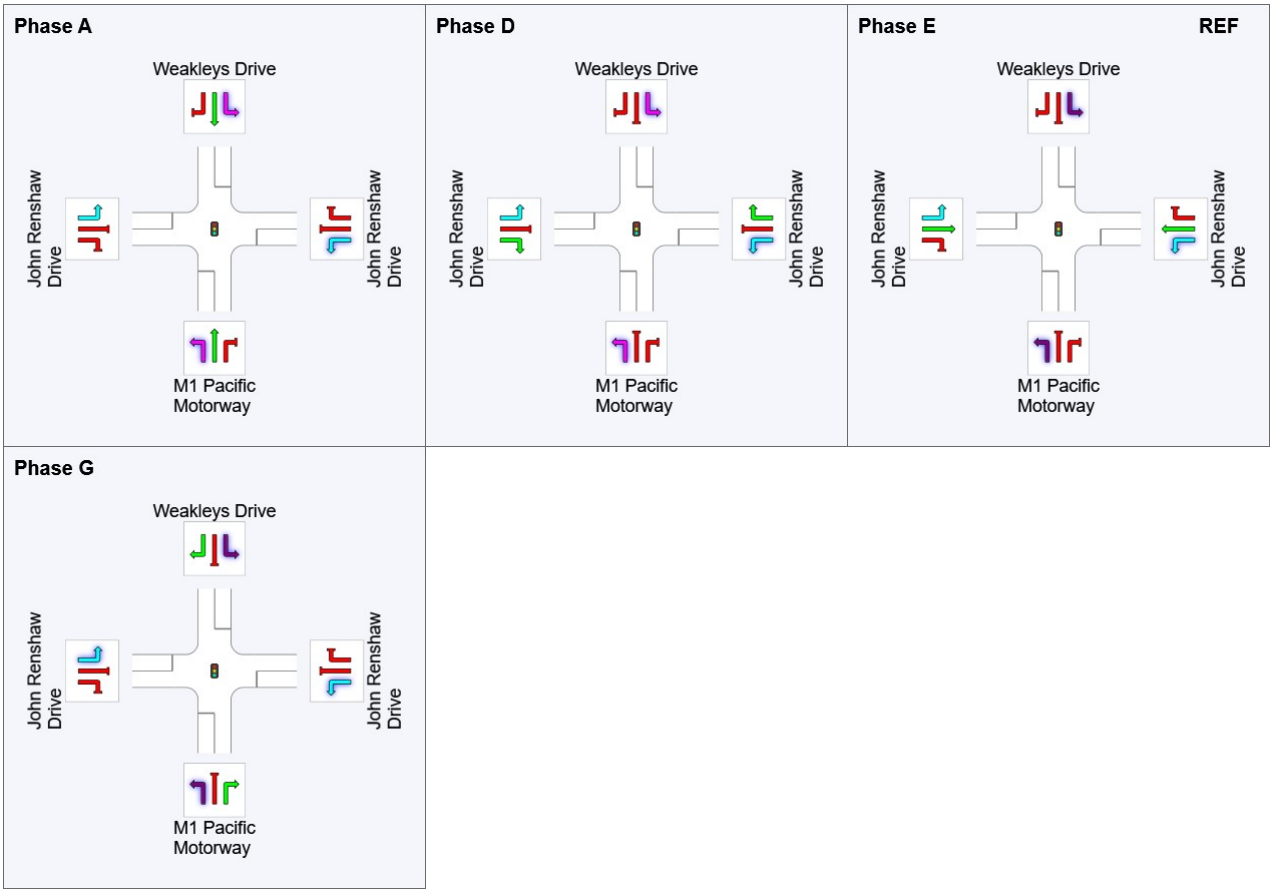
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	387	20.1	387	20.1	0.630	20.2	LOS B	9.6	77.2	0.73	0.81	0.73	39.6
2	T1	460	11.9	460	11.9	* 0.630	27.3	LOS B	9.6	77.2	0.86	0.80	0.86	41.0
3	R2	427	11.8	427	11.8	0.634	47.0	LOS D	6.2	47.8	0.97	0.82	0.98	34.0
Approach		1275	14.4	1275	14.4	0.634	31.7	LOS C	9.6	77.2	0.86	0.81	0.86	37.7
East: John Renshaw Drive														
4	L2	488	34.1	488	34.1	0.323	6.1	LOS A	0.0	0.0	0.00	0.51	0.00	53.6
5	T1	599	18.1	599	18.1	0.679	42.1	LOS C	6.6	53.3	0.97	0.82	1.00	26.0
6	R2	287	8.1	287	8.1	0.540	49.5	LOS D	4.1	30.8	0.97	0.80	0.97	33.1
Approach		1375	21.7	1375	21.7	0.679	30.8	LOS C	6.6	53.3	0.63	0.71	0.64	36.6
North: Weakleys Drive														
7	L2	81	53.2	81	53.2	0.551	33.7	LOS C	5.3	44.2	0.88	0.86	0.88	39.6
8	T1	667	11.2	667	11.2	0.551	34.7	LOS C	6.2	47.9	0.92	0.80	0.92	38.5
9	R2	440	22.2	440	22.2	* 0.715	49.6	LOS D	6.6	54.6	0.99	0.87	1.07	23.5
Approach		1188	18.2	1188	18.2	0.715	40.1	LOS C	6.6	54.6	0.94	0.83	0.97	33.6
West: John Renshaw Drive														
10	L2	297	19.9	297	19.9	0.181	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	726	11.9	726	11.9	* 0.697	42.5	LOS C	6.9	52.8	0.96	0.83	1.00	41.5
12	R2	184	12.0	184	12.0	* 0.710	55.9	LOS D	5.7	43.8	1.00	0.84	1.05	37.4
Approach		1207	13.9	1207	13.9	0.710	35.7	LOS C	6.9	52.8	0.73	0.75	0.76	43.5
All Vehicles		5045	17.1	5045	17.1	0.715	34.4	LOS C	9.6	77.2	0.78	0.77	0.80	38.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).

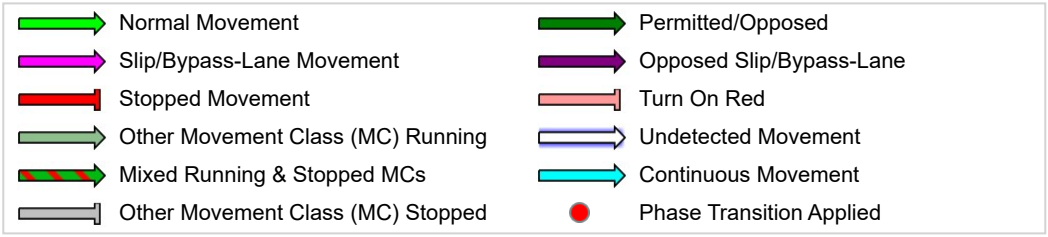
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	E	G
Phase Change Time (sec)	50	79	0	25
Green Time (sec)	23	15	19	19
Phase Time (sec)	29	21	25	25
Phase Split	29%	21%	25%	25%

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%.

Site: 101 [John Renshaw Drive/ BHI western access 2038 AM (Site Folder: Scenario 5)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	35	21.2	35	21.2	0.076	33.2	LOS C	0.8	6.3	0.77	0.69	0.77	26.7
3	R2	139	19.7	139	19.7	* 0.528	55.7	LOS D	2.1	17.5	1.00	0.77	1.01	20.1
Approach		174	20.0	174	20.0	0.528	51.2	LOS D	2.1	17.5	0.95	0.75	0.96	21.2
East: John Renshaw Drive														
4	L2	271	19.8	271	19.8	0.165	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	76.8
5	T1	1157	19.9	1157	19.9	* 0.553	4.1	LOS A	4.9	40.2	0.25	0.22	0.25	90.3
Approach		1427	19.9	1427	19.9	0.553	5.1	LOS A	4.9	40.2	0.20	0.30	0.20	86.4
West: John Renshaw Drive														
11	T1	1067	13.0	1067	13.0	0.402	4.6	LOS A	4.5	35.3	0.31	0.28	0.31	75.5
12	R2	67	20.3	67	20.3	* 0.587	61.4	LOS E	2.1	17.6	1.00	0.78	1.07	28.7
Approach		1135	13.5	1135	13.5	0.587	7.9	LOS A	4.5	35.3	0.35	0.31	0.36	62.7
All Vehicles		2736	17.2	2736	17.2	0.587	9.2	LOS A	4.9	40.2	0.31	0.33	0.31	71.7

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

* Critical Movement (Signal Timing)

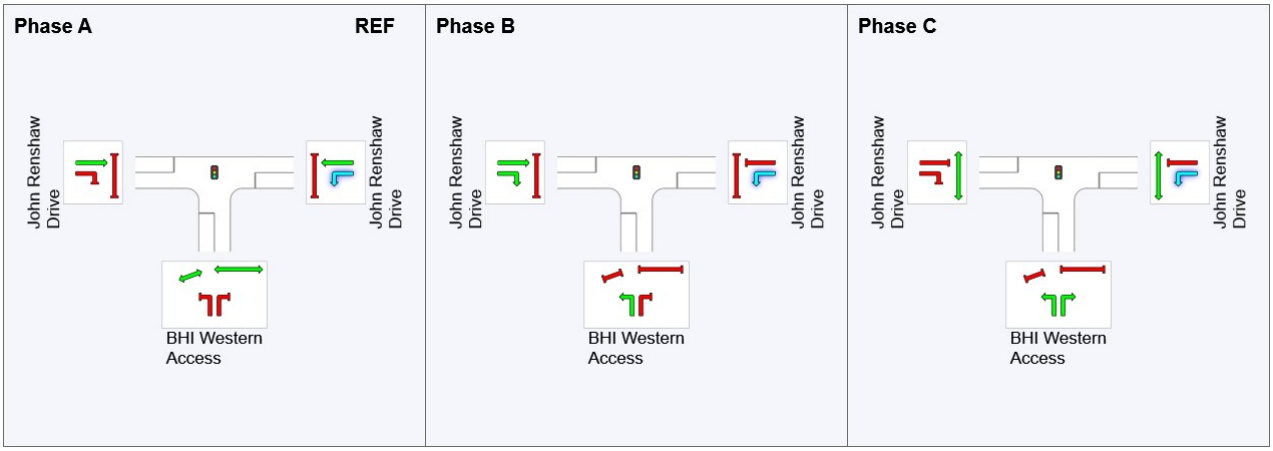
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

