Industrial Warehouse Development
COPE Sensitive Freight

Traffic Impact Assessment

18 December 2024

HB&B Property

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Our Ref:

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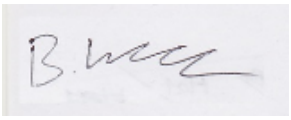

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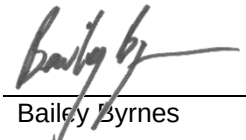

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Acronyms and Abbreviations

Acronym	Definition
AIBP	Alspec Industrial Business Park
EP&A Act	Environmental Planning and Assessment Act 1979
TIA	Traffic Impact Assessment
GTP	Green Travel Plan
HV	Heavy Vehicle
LV	Light Vehicle
DA	Development Approval
SSTOM	Sydney Metro's Stations, Systems, Trains, Operations and Maintenance

1 Introduction

The COPE Sensitive Freight development application is seeking approval to construct a warehouse and distribution building at 221-227 Luddenham Road, Orchard Hills (the site), situated within the Alspec Industrial Business Park (AIBP) at 221-235 Luddenham Road, Orchard Hills.

The AIBP Planning Proposal was lodged to Penrith City Council (PCC) in December 2022 and is expected to be finalised in 2024. The AIBP Planning Proposal amended the Penrith Local Environmental Plan (PLEP) 2010 through rezoning the central and eastern portions of the AIBP site to E4 General Industrial which permits the development and operation of warehouse and distribution uses.

The COPE project area is situated within the western portion of the AIBP site and has a direct interface with an electrical easement to the north-west, and two future basins along the northern and western boundaries of the site. The proposed development has a direct interface with the north-south internal local road, which provides access to Patons Lane and Luddenham Road.

The Traffic Impact Assessment prepared by Arcadis for the AIBP Planning Proposal identified that the COPE Sensitive Freight development at the subject site of 221 Luddenham Road, Orchard Hills, is acceptable on traffic planning grounds which supported the rezoning of AIBP and the development of the COPE proposal.

1.1 Background

Arcadis has been engaged by HB&B Property Ltd to undertake a Traffic Impact Assessment for the proposed COPE Sensitive Freight DC industrial warehouse development at 221 Luddenham Road, Orchard Hills.

The proposal is to develop an 80,170 m^2 warehouse at the above address to accommodate a mix of warehouse, industrial and office land uses. In the preparation of this assessment, the subject site and its surroundings have been inspected, along with developments plans and relevant traffic and parking data have been reviewed and analysed.

1.2 Scope of the report

This report has been structured as follows:

- Section 2 describes the existing conditions in relation to the site, including surrounding land uses, the road network and available transport modes.
- Section 3 outlines the development proposal for the construction of the COPE Sensitive Freight warehouse.
- Section 4 outlines the expected traffic generated by the development during the construction and operational phase and their associated impact on the surrounding road network.
- Section 5 outlines the expected parking requirements associated with the proposed development in accordance with local relevant planning policies.
- Section 6 assesses the access and internal design of the warehouse, describing transport movements and identifying any potential issues from the current DA plans.
- Section 7 provides a summary of the transport impact assessment.

1.3 Reference documents

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

- Schedule of Classified Roads and Unclassified Regional Roads (Transport for NSW [TfNSW], 2023)
- Development Control Plan E18 (DCP) (Penrith Council, 2021)
- Guide to Transport Impact Assessment (TfNSW, 2024)
- Technical Direction (TDT 2013/04a) (Roads and Maritime, 2013)
- 221 Luddenham Road, Orchard Hills –Alspec Industrial Business Park Traffic Impact Assessment (Arcadis, April 2023).

2 Existing conditions

2.1 Site location

The subject site is on Luddenham Road, south of Patons Lane, in Orchard Hills NSW. Located approximately 30 kilometres west of Parramatta CBD, the proposed COPE Sensitive Freight warehouse is part of the larger Alspec Industrial Business Park (AIBP) development. The AIBP site is irregular in shape, with frontages across both Luddenham Road and Patons Lane.

The subject site is broadly rectangular in shape, with a total area of 80,170 m^2. The site has frontage to an internal road within the AIBP site. The internal access road provides access to the broader road network via Patons Lane and Luddenham Road.

The site location is shown in Figure 2-1, with the location of the COPE site within the AIBP development shown in Figure 2-2.

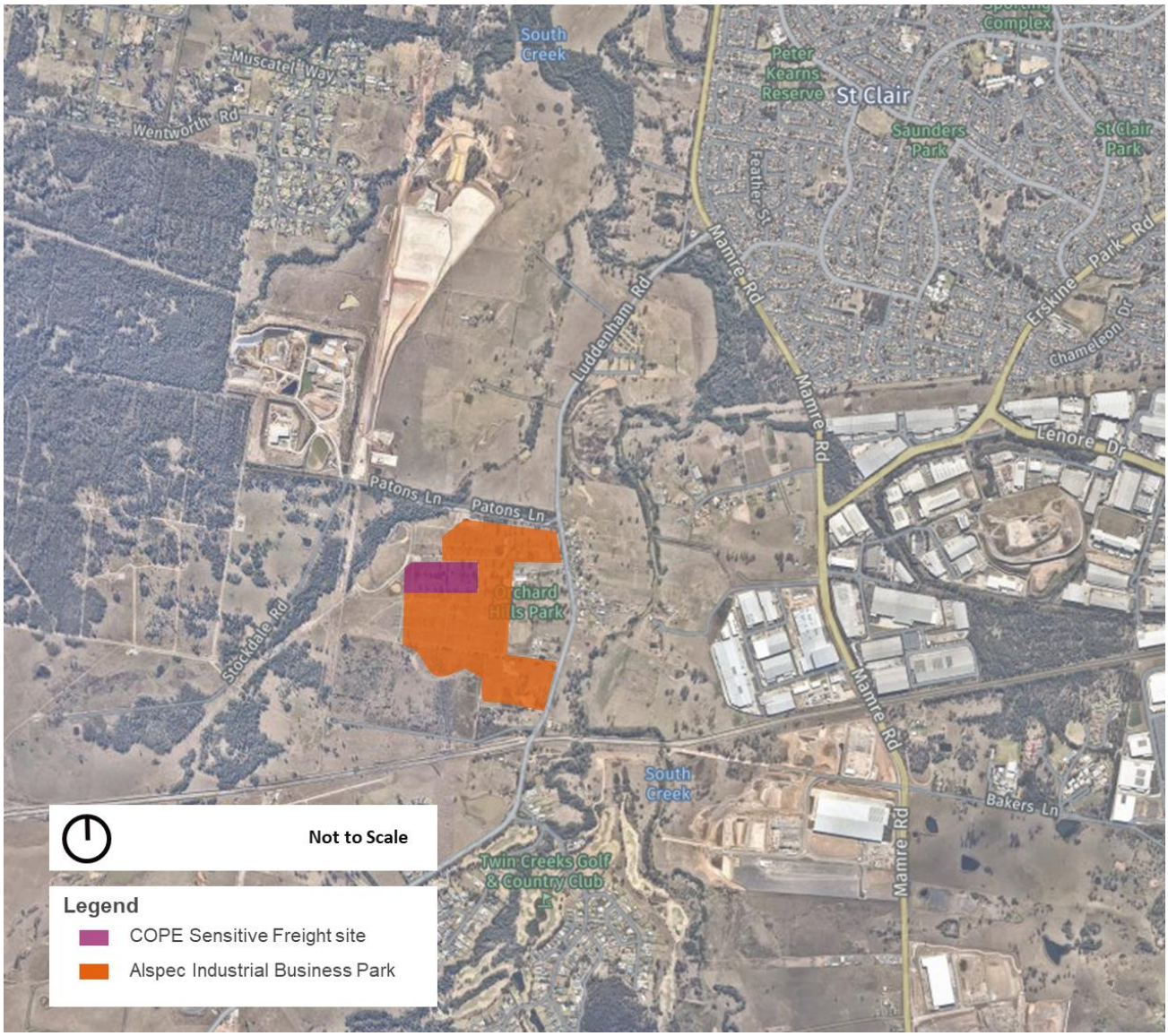


Figure 2-1 AIBP site location

Figure 2-2 Location of COPE site within the AIBP development

2.2 Land use

As shown in Figure 2-3, the subject site is in a General Industrial Zone (E4). The region surrounding the site is a mix of Environmental Conservation (C2) and Rural Landscape Zone (RU2). To the east of Mamre Road, the more common land uses are General Industrial (IN1) and Low Density Residential (R2).