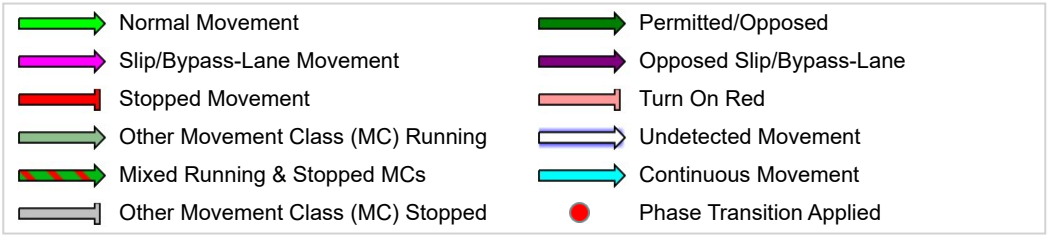
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	8	21
Green Time (sec)	60	7	15
Phase Time (sec)	66	13	21
Phase Split	66%	13%	21%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 AM (Site Folder: Scenario 5)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	54	19.6	54	19.6	0.080	23.8	LOS B	1.0	7.9	0.64	0.67	0.64	30.7
3	R2	214	20.2	214	20.2	* 0.465	49.0	LOS D	3.1	25.1	0.96	0.78	0.96	21.7
Approach		267	20.1	267	20.1	0.465	44.0	LOS D	3.1	25.1	0.90	0.76	0.90	23.0
East: John Renshaw Drive														
4	L2	421	20.0	421	20.0	0.256	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	65.3
5	T1	771	19.8	771	19.8	* 0.470	5.0	LOS A	3.2	26.0	0.21	0.19	0.21	76.4
Approach		1192	19.9	1192	19.9	0.470	6.6	LOS A	3.2	26.0	0.14	0.34	0.14	69.8
West: John Renshaw Drive														
11	T1	921	11.9	921	11.9	0.376	7.7	LOS A	6.0	46.1	0.47	0.42	0.47	85.6
12	R2	105	20.0	105	20.0	* 0.458	52.9	LOS D	3.0	24.7	0.96	0.79	0.96	47.3
Approach		1026	12.7	1026	12.7	0.458	12.3	LOS A	6.0	46.1	0.52	0.46	0.52	77.0
All Vehicles		2485	16.9	2485	16.9	0.470	13.0	LOS A	6.0	46.1	0.38	0.44	0.38	65.2

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

* Critical Movement (Signal Timing)

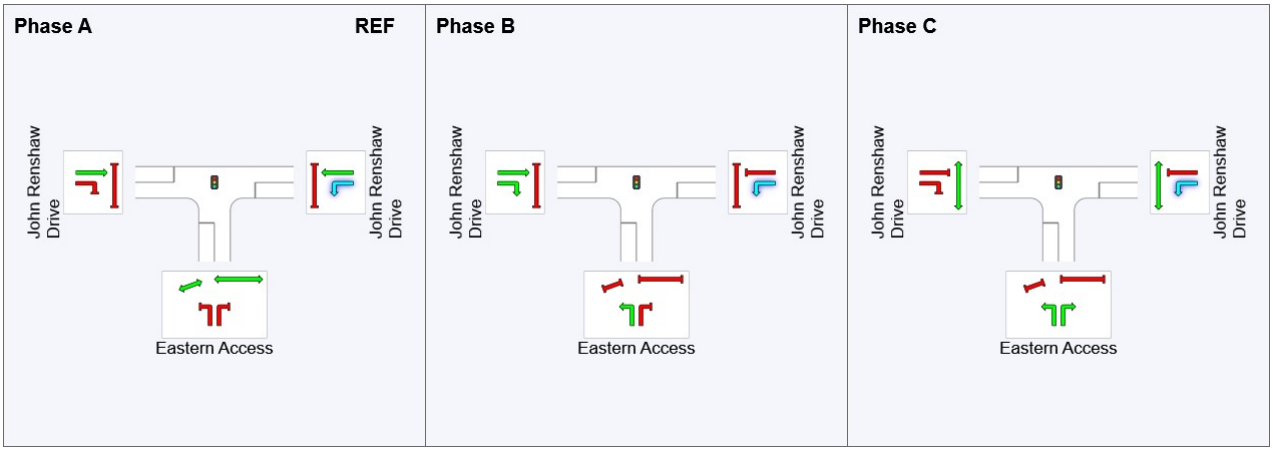
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

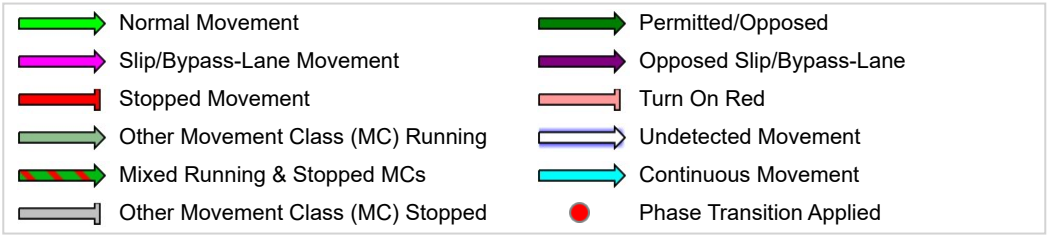
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive										
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	10	30
Green Time (sec)	47	14	21
Phase Time (sec)	53	20	27
Phase Split	53%	20%	27%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 AM (Site Folder: Scenario 5)]

Network: 30 [2038 AM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

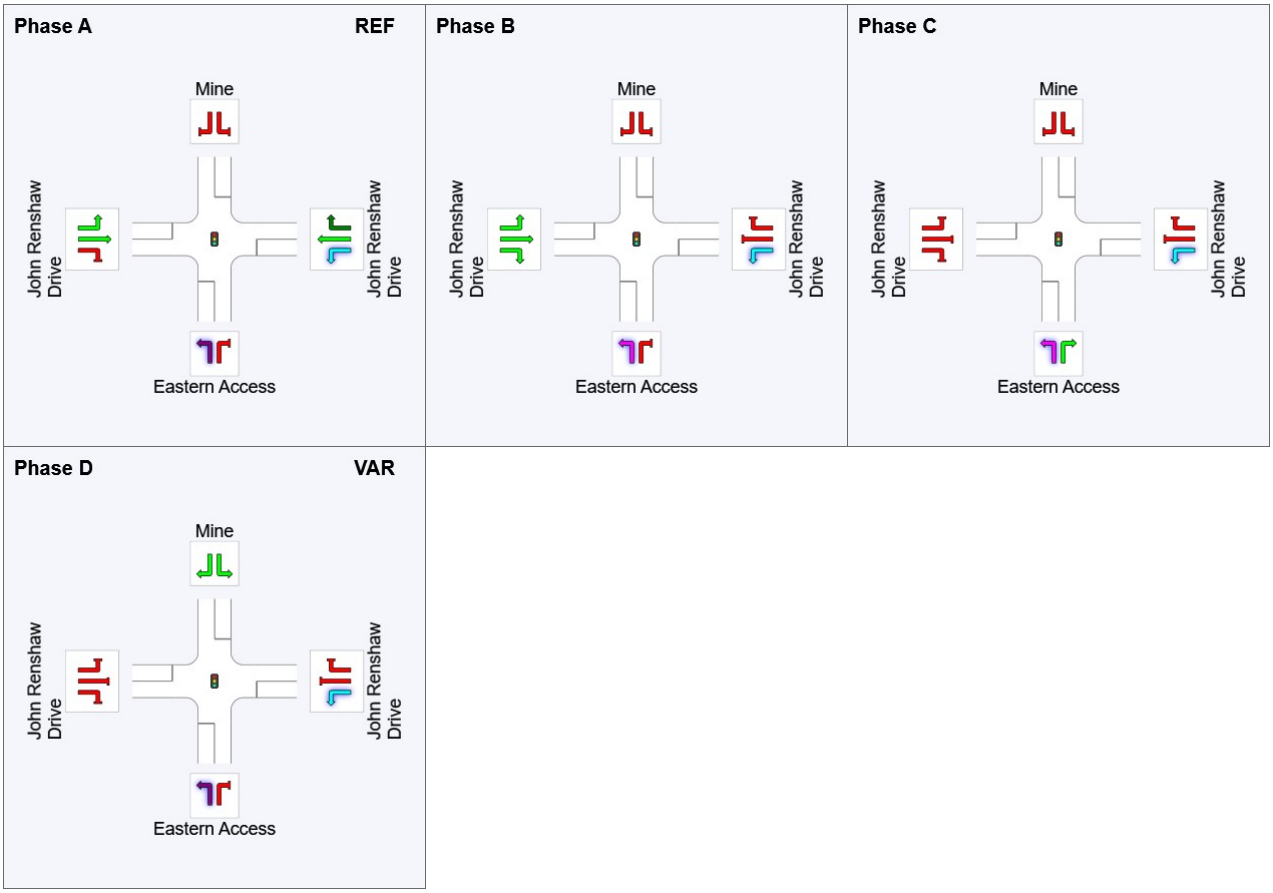
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	21	20.0	21	20.0	0.014	5.0	LOS A	0.0	0.4	0.09	0.51	0.09	52.9
3	R2	84	20.0	84	20.0	* 0.293	45.1	LOS D	1.0	8.3	0.97	0.73	0.97	23.1
Approach		105	20.0	105	20.0	0.293	37.1	LOS C	1.0	8.3	0.80	0.69	0.80	28.3
East: John Renshaw Drive														
4	L2	166	20.3	166	20.3	0.101	9.3	LOS A	0.0	0.0	0.00	0.63	0.00	78.8
5	T1	658	19.8	658	19.8	* 0.290	6.4	LOS A	3.4	27.6	0.46	0.40	0.46	90.8
6	R2	1	0.0	1	0.0	0.003	15.2	LOS B	0.0	0.1	0.42	0.65	0.42	65.2
Approach		825	19.9	825	19.9	0.290	7.0	LOS A	3.4	27.6	0.37	0.45	0.37	88.1
North: Mine														
7	L2	1	0.0	1	0.0	0.045	55.8	LOS D	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	54.9	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.318	9.8	LOS A	2.8	21.7	0.27	0.24	0.27	63.9
11	T1	942	12.1	942	12.1	0.318	3.0	LOS A	2.8	21.7	0.27	0.24	0.27	90.3
12	R2	41	20.5	41	20.5	* 0.287	48.1	LOS D	1.0	8.1	0.97	0.74	0.97	35.6
Approach		984	12.4	984	12.4	0.318	4.9	LOS A	2.8	21.7	0.30	0.26	0.30	80.5
All Vehicles		1917	16.0	1917	16.0	0.318	7.6	LOS A	3.4	27.6	0.36	0.37	0.36	80.6

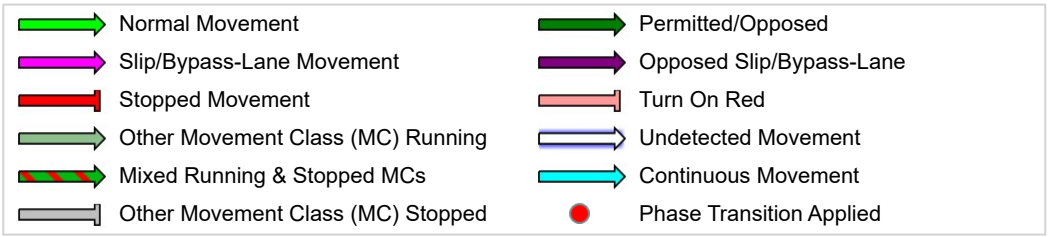
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	53	66	79
Green Time (sec)	52	7	7	1
Phase Time (sec)	58	13	7	2
Phase Split	73%	16%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 5 (50% total development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 PM (Site Folder: Scenario 5)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	149	15.5	149	15.5	0.598	33.1	LOS C	7.4	56.7	0.87	0.89	0.87	31.8
2	T1	474	7.3	474	7.3	0.598	32.5	LOS C	7.4	56.7	0.91	0.84	0.91	38.9
3	R2	926	20.2	926	20.2	* 1.020	105.5	LOS F	23.6	193.8	1.00	1.30	1.81	22.0
Approach		1549	15.8	1549	15.8	1.020	76.2	LOS F	23.6	193.8	0.96	1.12	1.45	26.1
East: John Renshaw Drive														
4	L2	564	13.8	564	13.8	0.330	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	54.3
5	T1	764	10.2	764	10.2	* 1.046	99.6	LOS F	15.0	114.3	1.00	1.29	1.80	14.4
6	R2	75	26.8	75	26.8	0.395	58.8	LOS E	1.2	10.1	1.00	0.73	1.00	30.4
Approach		1403	12.5	1403	12.5	1.046	59.7	LOS E	15.0	114.3	0.60	0.95	1.03	25.7
North: Weakleys Drive														
7	L2	41	20.5	41	20.5	1.001	70.9	LOS F	11.8	87.2	1.00	1.14	1.81	22.7
8	T1	807	4.7	807	4.7	* 1.002	82.4	LOS F	12.0	87.3	1.00	1.24	1.82	23.9
9	R2	401	16.0	401	16.0	0.627	47.1	LOS D	5.7	45.3	0.97	0.82	0.98	24.2
Approach		1249	8.8	1249	8.8	1.002	70.7	LOS F	12.0	87.3	0.99	1.10	1.55	23.9
West: John Renshaw Drive														
10	L2	352	15.3	352	15.3	0.208	6.5	LOS A	0.0	0.0	0.00	0.52	0.00	56.1
11	T1	753	16.5	753	16.5	0.486	31.9	LOS C	5.9	47.0	0.82	0.70	0.82	44.9
12	R2	351	14.7	351	14.7	* 1.032	113.9	LOS F	17.8	140.1	1.00	1.30	1.93	26.9
Approach		1455	15.8	1455	15.8	1.032	45.5	LOS D	17.8	140.1	0.67	0.80	0.89	40.4
All Vehicles		5657	13.5	5657	13.5	1.046	63.0	LOS E	23.6	193.8	0.80	0.99	1.22	29.5

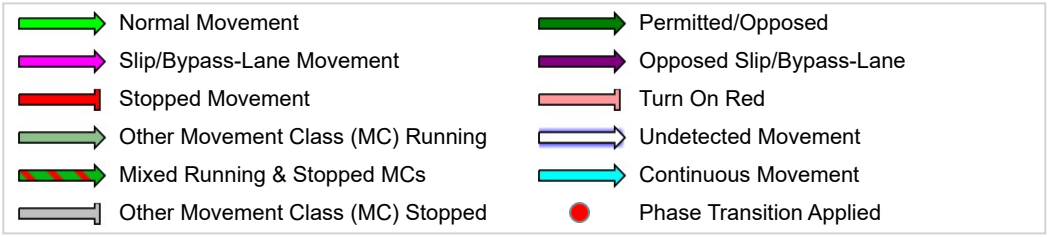
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G	G2
Phase Change Time (sec)	54	74	86	0	21	46
Green Time (sec)	14	6	8	15	19	2
Phase Time (sec)	20	12	14	21	25	8
Phase Split	20%	12%	14%	21%	25%	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%.

Site: 101 [John Renshaw Drive/ BHI western access 2038 PM (Site Folder: Scenario 5)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	72	16.2	72	16.2	0.125	29.0	LOS C	1.5	11.7	0.72	0.70	0.72	28.3
3	R2	286	15.4	286	15.4	* 0.565	48.8	LOS D	4.1	32.7	0.98	0.80	0.98	21.7
Approach		358	15.6	358	15.6	0.565	44.8	LOS D	4.1	32.7	0.93	0.78	0.93	22.8
East: John Renshaw Drive														
4	L2	146	15.8	143	15.9	0.085	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	77.7
5	T1	1168	12.3	1146	12.3	* 0.581	3.1	LOS A	3.6	28.1	0.20	0.18	0.20	92.7
Approach		1315	12.7	1289 N1	12.7	0.581	3.7	LOS A	3.6	28.1	0.17	0.23	0.17	90.0
West: John Renshaw Drive														
11	T1	1168	15.8	1168	15.8	0.495	5.0	LOS A	4.8	37.9	0.30	0.27	0.30	73.8
12	R2	37	14.3	37	14.3	* 0.361	60.9	LOS E	1.2	9.1	1.00	0.73	1.00	28.8
Approach		1205	15.7	1205	15.7	0.495	6.7	LOS A	4.8	37.9	0.32	0.28	0.32	66.8
All Vehicles		2878	14.3	2852 N1	14.4	0.581	10.1	LOS A	4.8	37.9	0.33	0.32	0.33	67.3

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

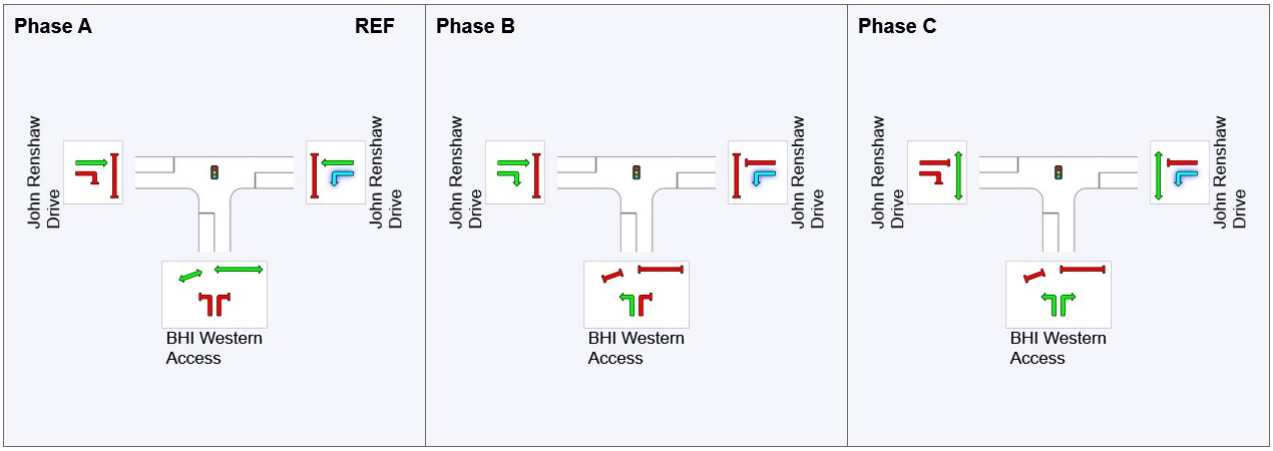
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03

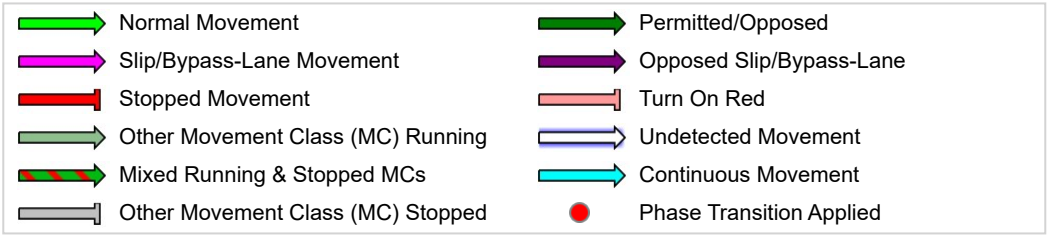
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	2	14
Green Time (sec)	54	6	22
Phase Time (sec)	60	12	28
Phase Split	60%	12%	28%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 PM (Site Folder: Scenario 5)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	106	15.8	106	15.8	0.154	24.5	LOS B	2.0	15.8	0.66	0.70	0.66	30.4
3	R2	425	15.6	425	15.6	* 0.600	44.1	LOS D	5.9	46.8	0.96	0.82	0.96	23.0
Approach		532	15.6	532	15.6	0.600	40.2	LOS C	5.9	46.8	0.90	0.79	0.90	24.2
East: John Renshaw Drive														
4	L2	242	15.7	238	15.7	0.141	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	66.6
5	T1	998	11.7	979	11.8	* 0.569	6.2	LOS A	5.2	40.1	0.27	0.24	0.27	73.8
Approach		1240	12.5	1217 N1	12.5	0.569	6.8	LOS A	5.2	40.1	0.21	0.31	0.21	71.0
West: John Renshaw Drive														
11	T1	780	15.9	780	15.9	0.364	10.9	LOS A	5.9	46.9	0.55	0.48	0.55	80.8
12	R2	61	15.5	61	15.5	* 0.516	60.5	LOS E	1.9	15.0	1.00	0.76	1.01	44.7
Approach		841	15.9	841	15.9	0.516	14.5	LOS A	5.9	46.9	0.58	0.50	0.58	74.9
All Vehicles		2613	14.2	2590 N1	14.3	0.600	16.1	LOS B	5.9	46.9	0.47	0.47	0.47	57.1