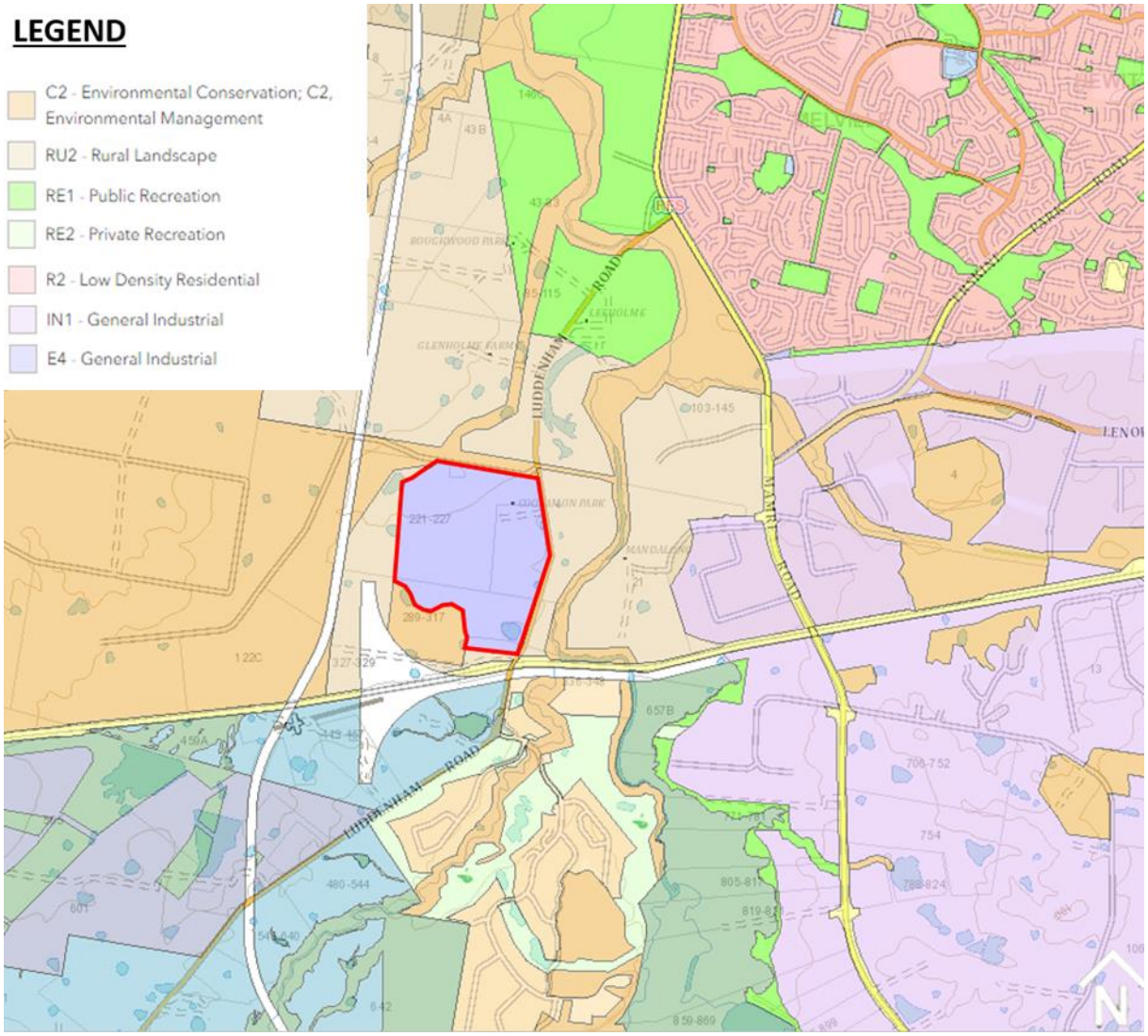


Figure 2-3 Land zoning map (source: ePlanning Spatial Viewer - NSW Planning Portal)

2.3 Road network

The existing roads which will be impacted by the development application are described below:

Luddenham Road

Luddenham Road is a regional road under the control and management of Penrith City Council. Near the site, Luddenham Road is aligned in a general north-east/south-west direction. It is a two-way road configured with a two-lane, seven-metre-wide carriageway, set within an approximately 21-metre-wide road reserve.

Luddenham Road carries approximately 3,000 vehicles per day and has a posted speed limit of 80 km/h (source: STFM Model, 2021).

Photos of Luddenham Road in the vicinity of the site are provided in Figure 2-4 and Figure 2-5.

Figure 2-4 Luddenham Road, facing north

Figure 2-5 Luddenham Road, facing south

Patons Lane

Patons Lane is a local road under the control and management of Penrith City Council. Near the site, Patons Lane is generally aligned in an east/west orientation. It is a two-way road configured with a two-lane, 6.6-metre-wide carriageway with 1.2-metre-wide sealed shoulders on both sides of the road, set within a road reserve that is approximately 19 metres wide.

Sydney Metro's Stations, Systems, Trains, Operations and Maintenance (SSTOM) contractors conducted traffic surveys in March 2024 which indicated Patons Lane carries approximately 1,260 vehicles per day, due to the construction of the Sydney Metro project (Source: Trans Traffic Survey 2024). Lower daily traffic volumes are to be expected once construction of the Metro is completed.

Photos of Patons Lane in the vicinity of the site are provided in Figure 2-6 and Figure 2-7.

Figure 2-6 Patons Lane, facing west

Figure 2-7 Patons Lane, facing east

2.4 Public transport network

A review of the public transport available in the vicinity of the site indicates that there are three bus services (Routes 775, 776 and 779) that operate in the St Clair/ Erskine Park area to the northeast of the site. No bus services connect past the site to the south.

Overall, the area is currently underserviced by public transport. However, the level of service provision reflects the low travel demands of the locality. Figure 2-8 shows a map of the existing public transport network for the Orchard Hills area.

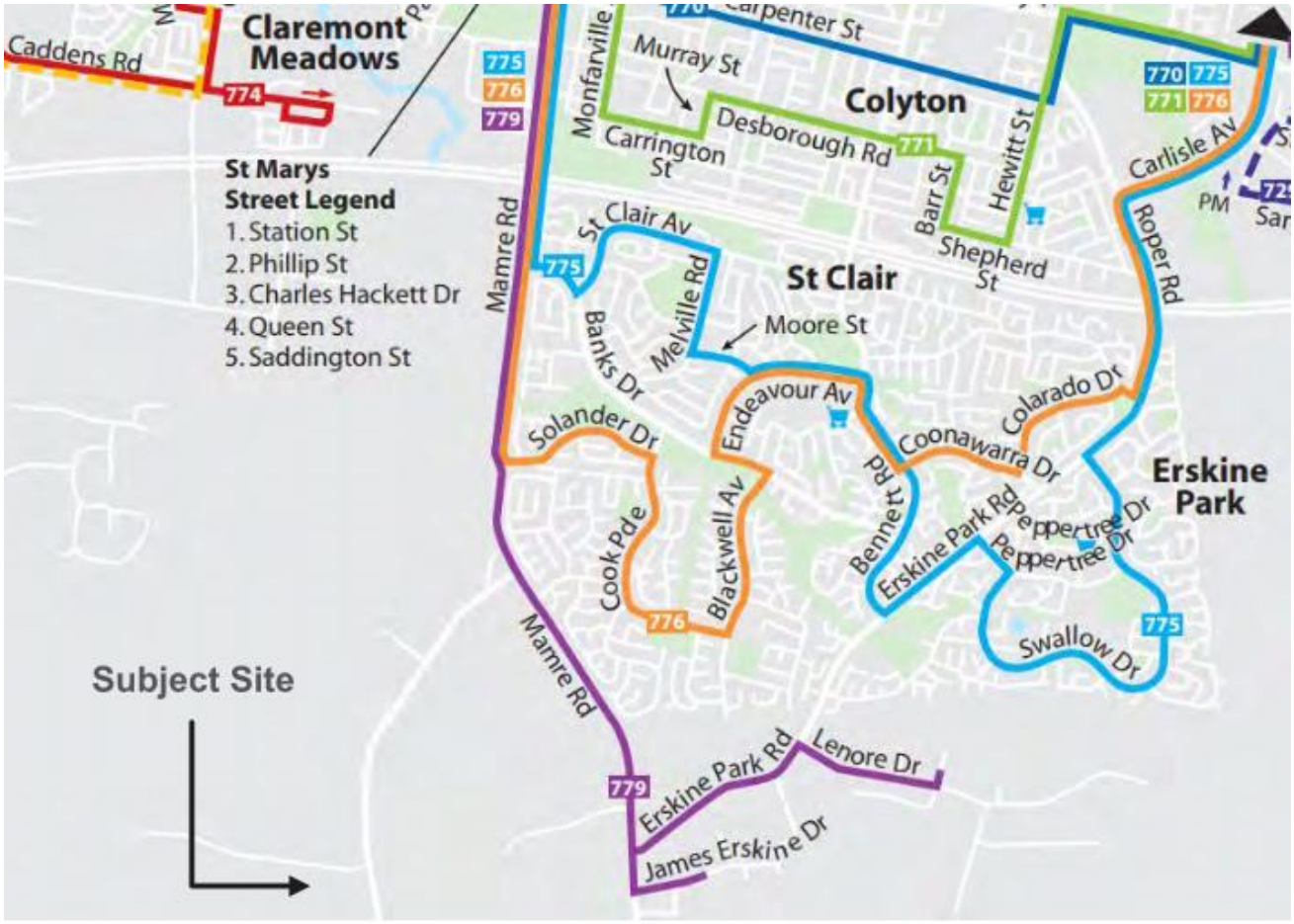


Figure 2-8 Existing public transport network - Orchard Hills area

2.5 Active transport

There is currently limited pedestrian or cyclist infrastructure provided in the vicinity of the site, mainly due to the nature of land use in the vicinity and the limited demand for such facilities at present.

2.6 Road safety

Historical crash data has been evaluated as part of this assessment to obtain an understating of current road safety characteristics and trends for Luddenham Road between Mamre Road and Elizabeth Drive. A summary of the crash statistics for crashes occurring along Luddenham Road is provided in Table 2-1.

Table 2-1 Crash history along Luddenham Road for the five-year period between 2018-2022

Crash Severity	Year				
	2018	2019	2020	2021	2022
Non-casualty	-	1	4	2	1
Minor/other injury	-	-	2	1	-
Moderate injury	3	2	1	1	4
Serious injury	1	-	1	3	1
Fatal	-	-	-	-	-
Total	**4**	**3**	**8**	**7**	**6**

The crash data revealed:

- A total of 28 crashes occurred along the length of Luddenham Road between Mamre Road and Elizabeth Drive over a five-year period between 2018 and 2022, averaging 0.015 per day or 5.6 per year.
- 71 per cent of the crashes resulted in an injury, and there were no fatalities recorded.
- 29 per cent involved vehicles travelling off the road and hitting an object resulted in an injury, and there were no fatalities recorded.
- No multi-vehicle crashes were recorded in this period.
- 39 per cent of crashes occurred in dusk or darkness conditions.
- Four per cent of crashes involved vehicles striking animals while travelling along the roadway.

The crash statistics indicate that a relatively high number of crashes involved vehicles colliding objects after veering off the roadway. Any future upgrade to Luddenham Road should address this trend and related safety issues.

3 Development proposal

The proposal is for the development of an 80,170 m^2 parcel of land as part the wider AIBP development. The COPE Sensitive Freight development will comprise of Warehouse and office land uses, as well as supporting car parking for both heavy vehicles and cars.

Figure 3-1 shows the plan for the proposed development.

Figure 3-1 Proposed development layout

A summary of the land use mix for the COPE Sensitive Freight development is provided in Table 3-1.

Table 3-1 Indicative land use mix for COPE Sensitive Freight development

	Land Use	Total building GFA (m^2)
COPE Sensitive Freight Proposal	Warehouse	37,000
	Office	1,500
	Carpark – Heavy Duty	29,636
	Carpark – Light Duty	5,869
	Total Building	**38,500**
	Total Carpark	**35,505**
	Total Landscape	**6,138**
	Total Site Area	**80,170**

The scope of works for the proposed development will include the following:

- Construction of a purpose-built warehouse and distribution facility.
- Installation of an in-ground weighbridges.
- Provision of hard stand driveways and parking areas around the building.
- Office and amenities buildings.
- Provision of 226 parking spaces.

Three driveways are proposed for the development, with all to be provided off the site access road for the AIBP development. Access for trucks and larger vehicles is to be provided via two separate driveway access points, with the truck entry access located on the southern boundary, and the exit located on the northern boundary. A separate combined entry and exit access point is provided for the car park.

A copy of the proposed development site layout can be found in Appendix A.

3.1 AIBP construction timeline

The construction of COPE Sensitive Freight will be in conjunction with other infrastructure works as part of the AIBP development. Figure 3-2 shows an indicative timeline for 2025/2026 construction period of AIBP, inclusive of COPE and other DA construction works.

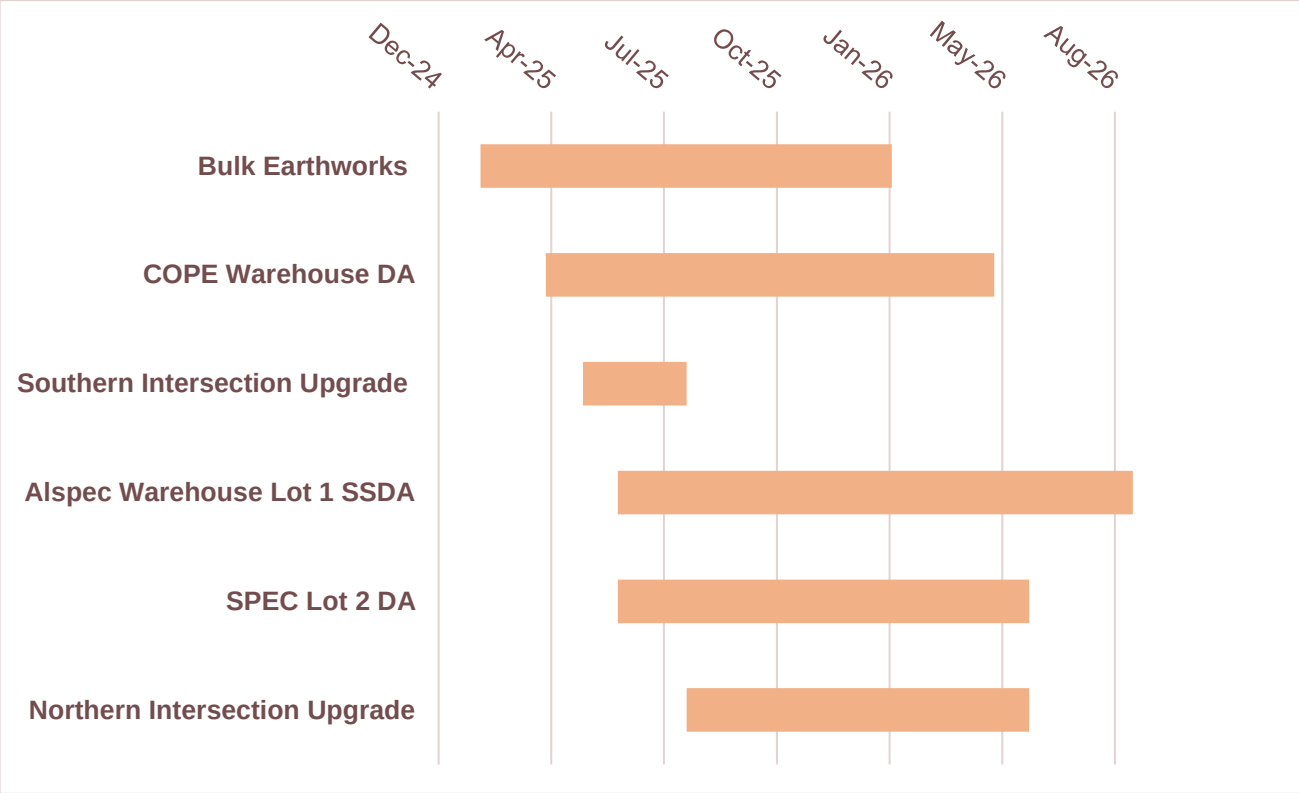


Figure 3-2 Indicative AIBP construction timeline

Construction period for the development will be roughly 10 months, with a subsequent internal fit-out phase of the warehouse anticipated to last 3 months. Operational phase of the warehouse is expected to closely align with the completion of the northern intersection upgrade, providing the surrounding road network with additional capacity for the operational traffic of COPE, as well as the adjacent warehouse lots.

4 Traffic impact assessment

An assessment of the likely traffic impact has been completed to understand the implications of the proposed development and the associated staging on the performance of the surrounding network.

4.1 Traffic generation

4.1.1 Construction traffic

Construction traffic demand for the development has been informed by expected construction activities based on information provided by COPE sensitive freight. Refer to the *Bulk Earthworks DA* for the cumulative construction impact assessment considering the construction traffic for COPE, as well as other AIBP developments such as bulk earthworks, northern and southern intersection upgrades, and adjacent warehouse lots during the 2025 construction phase. The estimated daily traffic volumes over an average day are presented in Figure 4-1 and a summary of the peak hour volumes are presented in Table 4-1.

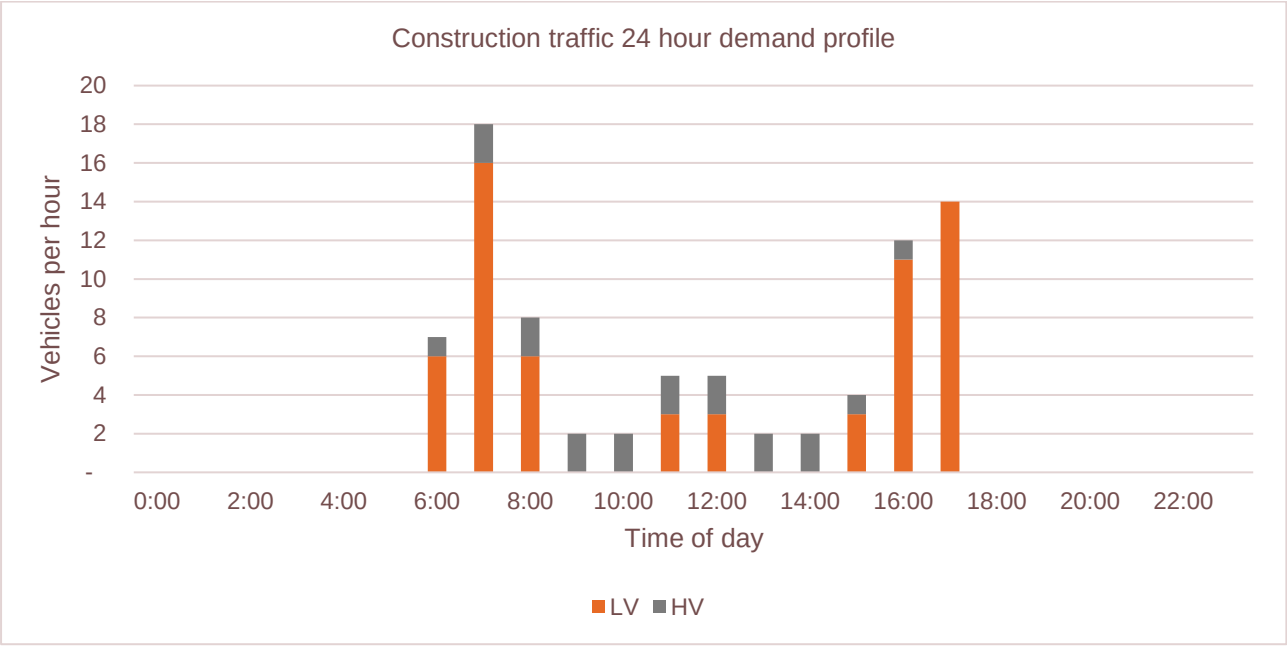


Figure 4-1 Construction traffic volumes over an average day

Table 4-1 Estimated construction traffic volume for the proposal

Vehicle Type	AM peak (7-8am)			PM peak (5-6pm)		
	IN	OUT	Total	IN	OUT	Total
LV	14	2	**16**	1	13	**14**
HV	1	1	**2**	1	1	**2**
Total	**15**	**3**	**18**	**2**	**14**	**16**

The following is assumed:

- 30 per cent of construction worker employees will arrive and leave site during the peak hours, resulting in an increase of up to 16 light vehicle trips along Patons Lane and Luddenham Road in the AM and PM peak. These vehicles are assumed to consist exclusively of light vehicles
- Up to 20 heavy vehicles transporting construction equipment, materials, and earthworks is expected per day. It is anticipated that 30 per cent of the heavy vehicles, 2-3 vehicles, will arrive and leave during the peak hours.

4.1.2 Operational traffic

Operational trip generation for the COPE development has been informed by *TMX COPE Sensitive Freight Sydney DC Principal Projects Requirements REV 1.1*, as well as information supplied by COPE Sensitive Freight. The daily demand profile for operational traffic volumes is provided in Figure 4-2.