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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

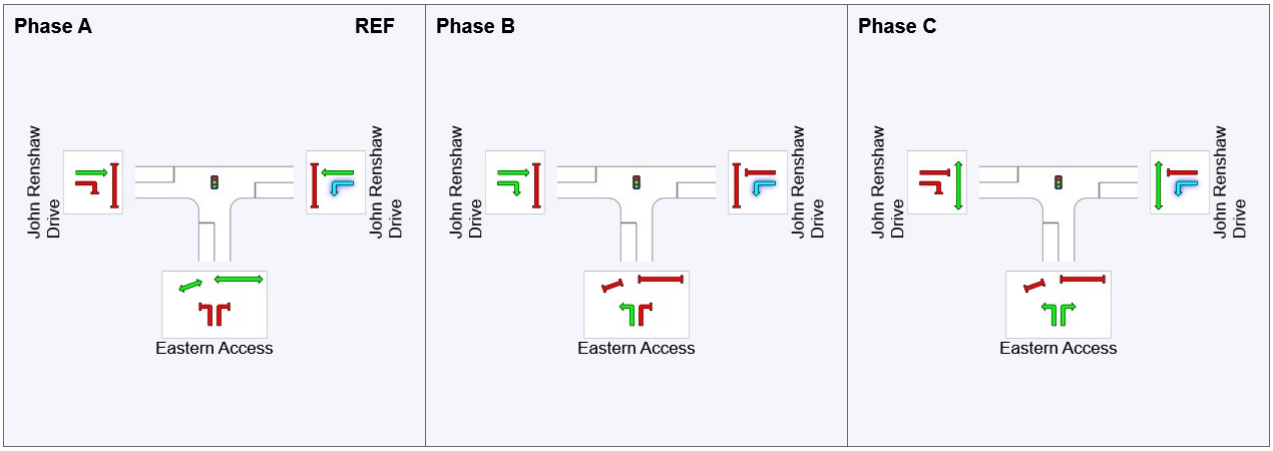
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03

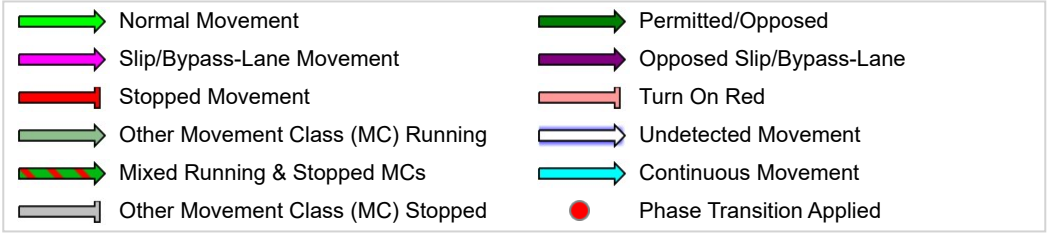
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	10	23
Green Time (sec)	47	7	28
Phase Time (sec)	53	13	34
Phase Split	53%	13%	34%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 PM (Site Folder: Scenario 5)]

Network: 29 [2038 PM with Dev & BHI (Network Folder: Scenario 5a (Stage 2 mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

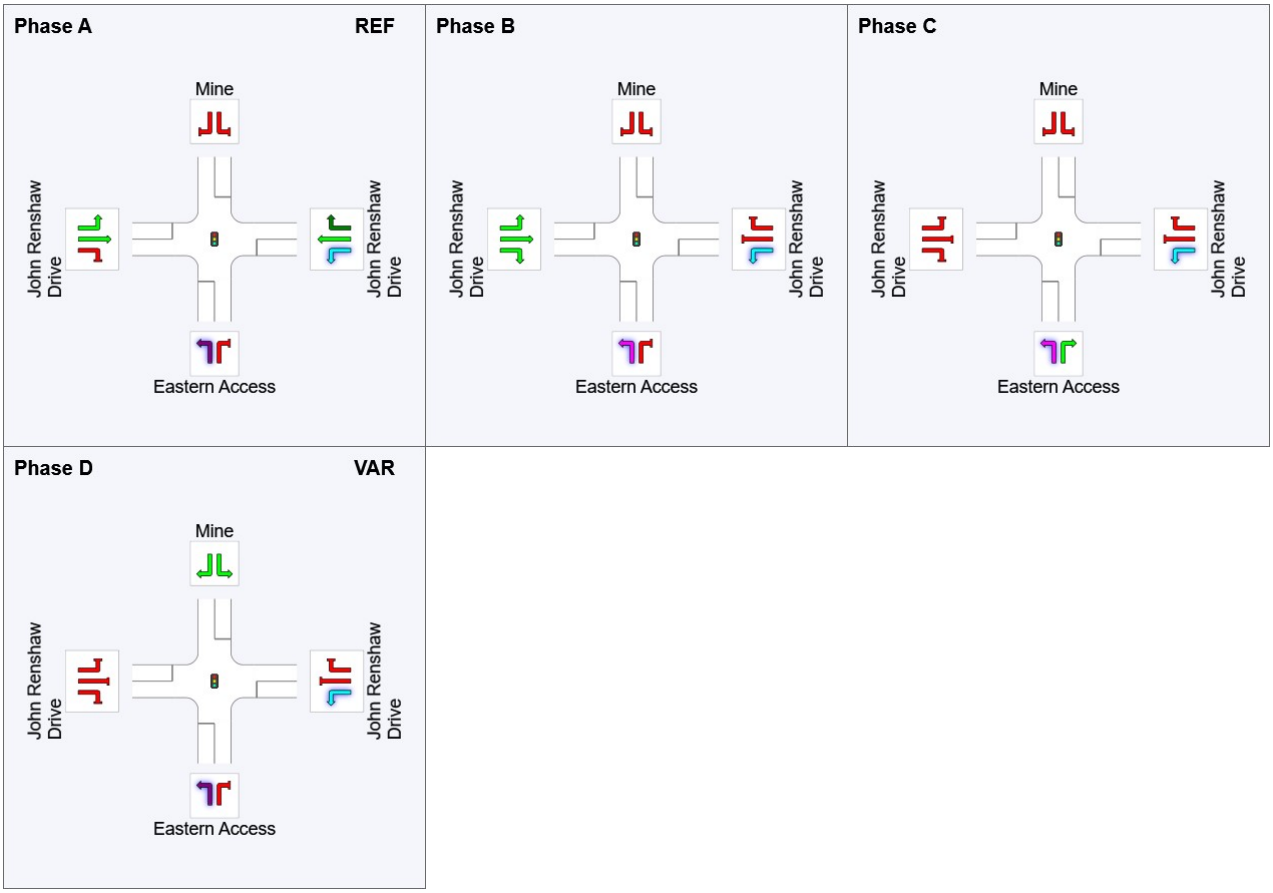
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	42	15.0	42	15.0	0.028	5.0	LOS A	0.1	0.7	0.11	0.52	0.11	53.8
3	R2	168	15.6	168	15.6	* 0.436	38.6	LOS C	1.8	14.0	0.97	0.76	0.97	24.9
Approach		211	15.5	211	15.5	0.436	31.9	LOS C	1.8	14.0	0.80	0.72	0.80	30.3
East: John Renshaw Drive														
4	L2	96	15.4	94	15.4	0.056	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	79.8
5	T1	1008	11.7	992	11.7	* 0.451	8.3	LOS A	5.7	43.8	0.59	0.52	0.59	88.5
6	R2	1	0.0	1	0.0	0.002	15.2	LOS B	0.0	0.1	0.45	0.65	0.45	65.2
Approach		1105	12.0	1087 N1	12.0	0.451	8.3	LOS A	5.7	43.8	0.54	0.53	0.54	87.7
North: Mine														
7	L2	1	0.0	1	0.0	0.040	48.8	LOS D	0.0	0.2	1.00	0.57	1.00	21.9
9	R2	1	0.0	1	0.0	* 0.040	47.6	LOS D	0.0	0.2	1.00	0.57	1.00	34.3
Approach		2	0.0	2	0.0	0.040	48.2	LOS D	0.0	0.2	1.00	0.57	1.00	28.8
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.245	10.2	LOS A	2.0	15.6	0.30	0.26	0.30	63.5
11	T1	673	16.0	673	16.0	0.245	3.0	LOS A	2.0	15.6	0.30	0.26	0.30	88.6
12	R2	24	17.4	24	17.4	* 0.169	42.9	LOS D	0.5	4.1	0.96	0.71	0.96	37.5
Approach		698	16.0	698	16.0	0.245	4.4	LOS A	2.0	15.6	0.32	0.28	0.32	81.2
All Vehicles		2016	13.7	1997 N1	13.9	0.451	9.5	LOS A	5.7	43.8	0.49	0.46	0.49	78.6