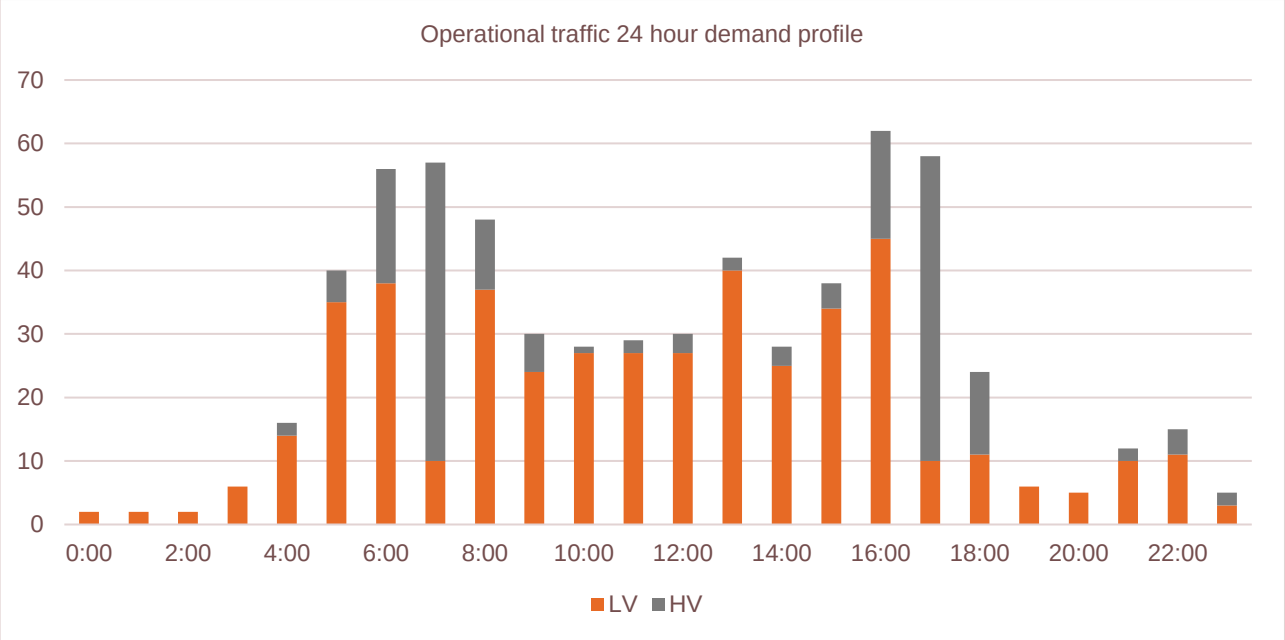


Figure 4-2 Operational traffic demand profile over an average day

The operational traffic demand for the COPE development involves a total of 190 heavy vehicle movements daily. This comprises approximately 30 to 40 movements each for local site trucks, local delivery semi-trailers and local tailgate rigid trucks. These vehicles will be utilised for loading at site depots in the morning, carrying out delivery runs, and then returning to site depots with acquired freight for distribution following pick up runs in the afternoon. The operational demand also expects 32 vehicle movements for interstate line haul semi-trailers which will be utilised for unloading at depot in the morning prior to departing followed by their return to depot in the afternoon for loading.

Comparison of the expected volumes against TfNSW survey data collected for similar large format warehousing estates (*Guide to Transport Impact Assessment, TfNSW 2024*) suggests traffic demands during the peak hours may range between 15 to 19 vehicles per hour. However, it is recognised that the recommended rates within the TfNSW guidelines are based on large estates, and trip generation rates vary substantially depending on the tenants, type of goods being warehoused and the nature of the facilities. The provided demands below align with observed demand at similar COPE freight facilities and are lower than the assessed demand for the broader industrial business park estate.

The traffic generation rates adopted for the broader AIBP assessment determined a likely traffic generation of 1,432 vehicles for similar sized sites. These higher rates were utilised for the evaluation of the broader road network, including the requirement for intersection upgrades to facilitate access to and from the site.

Table 4-2 summarises the peak hour and daily traffic demand for COPE sensitive freight development, TfNSW Warehouse survey data (*Guide to Transport Impact Assessment, TfNSW 2024*) and AIBP traffic impact assessment.

Table 4-2 Summary of peak hour and daily demand for COPE Sensitive Freight in comparison to TfNSW Warehouse data and AIBP Traffic Impact Assessment

Period	COPE Sensitive Freight (2024)	TfNSW Warehouse Data (2024)	AIBP TIA (2024)
	Total	Total	Total
AM Peak	57 (82% HV)	100 (15% HV)	166 (15% HV)
PM Peak	58 (82% HV)	89 (21% HV)	158 (21% HV)
Daily	652 (30% HV)	1090 (29% HV)	1432 (29% HV)

For the purposes of this assessment, both the lower site-specific data relevant to COPE operations, as well as the higher traffic generation rates adopted for the AIBP assessment, have been considered.

4.2 Background traffic volumes

Broader traffic volumes

Background traffic volumes for Patons Lane and Luddenham Road were derived from TfNSW traffic forecasting modelling for the morning peak period (7am to 9am) and the afternoon peak period (4pm to 6pm) for 2021, 2026 and 2036. These forecasts were provided from a model that was based on land use forecasts from LU2019 and demand matrices from Strategic Transport Model V3.8. These volumes were factored by 0.55 to estimate peak hour volumes. Table 4-3 summarises the peak hour traffic volumes on Luddenham Road.

It is noted that the strategic traffic forecasts predict a decrease in traffic along Luddenham Road in 2036 in comparison to 2026 for both the AM and PM peak periods. This is attributed to a new east-west arterial road located south of the subject site, which provides a new connection between Luddenham Road and Mamre Road. This assessment adopts the decreased traffic volumes in line with the traffic forecast.

Table 4-3 Forecasted background volumes for Luddenham Road determined from STFM inputs

	AM peak		PM peak	
	Northbound	Southbound	Northbound	Southbound
2021	790	510	510	840
2024	850	640	610	870
2025	870	690	640	880
2026	890	730	670	890
2036	760	470	480	650

Local traffic volumes

To assess the overall impact of traffic on the performance of Patons Lane and Luddenham Road, operational traffic generated by the Patons Lane Resource Recovery Centre (RRC) and construction traffic from Sydney Metro – Western Sydney Airport stabling and maintenance facility has been included in this assessment.

The Sydney Metro – Western Sydney Airport stabling and maintenance facility will be located at Orchard Hills, south of Blaxland Creek and north of Patons Lane. Access to the facilities is provided by Patons Lane.

Construction of the facility has commenced and is expected to be operational by 2027. It is forecasted that traffic will be generated from the stabling and maintenance facility during its construction and operation.

SSTOM contractors provided seven-day traffic surveys in March 2024 along Patons Lane approximately 330 metres west of Luddenham Road. The survey captures current construction traffic volumes for the

Sydney Metro Stabling and Maintenance Facility and traffic generated by the operational Patons Lane Resource Recovery Centre. To align with this assessment, survey data for the AM period between 7am and 8am and PM period between 5pm and 6pm is provided in Table 4-4. In addition, peak hour construction movements as reported in the *Construction Traffic Management Plan – SSTOM – Orchard Hills Stabling and Maintenance Facility (EIS and PLM)* have been considered for the modelled scenarios, with traffic data shown in Table 4-5 and Table 4-6, respectively.

Table 4-4 SSTOM contractors Patons Lane traffic survey March 2024 (source: Trans Traffic Survey, 2024)

Vehicle Type*	AM peak (7-8am)			PM peak (5-6pm)		
	EB	WB	Total	EB	WB	Total
LV	23	37	**60**	43	3	**46**
HV	36	18	**54**	5	1	**6**
Total	**59**	**55**	**114**	**48**	**4**	**52**

Table 4-5 Peak construction movements in 2024/ 2025 for the Sydney Metro – Western Sydney Airport stabling and maintenance facility (EIS)
Source: Construction Traffic Management Plan – SSTOM – Orchard Hills Stabling and Maintenance Facility (Table 10)

Vehicle Type*	AM peak			PM peak		
	IN	OUT	Total	IN	OUT	Total
LV Staff	212	0	**212**	0	212	**212**
LV Deliveries	2	2	**4**	2	2	**4**
HV	8	8	**16**	8	8	**16**
Total	**222**	**10**	**232**	**10**	**222**	**232**

Table 4-6 Peak construction movements in 2024/ 2025 for the Sydney Metro – Western Sydney Airport stabling and maintenance facility (PLM)
Source: Construction Traffic Management Plan – SSTOM – Orchard Hills Stabling and Maintenance Facility (Table 10)

Vehicle Type*	AM peak			PM peak		
	IN	OUT	Total	IN	OUT	Total
LV Staff	20	0	**20**	0	30	**30**
LV Deliveries	1	1	**2**	1	1	**2**
HV	8	8	**16**	8	8	**16**
Total	**29**	**9**	**38**	**9**	**39**	**48**

4.3 Traffic distribution

To account for peak traffic directional flows, the following assumptions were made for traffic generated by the various components of the proposed development:

- In the AM peak, 80 per cent of traffic generated by the proposal travelled inbound to the site, and 20 per cent outbound.
- In the PM peak, 60 per cent of traffic generated by the proposal travelled inbound to the site, and 40 per cent outbound.

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

- The future transport and road configuration in the vicinity of the site: the dominant freeway in the area is the M4 Western Motorway in the north, but the importance of the southern areas will be increasing with the proposed M12 Motorway and the development of the broader Aerotropolis (Northern Gateway Precinct).
- The distribution of residential, commercial, and other land use development in the surrounding areas.
- The likely distribution of employees' places of residence in relation to the site.
- The configuration and staging of the access points to the site.

In consideration of the above, the following distribution and assignments were adopted in this assessment:

- To/ from Luddenham Road north (towards Mamre Road) = 70 per cent.
- To/ from Luddenham Road south (towards Elizabeth Drive) = 30 per cent.

4.4 Operational traffic impact assessment

4.4.1 Modelling approach and assessment criteria

The assessment of the performance of the intersections were tested using SIDRA Intersection 9.0. Unless otherwise specified, the default model parameters were adopted for the intersection models. All traffic models were modelled as a 'Network' site in SIDRA 9.0.