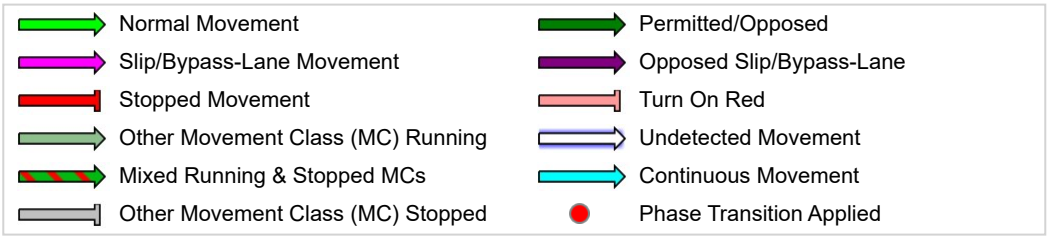
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	43	55	69
Green Time (sec)	42	6	8	1
Phase Time (sec)	48	12	8	2
Phase Split	69%	17%	11%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 5 (50% total development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 AM (Site Folder: Scenario 5b)]

Network: 31 [2038 AM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D1*, E, G
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	387	20.1	387	20.1	0.596	16.4	LOS B	9.4	75.5	0.68	0.73	0.68	42.9
2	T1	460	11.9	460	11.9	* 0.596	25.0	LOS B	9.4	75.5	0.83	0.76	0.83	42.0
3	R2	427	11.8	427	11.8	0.602	45.9	LOS D	6.1	47.0	0.96	0.82	0.96	34.4
Approach		1275	14.4	1275	14.4	0.602	29.4	LOS C	9.4	75.5	0.83	0.77	0.83	38.8
East: John Renshaw Drive														
4	L2	488	34.1	488	34.1	0.323	6.1	LOS A	0.0	0.0	0.00	0.51	0.00	53.6
5	T1	599	18.1	599	18.1	0.539	39.3	LOS C	5.4	44.0	0.94	0.78	0.94	27.1
6	R2	287	8.1	287	8.1	* 0.675	54.1	LOS D	4.4	32.8	1.00	0.84	1.08	31.8
Approach		1375	21.7	1375	21.7	0.675	30.6	LOS C	5.4	44.0	0.62	0.70	0.64	36.7
North: Weakleys Drive														
7	L2	81	53.2	81	53.2	0.510	30.9	LOS C	4.8	40.4	0.85	0.83	0.85	40.8
8	T1	667	11.2	667	11.2	0.511	32.5	LOS C	6.1	46.9	0.89	0.78	0.89	39.4
9	R2	440	22.2	440	22.2	* 0.679	47.7	LOS D	6.4	53.1	0.98	0.85	1.02	24.1
Approach		1188	18.2	1188	18.2	0.679	38.0	LOS C	6.4	53.1	0.92	0.81	0.94	34.4
West: John Renshaw Drive														
10	L2	297	19.9	297	19.9	0.181	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	56.0
11	T1	726	11.9	726	11.9	* 0.697	42.5	LOS C	6.7	51.9	0.94	0.81	0.98	41.5
12	R2	184	12.0	184	12.0	0.533	54.3	LOS D	2.8	21.8	1.00	0.78	1.00	37.8
Approach		1207	13.9	1207	13.9	0.697	35.5	LOS C	6.7	51.9	0.72	0.73	0.74	43.6
All Vehicles		5045	17.1	5045	17.1	0.697	33.2	LOS C	9.4	75.5	0.77	0.75	0.78	38.9

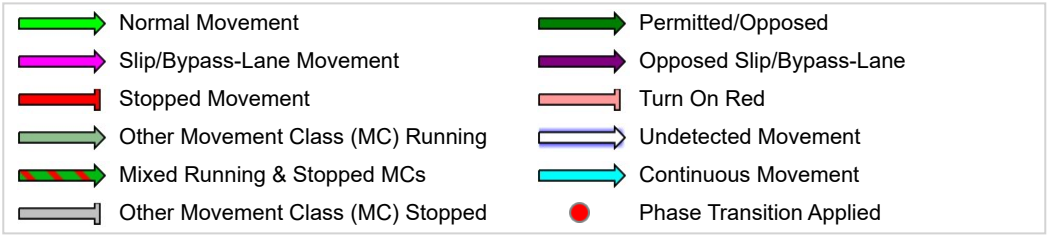
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D1	E	G
Phase Change Time (sec)	51	82	98	0	25
Green Time (sec)	25	10	***	19	20
Phase Time (sec)	31	16	2	25	26
Phase Split	31%	16%	2%	25%	26%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 AM (Site Folder: Scenario 5b)]

Network: 31 [2038 AM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	35	21.2	35	21.2	0.076	33.2	LOS C	0.8	6.3	0.77	0.69	0.77	26.7
3	R2	139	19.7	139	19.7	* 0.528	55.7	LOS D	2.1	17.5	1.00	0.77	1.01	20.1
Approach		174	20.0	174	20.0	0.528	51.2	LOS D	2.1	17.5	0.95	0.75	0.96	21.2
East: John Renshaw Drive														
4	L2	271	19.8	271	19.8	0.165	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	76.8
5	T1	1157	19.9	1157	19.9	* 0.553	4.3	LOS A	5.0	41.3	0.25	0.23	0.25	90.0
Approach		1427	19.9	1427	19.9	0.553	5.2	LOS A	5.0	41.3	0.21	0.30	0.21	86.2
West: John Renshaw Drive														
11	T1	1067	13.0	1067	13.0	0.402	4.6	LOS A	4.5	35.3	0.31	0.28	0.31	75.5
12	R2	67	20.3	67	20.3	* 0.587	61.4	LOS E	2.1	17.6	1.00	0.78	1.07	28.7
Approach		1135	13.5	1135	13.5	0.587	7.9	LOS A	4.5	35.3	0.35	0.31	0.36	62.7
All Vehicles		2736	17.2	2736	17.2	0.587	9.3	LOS A	5.0	41.3	0.31	0.34	0.32	71.6

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

* Critical Movement (Signal Timing)

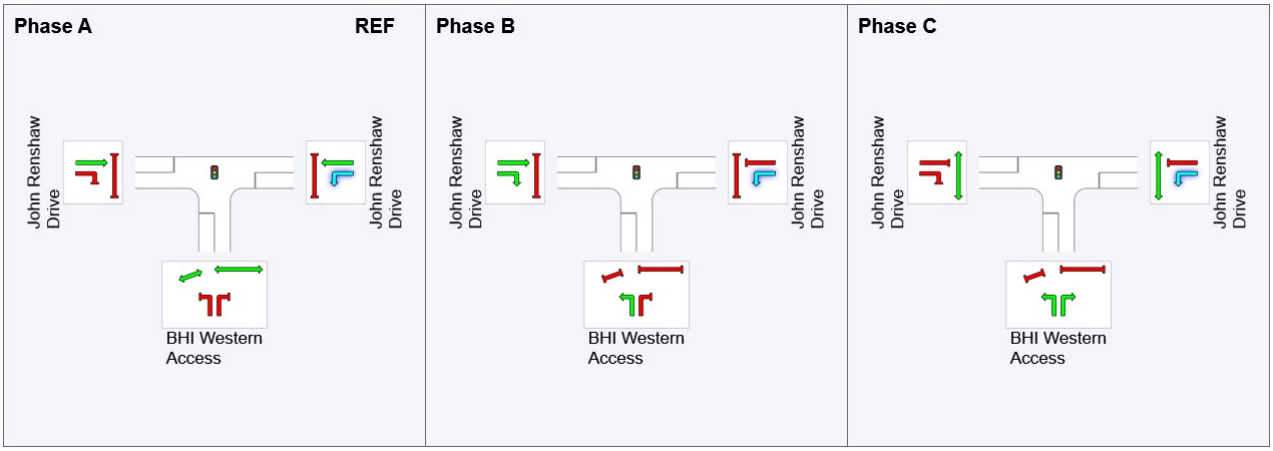
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

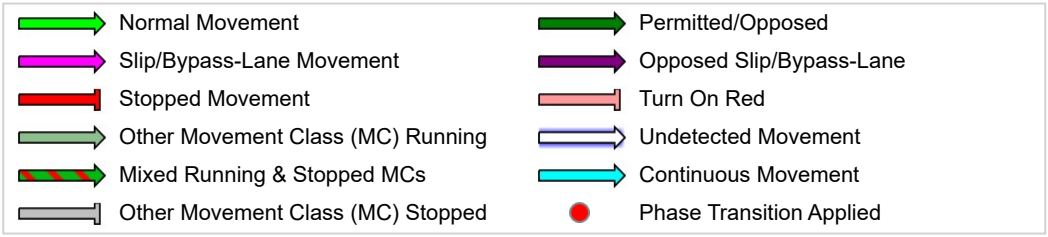
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	40	6	19
Green Time (sec)	60	7	15
Phase Time (sec)	66	13	21
Phase Split	66%	13%	21%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 AM (Site Folder: Scenario 5b)]

Network: 31 [2038 AM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	54	19.6	54	19.6	0.080	23.8	LOS B	1.0	7.9	0.64	0.67	0.64	30.7
3	R2	214	20.2	214	20.2	* 0.465	49.0	LOS D	3.1	25.1	0.96	0.78	0.96	21.7
Approach		267	20.1	267	20.1	0.465	44.0	LOS D	3.1	25.1	0.90	0.76	0.90	23.0
East: John Renshaw Drive														
4	L2	421	20.0	421	20.0	0.256	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	65.3
5	T1	771	19.8	771	19.8	* 0.470	4.2	LOS A	2.6	21.2	0.18	0.16	0.18	79.7
Approach		1192	19.9	1192	19.9	0.470	6.1	LOS A	2.6	21.2	0.12	0.32	0.12	71.0
West: John Renshaw Drive														
11	T1	921	11.9	921	11.9	0.376	7.7	LOS A	6.0	46.1	0.47	0.42	0.47	85.6
12	R2	105	20.0	105	20.0	* 0.458	52.9	LOS D	3.0	24.7	0.96	0.79	0.96	47.3
Approach		1026	12.7	1026	12.7	0.458	12.3	LOS A	6.0	46.1	0.52	0.46	0.52	77.0
All Vehicles		2485	16.9	2485	16.9	0.470	12.7	LOS A	6.0	46.1	0.37	0.43	0.37	65.5

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

* Critical Movement (Signal Timing)