The operational performance of the intersection was evaluated by assessing the average vehicle delay and the corresponding **Level of Service** (LoS). The average vehicle delay and level of service were assessed in accordance with the RMS Traffic Modelling Guidelines and is summarised in Table 4-7.

The RMS Traffic Modelling Guidelines recommends that LoS is determined by the critical movement with the highest delay for priority intersections such as roundabout and sign-controlled intersections. With these intersection controls (roundabout, stop and give way sign controls), some movements may experience high levels of delay while others may experience a minimal delay.

The level of service criteria for a signalised intersection is related to the average intersection delay measure in seconds per vehicle.

Table 4-7 LOS Criteria for Intersection Capacity Analysis

Level of Service	Traffic Signals	Description of intersection operation
A	d ≤14	Good operation
B	15 ≤ d ≤ 28	Good with acceptable delays & spare capacity
C	29 ≤ d ≤ 42	Satisfactory
D	43 ≤ d ≤ 56	Operating near capacity
E	57 < d ≤ 70	At capacity, at signals, incidents will cause excessive delays Roundabouts require other control mode
F	d > 70	Unsatisfactory and requires additional capacity.

Source: RMS Traffic Modelling Guidelines, 2013

Degree of Saturation (DoS) is equal to the *demand to capacity ratio* for each traffic movement, with the overall intersection DoS defined as the highest DoS of all individual movements calculated at the intersection. For various intersection controls, the following DoS ratings are defined in Table 4-8.

Table 4-8 Degree of saturation (SIDRA 9.1)

Degree of Saturation (DoS)	Rating
DoS < 0.6	Excellent
0.6 < X < 0.7	Very good
0.7 < X < 0.8	Good
0.8 < X < 0.9	Acceptable
0.9 < X < 1.0	Poor
X > 1.0	Very poor

The intersection traffic performance targets established for this assessment include:

- An overall intersection level of service (LoS) D or better
- A degree of saturation (DoS) of
  - Less than 0.85 for roundabouts
  - Less than 0.90 for signalised intersections.

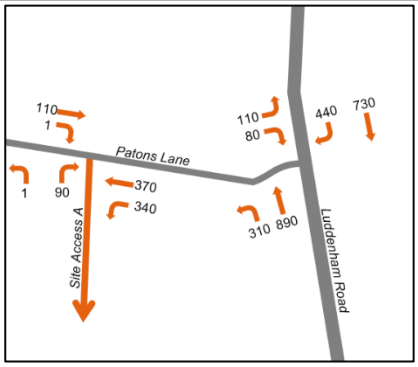
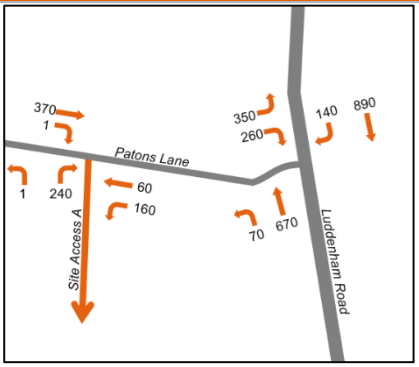
4.4.2 Assessed network and traffic demand

This traffic impact assessment includes traffic modelling using SIDRA Network software to assess the impacts of COPE sensitive freight development at the Luddenham Road/ Patons Lane intersection and Patons Lane/ Site Access A intersection. For each of these intersections the following scenarios (A,B,C and D) have been considered:

- **Scenario A –** 2026 AIBP development with COPE sensitive freight operational demand and adjacent warehouse's operational demand.
- **Scenario B –** 2026 sensitivity assessment using the previously adopted AIBP masterplan (Arcadis, 2023) traffic generation rates for COPE sensitive freight and adjacent warehouse's operational demand.
- **Scenario C –** 2036 AIBP development with COPE sensitive freight operational demand and complete AIBP operational demand.
- **Scenario D –** 2036 sensitivity assessment using the previously adopted AIBP masterplan (Arcadis, 2023) traffic generation rates for COPE sensitive freight and complete AIBP operational demand.

Table 4-9 summarises the turning movements that result from the generation and distribution of trips during the AM and PM peak periods for the modelled scenarios, and the ultimate development state for AIBP

Table 4-9 Turning movement demands

Scenario	AM PEAK	PM PEAK
A		

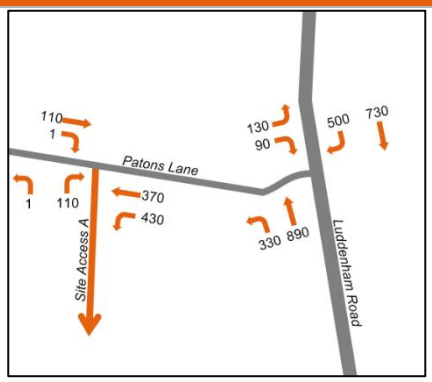
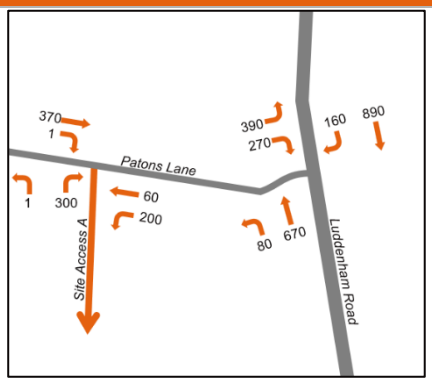
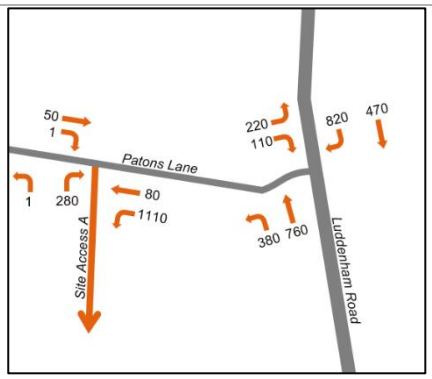
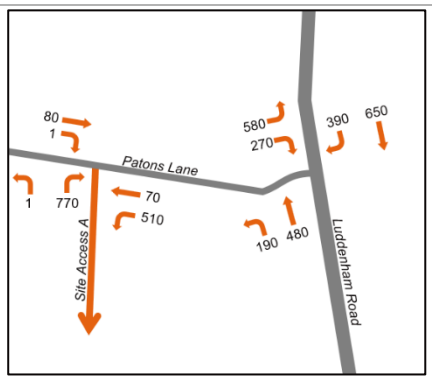
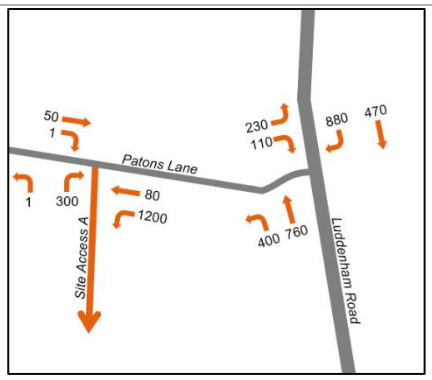
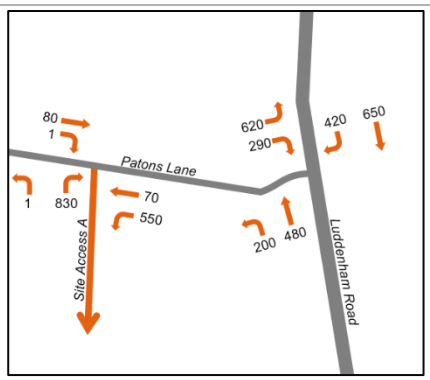
Scenario	AM PEAK	PM PEAK
B		
C		
D		

Table 4-10 provides a summary of the demands used in the previous assessment against the identified operational and construction demands in Section 4.1.

Table 4-10 Traffic demand summary

Stage	Area (m^2)	AM trips	PM trips	Daily trips
DA assessment				
Cope Warehouse demand	78,688	57 (82% HV)	58 (83% HV)	652 (29% HV)
Remaining AIBP demand	245,636	1,305 (22% HV)	1,207 (22% HV)	5,212 (22% HV)
TOTAL	**324,324**	**1,362 (22%HV)**	**1,265 (22% HV)**	**5,864 (22% HV)**
Sensitivity assessment				
Cope Warehouse demand	78,688	166 (15% HV)	158 (21% HV)	1,432 (29% HV)
Remaining AIBP demand	245,636	1,305 (22% HV)	1,207 (22% HV)	5,212 (22% HV)
TOTAL	**324,324**	**1,471 (22%HV)**	**1,365 (22% HV)**	**6,644 (22% HV)**

The following intersections were assessed as part of this traffic impact assessment, as recommended in the AIBP masterplan (Arcadis, 2023):

- Luddenham Road and Patons Lane:

  The Luddenham Road/ Patons Lane intersection was modelled as a signalised intersection with two through lanes and two right lanes in the north approach and two through lanes and a right slip lane in the south approach.

- Patons Lane and Site Access Road:

  The Patons Lane/ Site Access Road was modelled as a two-lane roundabout with two full lanes on the east and south approach and one lane on the west approach

The assessed network configuration is provided in Figure 4-3.

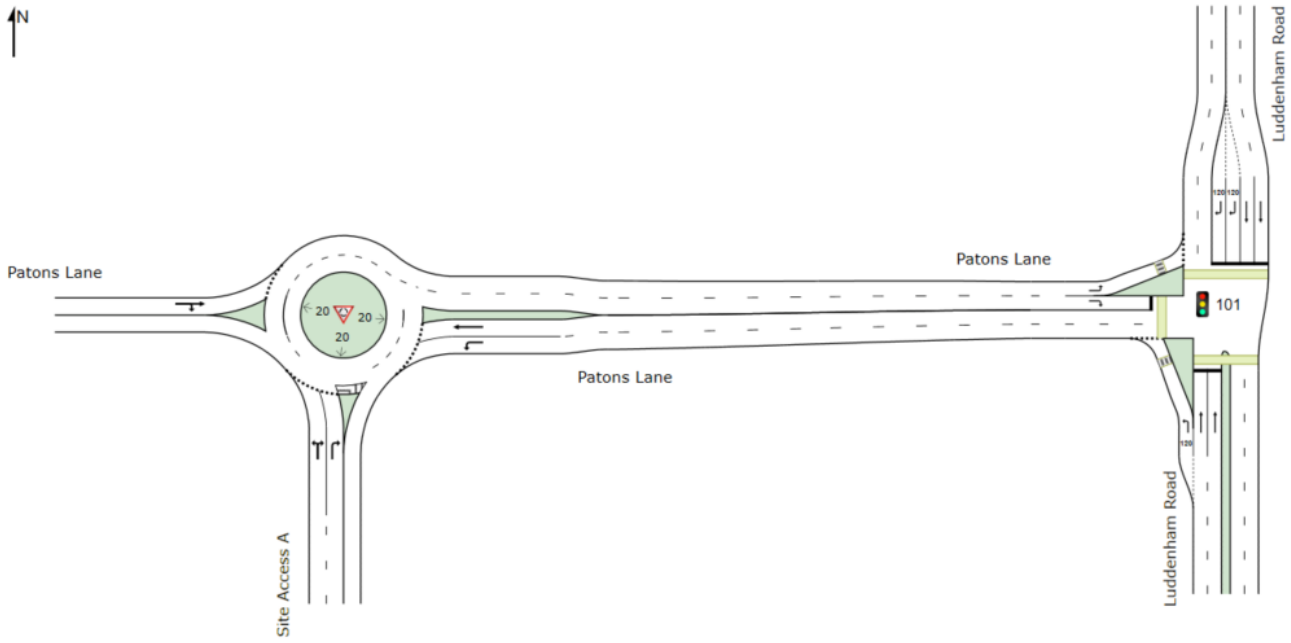


Figure 4-3 Signalised intersection at Luddenham Road and Patons Lane with Luddenham modelled as a two-lane configuration

4.4.3 Findings and results

Table 4-11 summarises the AM and PM peak intersection performance results for the assessed scenarios as mentioned above in section 4.4.2. Both the Patons Lane/ Site access A and Luddenham Road/ Patons Lane intersections are expected to operate at LOS C or better, which is considered an acceptable level of operation.

Table 4-11 SIDRA Modelling outputs

Scenario	Intersection	Intersection treatment	Peak hour	Volume	DoS	LoS
A	Patons Lane / Site Access A Road	Roundabout	AM	960	0.260	A
			PM	876	0.417	A
	Luddenham Road / Patons Lane Intersection	Signalised intersection	AM	2695	0.701	B
			PM	2505	0.545	B
B	Patons Lane / Site Access A Road	Roundabout	AM	1076	0.287	A
			PM	981	0.432	A
	Luddenham Road / Patons Lane Intersection	Signalised intersection	AM	2811	0.734	B
			PM	2589	0.564	B
C	Patons Lane / Site Access A Road	Roundabout	AM	1602	0.740	A
			PM	1507	0.340	A
	Luddenham Road / Patons Lane Intersection	Signalised intersection	AM	2905	0.863	C
			PM	2905	0.610	B
D	Patons Lane / Site Access A Road	Roundabout	AM	1718	0.800	A
			PM	1613	0.367	A
	Luddenham Road / Patons Lane Intersection	Signalised intersection	AM	3000	0.899	C
			PM	2800	0.650	B

The assessment identified that the Patons Lane and Site Access Road intersection meets both the traffic performance criteria for capacity and delay across all scenarios considered in this assessment, including the fully developed AIBP site scenario.

For the Luddenham Road and Patons Lane intersection, the signalised intersection treatments meet the traffic performance criteria for delay across all scenarios. The signalised intersection meets the criteria for capacity for all scenarios, with results indicating a DoS less than 0.9, which is the acceptable limit set by the RMS modelling guidelines.

4.5 Construction traffic impact and mitigation

4.5.1 Construction impact

A comparison of the traffic demand generated by the proposal against the broader AIBP traffic impact assessment demonstrates the future road network will accommodate the likely traffic demand during construction. The total traffic demand for this stage of development is less than the modelled demand, with the SIDRA results demonstrating both the Site Access Road / Patons Lane and Patons Lane / Luddenham Road intersections performing at LoS C or better.

The COPE Sensitive Freight development will be constructed in conjunction with bulk earthworks, intersection upgrades and surrounding warehouse lots, as part of the wider AIBP development. Access to an existing maintenance driveway along Luddenham Road can be utilised to reduce construction traffic volumes accessing the site via the northern intersection (Luddenham Road / Patons Lane).

Separate warehouses are proposed for construction within the AIBP during the same construction period. These construction sites all follow right-in/left-out turning movements to facilitate smooth traffic flow. Separation is also provided between the access points of the COPE warehouse and the adjacent proposed construction site (WH 9) south of the development. Both sites have their entry points on the south side of the warehouse, providing adequate separation within the internal road network for the mixture of vehicles requiring access to each individual site.

Furthermore, this separation is consistent with any proposed concurrent construction/operation of AIBP warehouses to the south of the site, minimising the risk of causing traffic congestion and queuing particularly for multiple heavy vehicles attempting to access the constructions sites and those which may be in operation.

4.5.2 Construction period traffic assessment

The site is expected to generate an estimated average traffic demand of 20 heavy vehicles and 60 light vehicles a day during the construction period. It is assumed that 30 per cent of heavy vehicles enter or exit the site during each AM and PM peak hours, and all light vehicles enter the site during the AM peak hour and exit during the PM peak hour. A Traffic Management Plan should be prepared when applying for the construction certificate to manage heavy vehicles traffic movements efficiently throughout the day and to minimise any traffic impacts during the peak periods.

A high-level assessment of roadway capacity to facilitate this demand was undertaken, adopting the methodology for single lane flow outlined in the Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods.

$$C = 1800 f_W f_{HV}$$

where

C = capacity in veh/h under prevailing roadway and traffic conditions

f_W = adjustment factor for narrow lanes and lateral clearances, obtained from Table 5.1

f_{HV} = adjustment factor for heavy vehicles

$= 1/[1+ P_{HV} (E_{HV} - 1)]$

P_{HV} = the proportion of heavy vehicles in the traffic stream, expressed as a decimal

E_{HV} = the average passenger car equivalents for heavy vehicles obtained from Table 5.2.

Figure 4-4 Capacity for single lane flow

Adopting the assumption that about 20 per cent of all vehicles on Luddenham Road are classified as heavy vehicles, the estimated capacity per lane is 1,500 vehicles per hour.

The estimated total demand on Luddenham Road during the 2026 construction period is shown in Table 4-12 and shows that there is over 30 per cent spare capacity remaining. The construction works therefore are not expected to result in adverse traffic impacts from a capacity perspective.

Table 4-12 Construction period vehicle passenger car units (PCU) assessment on Luddenham Road

Peak hour	Direction	2026 estimated demand			Capacity	Sufficient
		Background	Construction*	Total		
AM peak	Northbound	870	5	875	1500	✓
	Southbound	690	15	705	1500	✓
PM peak	Northbound	640	15	655	1500	✓
	Southbound	880	5	885	1500	✓

** Construction volumes shown are for the construction of the COPE Sensitive Freight development. Refer to the Bulk Earthworks DA for the cumulative construction impact on Luddenham Road.*

4.5.3 Construction mitigation and management measures

Traffic Management

A range of mitigation and management measures would be needed to manage the impacts to traffic and transport during construction. These include:

- Traffic Guidance Schemes would be prepared and implemented in accordance with the Traffic control at work sites, version 6.1 (TfNSW, 2022) by suitably qualified personnel.
- Dilapidation surveys of roads around the proposal area would be undertaken prior to their use for construction as well as after construction is complete. Any damage to roads will be repaired.
- Direct access at the frontages would be provided with adequate sight distances relating to the posted road speed. This will allow vehicles on the main road to see vehicles emerging from the construction compound and will allow ample room to slow down and stop if necessary. Similarly, it will allow vehicles waiting to emerge from the site access, adequate sight distance to see approaching vehicles and determine acceptable gaps for them to enter the main road traffic.
- All vehicles accessing the site for the purpose of material delivery and construction works would be fitted with safety flashing lights located on the top of the vehicle and functioning reverse beepers. All operators will be licensed for the particular item of plant/ equipment and will demonstrate competence in the use of the plant/ equipment as part of the site management and safety plan.
- Only left-in/ right-out movements would be provided at the site access point.

Site access to Sydney Metro Western Sydney Airport stabling and maintenance facility

Patons Lane is the only vehicular access road to the Sydney Metro Western Sydney Airport stabling and maintenance facility. Access to the Sydney Metro facility along Patons Lane must be always maintained as there are no alternative access options.

Stakeholder consultation with Sydney Metro is required to understand the vehicular movements associated with the stabling and maintenance facility to mitigate any negative impacts.

4.6 Broader operational traffic impact

4.6.1 Operational traffic impact

Based on a comparison of traffic demand against the broader AIBP traffic impact assessment, and the operational traffic generated by the proposed development, the future road network will accommodate the operational traffic in both scenarios involving the AIBP development with COPE freight demand and the fully developed AIBP site. The total traffic demand for this proposal is less than the modelled demand, with the SIDRA results demonstrating both the Site Access Road / Patons Lane and Patons Lane / Luddenham Road intersections performing at a LoS C or better in both scenarios.

A swept path analysis has been undertaken for the warehouse hardstand movements around the truck wash bay, refuelling station, and weighbridge. The clearances for the trucks in this area were deemed sufficient and a copy of the swept path diagram is provided in Appendix C.

Active transport network

No additional provisions have been made for people walking or people cycling to site during the construction phase.

Pedestrian movements around the site are expected to be predominately generated by the residential homes on the eastern side of Luddenham Road. Construction work may result in reduced visibility of pedestrians entering and exiting residential driveways. Construction works may also result in some narrowing of existing traffic lanes along Luddenham Road, in addition to decreased visibility. These factors present potential safety issues for cyclists on the network.