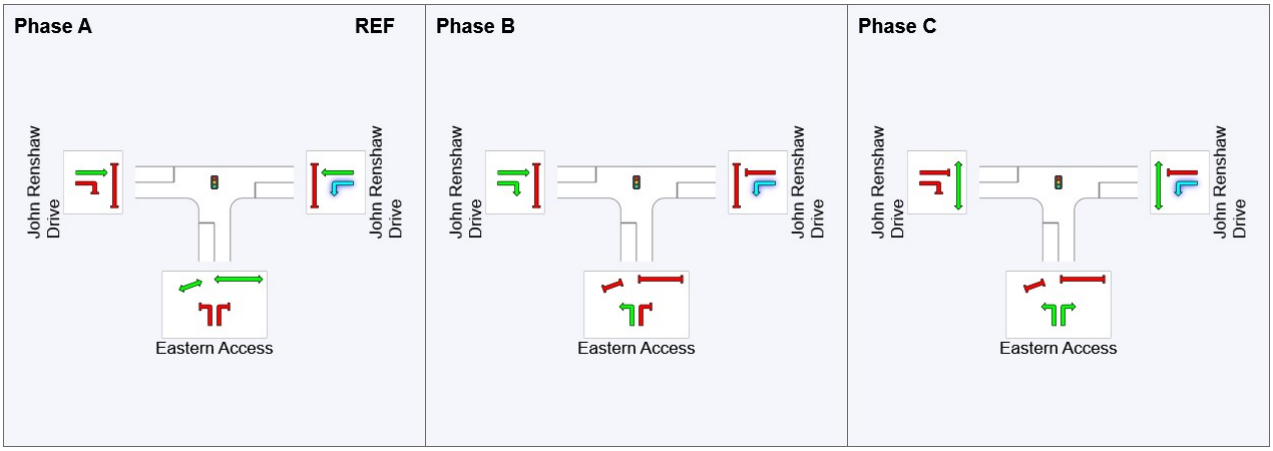
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

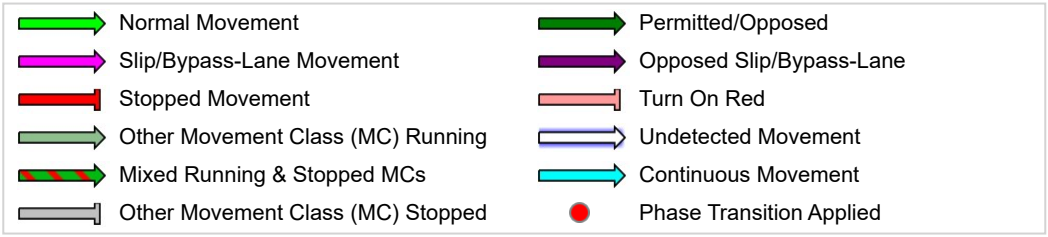
P2 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive										
P4 Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians	211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	55	8	28
Green Time (sec)	47	14	21
Phase Time (sec)	53	20	27
Phase Split	53%	20%	27%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 AM (Site Folder: Scenario 5b)]

Network: 31 [2038 AM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

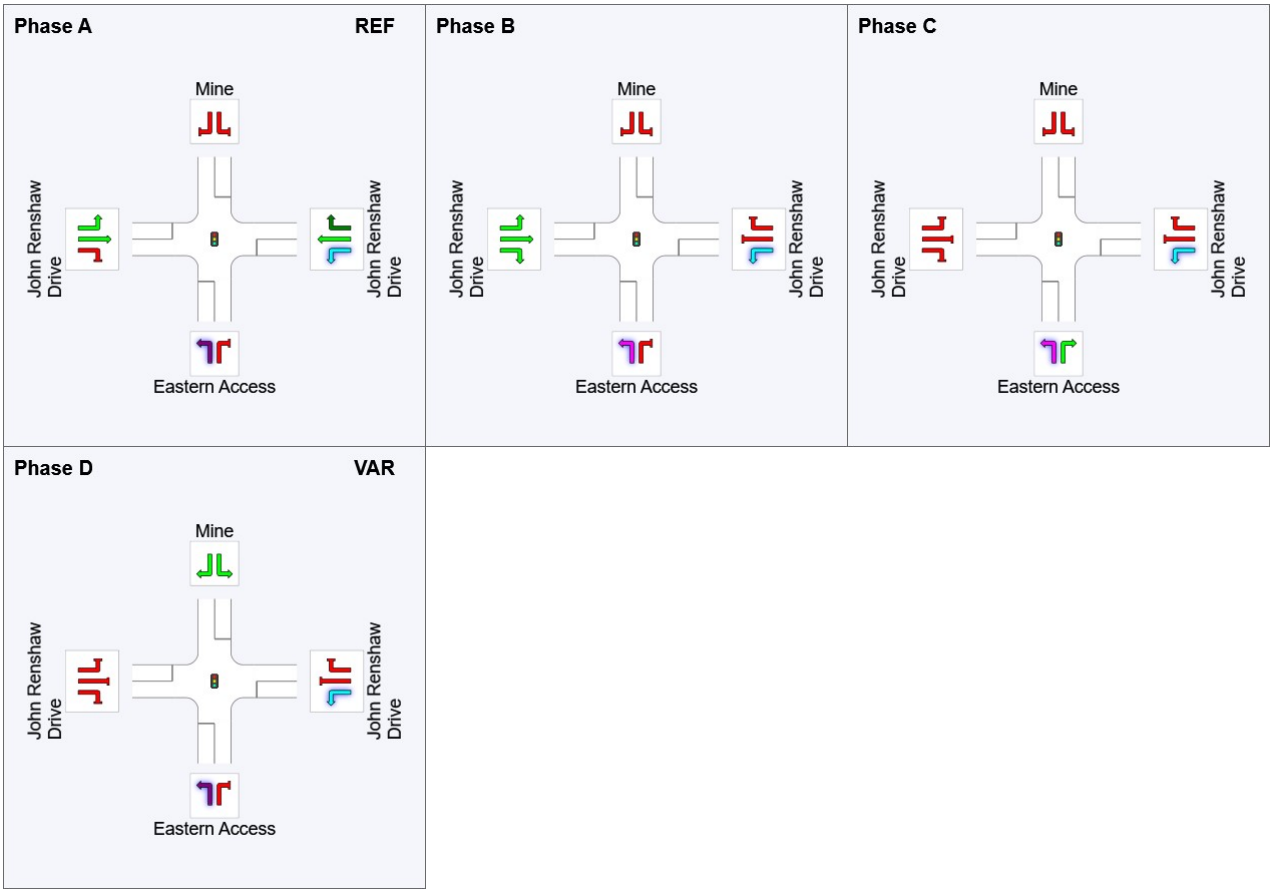
Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	21	20.0	21	20.0	0.014	5.0	LOS A	0.0	0.4	0.09	0.51	0.09	52.9
3	R2	84	20.0	84	20.0	* 0.293	45.1	LOS D	1.0	8.3	0.97	0.73	0.97	23.1
Approach		105	20.0	105	20.0	0.293	37.1	LOS C	1.0	8.3	0.80	0.69	0.80	28.3
East: John Renshaw Drive														
4	L2	166	20.3	166	20.3	0.101	9.3	LOS A	0.0	0.0	0.00	0.63	0.00	78.8
5	T1	658	19.8	658	19.8	* 0.290	6.4	LOS A	3.4	27.6	0.46	0.40	0.46	90.8
6	R2	1	0.0	1	0.0	0.003	15.2	LOS B	0.0	0.1	0.42	0.65	0.42	65.2
Approach		825	19.9	825	19.9	0.290	7.0	LOS A	3.4	27.6	0.37	0.45	0.37	88.1
North: Mine														
7	L2	1	0.0	1	0.0	0.045	55.8	LOS D	0.0	0.2	1.00	0.57	1.00	20.4
9	R2	1	0.0	1	0.0	* 0.045	53.9	LOS D	0.0	0.2	1.00	0.57	1.00	32.4
Approach		2	0.0	2	0.0	0.045	54.9	LOS D	0.0	0.2	1.00	0.57	1.00	27.0
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.318	9.8	LOS A	2.8	21.7	0.27	0.24	0.27	63.9
11	T1	942	12.1	942	12.1	0.318	3.0	LOS A	2.8	21.7	0.27	0.24	0.27	90.3
12	R2	41	20.5	41	20.5	* 0.287	48.1	LOS D	1.0	8.1	0.97	0.74	0.97	35.6
Approach		984	12.4	984	12.4	0.318	4.9	LOS A	2.8	21.7	0.30	0.26	0.30	80.5
All Vehicles		1917	16.0	1917	16.0	0.318	7.6	LOS A	3.4	27.6	0.36	0.37	0.36	80.6

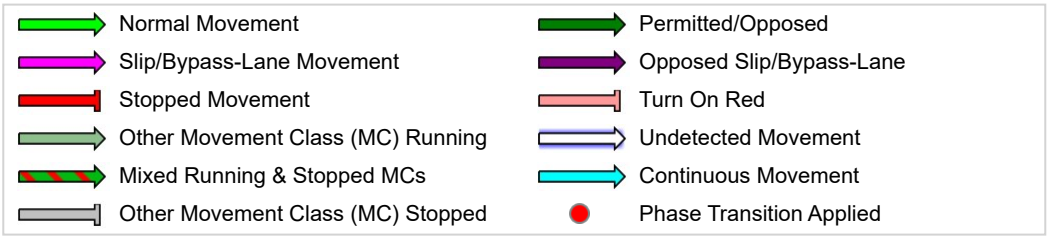
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	53	66	79
Green Time (sec)	52	7	7	1
Phase Time (sec)	58	13	7	2
Phase Split	73%	16%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 5 (50% total development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5.sip9

USER REPORT FOR NETWORK SITE

All Movement Classes

Project: 211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5 **Template: Movement, Phasing**

Site: TCS 4781 [John Renshaw Dr/ M1/ Weakleys Dr 2038 PM (Site Folder: Scenario 5b)]