However, considering the land use around the site that is predominately zoned as RU2 Rural Landscape and E2 Environmental Conservation, with no dedicated pedestrian or cyclist facilities currently being available along Luddenham Road and Patons Lane, overall low active transport demand is expected around the area. The construction works are not expected to impact significantly on pedestrians and cyclists in the area.

Public transport network

Due to the land zoning and low density of residential dwellings in the area, it is not serviced by any train stations. There are currently no bus services running along Luddenham Road that stop near the site. Construction is not expected to impact on any public transport in the area.

Road network

The Sydney Metro Western Sydney Airport stabling yard and maintenance facility is accessed via Patons Lane, about 1.3 kilometres west of Luddenham Road. The construction period for the maintenance facility would coincide with the construction period of the Alspec Industrial Business Park, requiring light and heavy vehicle access along Patons Lane to be maintained. The newly constructed temporary arrangement for site access on Patons Lane does not currently result in any layout changes that would limit east-west truck movements to the west and is not expected to impact on vehicle access to the site of the maintenance facility. However, the intersection is planned to be upgraded to a roundabout in the future. With Patons Lane being the only access road to the maintenance facility, it is critical that east-west through movements along the road as well as its connection to Luddenham Road are not disrupted.

Construction traffic impacts on through traffic on Luddenham Road are similarly required to be managed, as the formalisation of the two proposed site accesses along the road would potentially disrupt through traffic operations. The broader masterplan seeks approval for a signalised intersection at Luddenham Road/ Patons Lane. This is being considered as part of a separate development application.

4.6.2 Operational traffic management measures

To support non-private vehicle access to the site during normal operations, a Green Travel plan has been prepared that outlines the management measures that can be adopted for the development, which is provided in Appendix B.

5 Car parking assessment

The site has specific provisions with parking outlined in the Penrith Development Control Plan (DCP) E17 Luddenham Road Industrial Business Park. A summary of the rates is outlined in Table 5-1.

Table 5-1 Parking requirements for Luddenham Road Industrial Business Park (source: Penrith DCP E17 Luddenham Road Industrial Business Park)

Activity	Parking Requirement
Freight transport facilities	1 per transport vehicle present at peak vehicle accumulation plus 1 per 2 employees, or to be determined by a car parking survey of a comparable facility
Industries	1 space per 200 m^2 of gross floor area or 1 space per 2 employees, whichever is the greater
Vehicle body repair workshops/ vehicle repair stations	3 spaces per 100 m^2 of gross floor area or 6 per work bay, whichever is the greater
Warehouses or distribution centres	**1 space per 300 m^2 of gross floor area or 1 space per 4 employees, whichever is the greater.**
Ancillary office space	1 space per 40 m^2 of gross floor area
Neighbourhood shops	1 space per 40 m^2 of gross leasable area
Accessible parking	Accessible car spaces should be in accordance with the Access to Premises Standards, Building Code of Australia and AS2890.
Bicycle parking	1 space per 600 m^2 of gross floor area of office and retail space (over 1200 m2 gross floor area) 1 space per 1000 m^2 of gross floor area of industrial activities (over 2000 m2 gross floor area)
Electric vehicle	1 space per 40 car spaces
Car share	1 space per 40 car spaces
Electric bicycle	A charging station for electric bicycles is provided for the first 5 bicycle spaces within a development, and for every 10 bicycle spaces thereafter
Motorcycle parking	1 space per 10 car spaces

5.1 Proposed parking provisions

The parking provisions for the site are identified in the Penrith DCP E17 Luddenham Road Industrial Park. The minimum requirements stipulated in the Penrith development control plan (DCP) aims to ensure that the development functions efficiently and there is limited impact on street parking and congestion. The car parking requirements for warehouse developments are:

- 1 space per 300 m^2 of warehouse GFA.
- 1 space per 40 m^2 of GFA for ancillary office spaces.

An assessment of the parking requirements for the proposed development is provided in Table 5-2,

Table 5-2 Parking requirements

Land use	Area (m^2)	Parking rate	Minimum Parking requirement (spaces)
Cope Sensitive Freight Development	**38,500**		
• Warehouse	37,000	1 space per 300 m^2 GFA	124
• Office	1,500	1 space per 40 m^2 GFA	38
		TOTAL	**162**

The proposed site plans for the COPE warehouse facility indicate 226 car spaces will be provided for the development (222 spaces within the private vehicle car park plus four spaces on the western side of the hardstand). This exceeds the minimum parking requirements as outlined in the Penrith DCP E18.

Electric vehicle parking

As outlined in the Penrith DCP E17 Luddenham Road Industrial Business Park, electric vehicle parking and charging stations are to be integrated into car park design on the development site. This includes:

- Charging stations to be located within or immediately adjacent to the parking spaces.
- The charging stations to be located clear of pedestrian paths of travel and do not impede desire lines.
- A provision for electric vehicle parking of is identified as one charging space per 40 car spaces.

To meet the Penrith DCP E17 Luddenham Road Industrial Business Park controls, at least four car spaces will be designated for electric vehicles with charging stations. The Penrith DCP E17 Luddenham Road Industrial Business Park controls outline all car parking spaces should be designed to be easily converted into electric charging stations. Current site plans have designated six EV parking spaces with charging stations therefore, the site is compliant with the Penrith DCP.

Car share parking

The Penrith DCP E17 Luddenham Road Industrial Business Park outlines car share parking rates for the development. One space per 40 car spaces will be allocated for car share. To meet the requirements outlined in the Penrith DCP, at least four car spaces will be dedicated for car sharing.

Motorcycle parking

The motorcycle parking requirements are outlined in the Penrith DCP E17 Luddenham Road Industrial Business Park. The site-specific controls outline one motorcycle space per 10 car spaces. To meet the minimum requirements, the site must provide at least 16 motorcycle spaces.

5.2 Accessible parking

As outlined in Part C10 of the Penrith Developmental Control Plan (DCP), accessible parking is to be provided in accordance with the Disability (Access to Premises – Buildings) Standards 2010 from the Building Code of Australia and Australian Standard AS 2890.

The accessible parking requirements in the Disability (Access to Premises – Buildings) Standards states for offices (Class 5) and warehouses (Class 7) should be provided at the rate of one space for every 100 car spaces or part thereof.

Accessible spaces within the industrial development are to be designed in accordance with the Australian Standard AS 2890.6 for accessible parking. These parking spaces shall be designed with minimum dimensions of 2.4-metre width and 5.4-metre length with an aisle width of 5.8 metres.

For the proposal to meet the requirements stipulated in the Penrith DCP, the development will be required to provide at least two accessible (disabled) parking spaces. Current site plans have designated three accessible parking spaces therefore, the site is compliant with the Penrith DCP.

5.3 Bicycle parking

Regarding bicycle parking and end-of-trip facilities, the Penrith Development Control Plan (DCP) E17 Luddenham Road Industrial Business Park permits bicycle parking to be in secure, visible, and accessible locations, and provided with weather protection, in accordance with AS2890.3:1993 Bicycle Parking Facilities.

The following associated facilities are to be provided:

- For ancillary office and retail space with a gross floor area over 2,500 m^2, at least one shower cubicle with ancillary change rooms
- For industrial activities with a gross floor area over 4,000 m^2, at least one shower cubicle with ancillary change rooms
- Changing and shower facilities for cyclists and are to be conveniently located close to the bicycle storage areas
- Where the building is to be strata-titled, the bicycle storage facilities and shower/ change facilities are to be made available to all occupants of the building.

In terms of overall bicycle parking provision, the Penrith DCP E17 Luddenham Road Industrial Business Park provides the following bicycle parking rates for the site:

- One space per 600 m^2 of gross floor area (GFA) of office and retail space (over 1,200 m^2 GFA)
- One space per 1,000 m^2 of GFA of industrial activities (over 2,000 m^2)

As the proposal is developed, appropriate bicycle parking and storage will be provided in accordance with the Penrith DCP. A total of 39 bicycle parking spaces will be provided on site. Given the size of the site, there is ample area available to cater for the bicycle parking provision.

5.3.1 Electric bicycle parking

Requirements for electric bicycle facilities are set out in the Penrith Development Control Plan (DCP) E17 Luddenham Road Industrial Business Park. Charging stations will be provided on-site at a rate in accordance with the DCP as the proposal is developed. One charging station for electric bicycles should be provided for the first five bicycles spaces within a development, and one charger for every 10 bicycle spaces afterwards. A total of four electric bicycle charging stations will be provided at the completion of the proposal.

5.4 Parking summary

The COPE Sensitive Freight warehouse development currently includes a provision of a total of 226 car spaces, which meets the parking requirement of 162 car spaces outlined in Section 5.1. At least two accessible parking spaces should be provided from the 226 car spaces proposed. The development should provide at least four car spaces with charging stations for electric vehicles. At least 16 spaces should be provided for motorcycles.

The bicycle parking rates required to meet the requirements specified in the Penrith DCP have been outlined in this report and will be accommodated during the proposal development.

In summary, the parking demand generated by the land uses will be met on-site and will meet the requirements set out in the Penrith Development Control Plan (DCP) E17 Luddenham Road Industrial Business Park. Current site plans for the car parking and manoeuvring were deemed to be satisfactory after being assessed against AS 2890 Parts 1, 2 and 6 and the Penrith DCP.

6 Access and internal design assessment

6.1 Site access and internal configuration layout

As identified in Section 3, the development plans show three vehicle access points into the site. The entry point for heavy vehicles is provided along the southern side of the project boundary, with the exit provided along the northern project boundary. The design indicates a 36-metre-wide hardstand on the southern side of the complex, a 40-metre wide hardstand on the northern side, and a variable width constricted by the site boundary on the west side. The heavy vehicle access is a minimum of seven metres wide throughout the site, with clearance to loading facilities and trailer parking areas.

A hardstand surrounds the main warehouse building and has been designed to accommodate heavy vehicle movements (in a clockwise direction), parking bays, loading docks, truck wash facilities, refuelling bays, and a weighbridge. The design indicates that on the northern boundary of the warehouse building, loading zones have been provided for trailers and trucks for staging of client equipment, truck checks and installing equipment in vehicles. Furthermore, loading docks have been provided on the southern boundary for rigid trucks, linehaul trailers and local delivery fleet to load and go out for deliveries. Proposed dock usage for the site hardstand as provided by COPE is given in Appendix D, highlighting each loading zone / dock along with their intended usage and frequency of truck movements.