Network: 32 [2038 PM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: TCS 4781 - mod - Import
Reference Phase: Phase E
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*
Output Phase Sequence: A, D, D2*, E, G, G2*
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: M1 Pacific Motorway														
1	L2	149	15.5	149	15.5	0.515	25.4	LOS B	6.1	46.9	0.80	0.80	0.80	36.5
2	T1	474	7.3	474	7.3	0.515	26.9	LOS B	6.5	48.4	0.85	0.78	0.85	41.4
3	R2	926	20.2	926	20.2	* 0.888	54.4	LOS D	16.3	134.2	1.00	1.02	1.27	31.8
Approach		1549	15.8	1549	15.8	0.888	43.2	LOS D	16.3	134.2	0.94	0.92	1.10	34.6
East: John Renshaw Drive														
4	L2	564	13.8	564	13.8	0.330	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	54.3
5	T1	764	10.2	764	10.2	* 0.862	53.7	LOS D	8.5	64.9	1.00	1.01	1.30	22.5
6	R2	75	26.8	75	26.8	0.395	58.8	LOS E	1.2	10.1	1.00	0.73	1.00	30.4
Approach		1403	12.5	1403	12.5	0.862	34.7	LOS C	8.5	64.9	0.60	0.80	0.76	34.0
North: Weakleys Drive														
7	L2	41	20.5	41	20.5	0.832	58.1	LOS E	9.2	68.3	1.00	1.07	1.21	31.9
8	T1	807	4.7	807	4.7	* 0.833	51.3	LOS D	9.2	68.3	1.00	1.00	1.22	32.9
9	R2	401	16.0	401	16.0	0.541	43.8	LOS D	5.4	43.2	0.94	0.81	0.94	25.3
Approach		1249	8.8	1249	8.8	0.833	49.1	LOS D	9.2	68.3	0.98	0.94	1.13	31.1
West: John Renshaw Drive														
10	L2	352	15.3	352	15.3	0.208	6.5	LOS A	0.0	0.0	0.00	0.52	0.00	56.1
11	T1	753	16.5	753	16.5	0.641	38.9	LOS C	6.9	54.8	0.95	0.80	0.95	42.5
12	R2	351	14.7	351	14.7	* 0.860	54.9	LOS D	5.6	44.3	1.00	0.91	1.20	37.7
Approach		1455	15.8	1455	15.8	0.860	34.9	LOS C	6.9	54.8	0.73	0.76	0.78	43.7
All Vehicles		5657	13.5	5657	13.5	0.888	40.3	LOS C	16.3	134.2	0.81	0.85	0.94	36.7

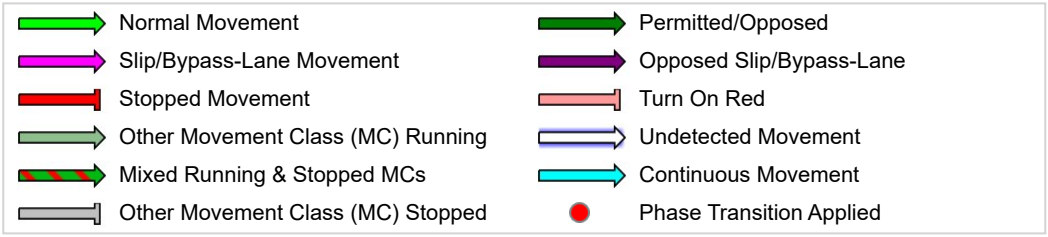
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence

REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G	G2
Phase Change Time (sec)	59	82	94	0	22	50
Green Time (sec)	17	6	***	16	22	3
Phase Time (sec)	23	12	6	22	28	9
Phase Split	23%	12%	6%	22%	28%	9%

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.

Site: 101 [John Renshaw Drive/ BHI western access 2038 PM (Site Folder: Scenario 5b)]

Network: 32 [2038 PM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BHI Western Access														
1	L2	72	16.2	72	16.2	0.129	29.8	LOS C	1.5	11.9	0.73	0.71	0.73	28.0
3	R2	286	15.4	286	15.4	* 0.605	50.2	LOS D	4.2	33.3	0.99	0.81	1.00	21.4
Approach		358	15.6	358	15.6	0.605	46.1	LOS D	4.2	33.3	0.94	0.79	0.95	22.5
East: John Renshaw Drive														
4	L2	146	15.8	146	15.8	0.087	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	77.8
5	T1	1168	12.3	1168	12.3	* 0.582	3.2	LOS A	3.9	30.2	0.21	0.19	0.21	92.3
Approach		1315	12.7	1315	12.7	0.582	3.9	LOS A	3.9	30.2	0.18	0.24	0.18	89.7
West: John Renshaw Drive														
11	T1	1168	15.8	1168	15.8	0.488	4.7	LOS A	4.6	36.2	0.29	0.26	0.29	75.1
12	R2	37	14.3	37	14.3	* 0.361	60.9	LOS E	1.2	9.1	1.00	0.73	1.00	28.8
Approach		1205	15.7	1205	15.7	0.488	6.4	LOS A	4.6	36.2	0.31	0.27	0.31	67.8
All Vehicles		2878	14.3	2878	14.3	0.605	10.2	LOS A	4.6	36.2	0.33	0.32	0.33	67.4

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

* Critical Movement (Signal Timing)

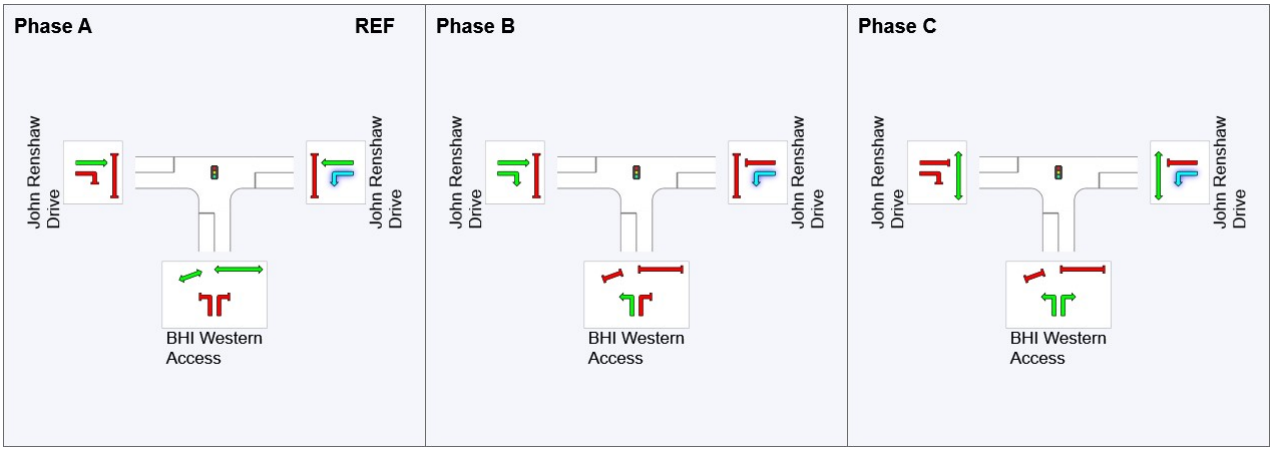
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: BHI Western Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

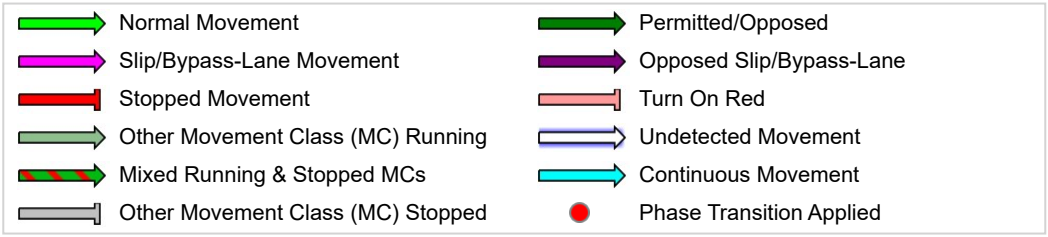
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.5	221.3	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.7	216.3	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	42	3	15
Green Time (sec)	55	6	21
Phase Time (sec)	61	12	27
Phase Split	61%	12%	27%

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%.

Site: 101 [John Renshaw Drive/ eastern access 2038 PM (Site Folder: Scenario 5b)]

Network: 32 [2038 PM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 100 seconds (Network Optimum Cycle Time - Minimum Delay)

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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	106	15.8	106	15.8	0.154	24.5	LOS B	2.0	15.8	0.66	0.70	0.66	30.4
3	R2	425	15.6	425	15.6	* 0.600	44.1	LOS D	5.9	46.8	0.96	0.82	0.96	23.0
Approach		532	15.6	532	15.6	0.600	40.2	LOS C	5.9	46.8	0.90	0.79	0.90	24.2
East: John Renshaw Drive														
4	L2	242	15.7	242	15.7	0.143	9.2	LOS A	0.0	0.0	0.00	0.63	0.00	66.6
5	T1	998	11.7	998	11.7	* 0.580	5.9	LOS A	5.0	38.9	0.26	0.23	0.26	75.0
Approach		1240	12.5	1240	12.5	0.580	6.6	LOS A	5.0	38.9	0.21	0.31	0.21	71.8
West: John Renshaw Drive														
11	T1	780	15.9	780	15.9	0.364	10.9	LOS A	5.9	46.9	0.55	0.48	0.55	80.8
12	R2	61	15.5	61	15.5	* 0.516	60.5	LOS E	1.9	15.0	1.00	0.76	1.01	44.7
Approach		841	15.9	841	15.9	0.516	14.5	LOS A	5.9	46.9	0.58	0.50	0.58	74.9
All Vehicles		2613	14.2	2613	14.2	0.600	15.9	LOS B	5.9	46.9	0.47	0.47	0.47	57.3

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

* Critical Movement (Signal Timing)

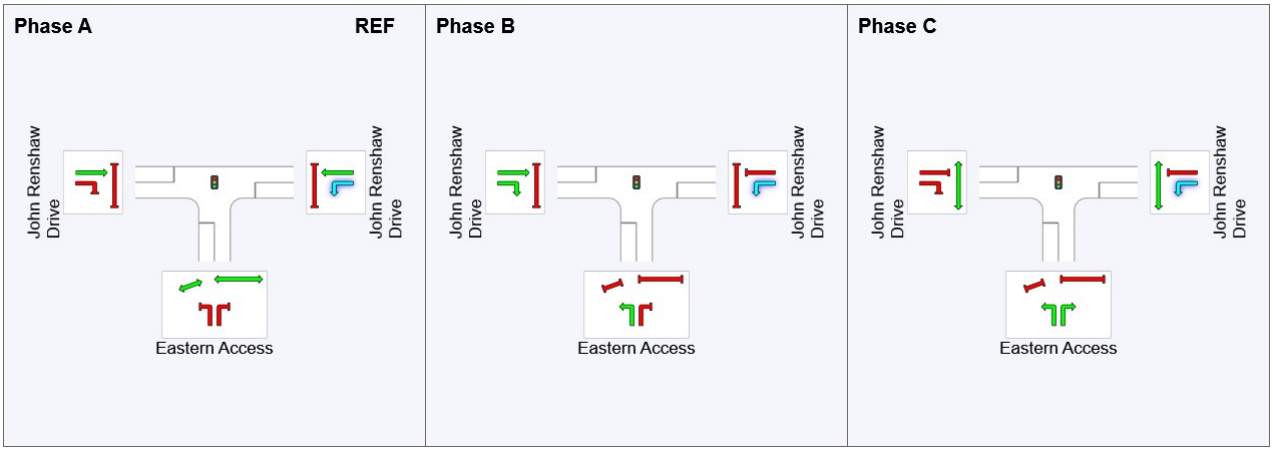
Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Eastern Access											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	212.0	218.0	1.03
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	201.6	204.5	1.01
East: John Renshaw Drive											

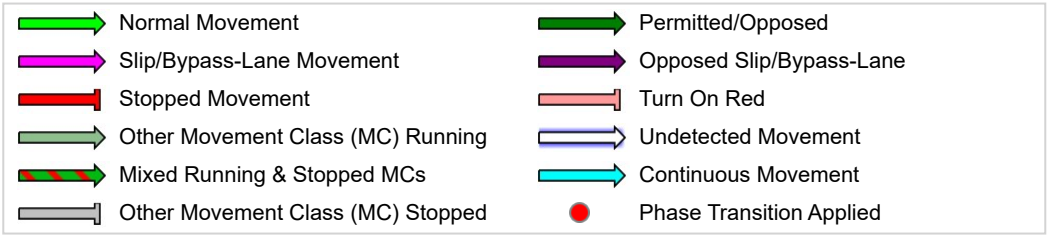
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
West: John Renshaw Drive											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	214.7	221.5	1.03
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	210.5	216.1	1.03

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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	57	10	23
Green Time (sec)	47	7	28
Phase Time (sec)	53	13	34
Phase Split	53%	13%	34%

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%.

Site: 101 [John Renshaw Drive/ western access 2038 PM (Site Folder: Scenario 5b)]

Network: 32 [2038 PM with Dev & BHI (Network Folder: Scenario 5b (additional mitigation))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 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: Leading Right Turn
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D*
Output Phase Sequence: A, B, C, D*
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Eastern Access														
1	L2	42	15.0	42	15.0	0.028	5.0	LOS A	0.1	0.7	0.11	0.52	0.11	53.8
3	R2	168	15.6	168	15.6	* 0.436	38.6	LOS C	1.8	14.0	0.97	0.76	0.97	24.9
Approach		211	15.5	211	15.5	0.436	31.9	LOS C	1.8	14.0	0.80	0.72	0.80	30.3
East: John Renshaw Drive														
4	L2	96	15.4	96	15.4	0.057	9.1	LOS A	0.0	0.0	0.00	0.63	0.00	79.9
5	T1	1008	11.7	1008	11.7	* 0.459	8.3	LOS A	5.8	44.8	0.59	0.52	0.59	88.5
6	R2	1	0.0	1	0.0	0.002	15.2	LOS B	0.0	0.1	0.45	0.65	0.45	65.2
Approach		1105	12.0	1105	12.0	0.459	8.4	LOS A	5.8	44.8	0.54	0.53	0.54	87.6
North: Mine														
7	L2	1	0.0	1	0.0	0.040	48.8	LOS D	0.0	0.2	1.00	0.57	1.00	21.9
9	R2	1	0.0	1	0.0	* 0.040	47.6	LOS D	0.0	0.2	1.00	0.57	1.00	34.3
Approach		2	0.0	2	0.0	0.040	48.2	LOS D	0.0	0.2	1.00	0.57	1.00	28.8
West: John Renshaw Drive														
10	L2	1	0.0	1	0.0	0.245	10.2	LOS A	2.0	15.6	0.30	0.26	0.30	63.5
11	T1	673	16.0	673	16.0	0.245	3.0	LOS A	2.0	15.6	0.30	0.26	0.30	88.6
12	R2	24	17.4	24	17.4	* 0.169	42.9	LOS D	0.5	4.1	0.96	0.71	0.96	37.5
Approach		698	16.0	698	16.0	0.245	4.4	LOS A	2.0	15.6	0.32	0.28	0.32	81.2
All Vehicles		2016	13.7	2016	13.7	0.459	9.5	LOS A	5.8	44.8	0.49	0.46	0.49	78.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
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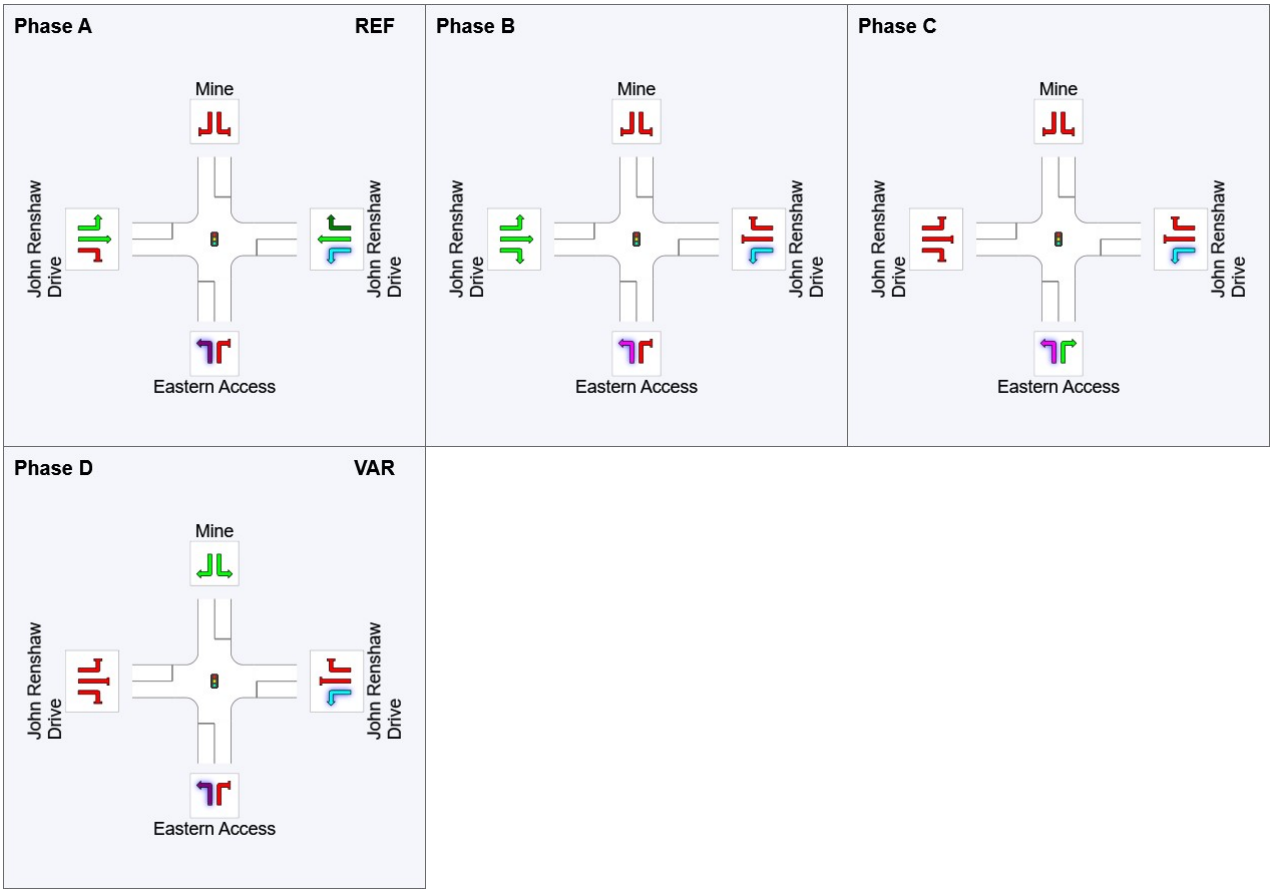
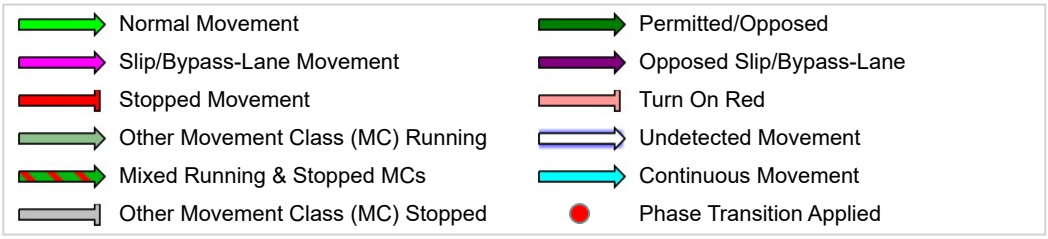
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	43	55	69
Green Time (sec)	42	6	8	1
Phase Time (sec)	48	12	8	2
Phase Split	69%	17%	11%	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%.

Project: P:\N17100-17199\N171073 John Renshaw Drive, Black Hill -\Modelling\SIDRA\211203 2038 traffic modelling\For distribution - Copy \Scenario 5 (50% total development)\211203sid-N171073 Black Hill Industrial Precinct 2038 Scenario 5.sip9

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