Light and passenger vehicle movements are separated from heavy vehicle movements, with the car park access driveway located on the southern side of the development, between the entry and exit points for heavy vehicles.

6.2 Car parking

A total of 222 parking spaces have been provided for within the carpark at the front of the site. An additional four parking spaces are provided on the western side of the hardstand, making a total of 226 parking spaces for the development.

The design of the parking area generally complies with the guidance on driveway access into the development, warehouses and car parking spaces shown in *AS 2890.1 Off-street car parking*. Provisions for accessible parking spaces, as identified in Section 5.2, should be considered in accordance with *AS 2890.6 Parking facilities Off-street parking for people with disabilities.*

6.3 Pedestrian access

Along the frontage of the site, the road reserve width is sufficient to accommodate footpaths along both sides of the road in accordance with the requirements of the Penrith DCP. Within the site, pedestrian access should be provided to the office and warehouse, by extending the pedestrian pathway along the northern and southern edges of the parking area to the site boundary. This will allow pedestrians clear and delimited access from the building into the broader pedestrian network outside the site.

Within the site, pedestrian pathways have been clearly identified within the warehouse. Based on current practices, delineation of pathways for pedestrians across the hardstand area are not expected to be required, however this should be monitored as operations across the site become active.

7 Summary

The proposal is for the development of an 80,170 m^2 parcel of land as part of Alspec Industrial Business Park (AIBP) construction. The COPE Sensitive Freight development will comprise of a 37,000 m^2 warehouse and 1,500 m^2 office, as well as supporting car parking for both heavy vehicles and cars.

The key findings of this assessment are:

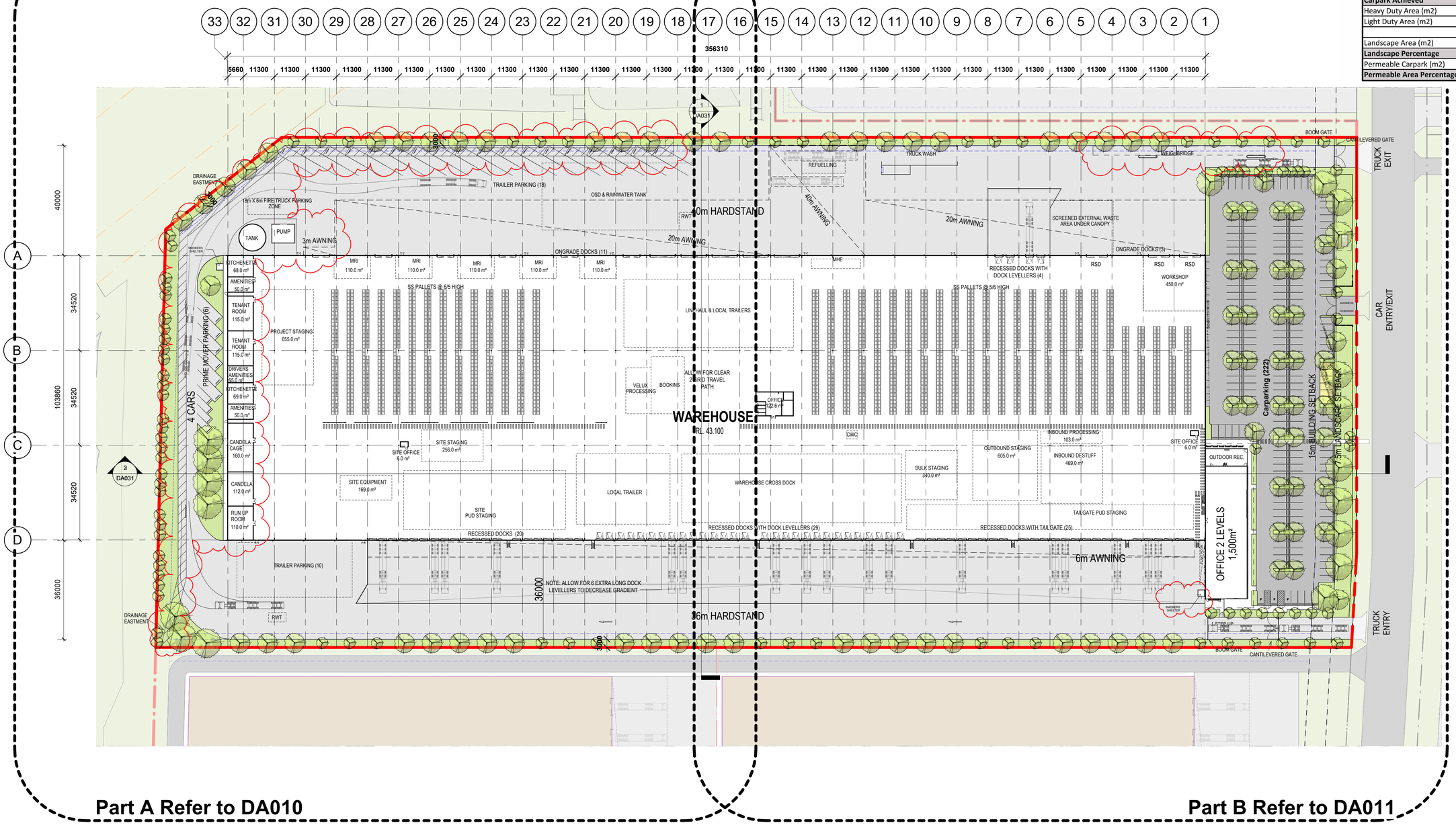
- Access to the site will be provided via a site access road within the AIBP development with access to the broader road network via Patons Lane.
- The traffic demands associated with the potential development during construction and the operation of the site is expected to be accommodated safely.
- The provided car parking meets the anticipated demands generated by the site. Provisions for accessible parking and bicycle parking will be accommodated during further development of the proposal.
- The internal configuration of the site has been designed in accordance with Penrith City Council's DCP and the relevant Australian Standards.

Modelled assessment results indicate the development has negligible impact on the surrounding road network, pedestrian and cyclist facilities, and public transport services. Additionally, minimal disruption is foreseen to the ongoing Sydney Metro construction and operations.

It is therefore concluded that the proposed COPE Sensitive Freight development at the subject site of 221 Luddenham Road, Orchard Hills, is supportable on traffic planning grounds.

Appendix A - Site Plans

221-227 Luddenham Road, Orchard Hills NSW	
DA005	**8-Jul-24**
SITE AREA (m2)	**80,170**
Warehouse Area (m2)	37,000
Office Area (m2)	1,500
Total Building Area (m2)	**38,500**
FSR	**0.48:1**
Carpark Achieved	**222**
Heavy Duty Area (m2)	29,636
Light Duty Area (m2)	5,869
Landscape Area (m2)	6,138
Landscape Percentage	**7.7%**
Permeable Carpark (m2)	5,869
Permeable Area Percentage	**15.0%**



1 Site Plan
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Client

COPE SENSITIVE FREIGHT

Issue	Description	Date
H	LAYOUT ADJUSTMENTS	15/11/2024
G	UPDATED FOR DA	18/09/2024
P1	UPDATED AREA TABLE	08/07/2024
F	UPDATED GATE	25/03/2024
E	FOR DA	13/02/2024
D	FOR DA	06/02/2024
C	FOR DA	11/12/2023
B	FOR DA	07/12/2023
A	FOR DA	29/11/2023

Project Name
Industrial Warehouse Development
Cope Sensitive Freight DC
Project Address
Alspec Industrial Business Park
221 - 227 Luddenham Road, Orchard Hills NSW

Key Plan
0 15000 37500

Drawing Title: **Site Plan**

Author:	Checker:	Sheet Size:	Scale:
MJ	NG	A1	1:750

Drawing Number: **13102_DA005** Issue: **H**

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Appendix B – Green Travel Plan

Green Travel Plan

COPE Sensitive Freight Development, Orchard Hills NSW

22 November 2024

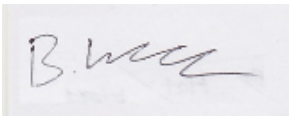
COPE Sensitive Freight, Orchard Hills NSW

Green Travel Plan

22 November 2024

Our Ref:

30088823- TP-COPE-RPT-02-GTP



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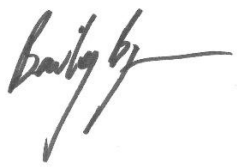


Bailey Byrnes

APPROVER

Version Control

Revision No.	Date Issued	Description	Author	Approver
0.1	16 October 2023	Draft report	B. Williams	B. Byrnes
1	1 December 2023	Final Report	B. Williams	B. Byrnes
1.1	2 April 2024	Final Report	B. Williams	B. Byrnes
1.2	22 October 2024	Final Report	N. Aryan Thope	B. Byrnes
1.3	22 November 2024	Final Report	N. Aryan Thope	N. Vukic

Contents

Figures

Acronyms and Abbreviations

Acronym	Definition
AIBP	Alspec Industrial Business Park
GTP	Green Travel Plan
TIA	Traffic Impact Assessment
TAG	Transport Access Guide

1 Introduction

1.1 Background

This Green Travel Plan has been prepared to accompany a Traffic Impact Assessment (TIA) for the proposed COPE Sensitive Freight DC industrial warehouse development at 221 Luddenham Road, Orchard Hills.

The proposal is to develop a 7.8-hectare warehouse at the above address to accommodate a mix of warehouse and office land uses. The subject site is located on Luddenham Road, south of Patons Lane, in Orchard Hills. Situated approximately 30 kilometres west of Parramatta CBD, the proposed COPE Sensitive Freight warehouse is part of the larger Alspec Industrial Business Park (AIBP) development. The AIBP site is irregular in shape, with the COPE warehouse making up one of many split frontages across both Luddenham Road and Patons Lane.

The site location is shown in Figure 1-1 and current development plans are illustrated in Figure 1-2.

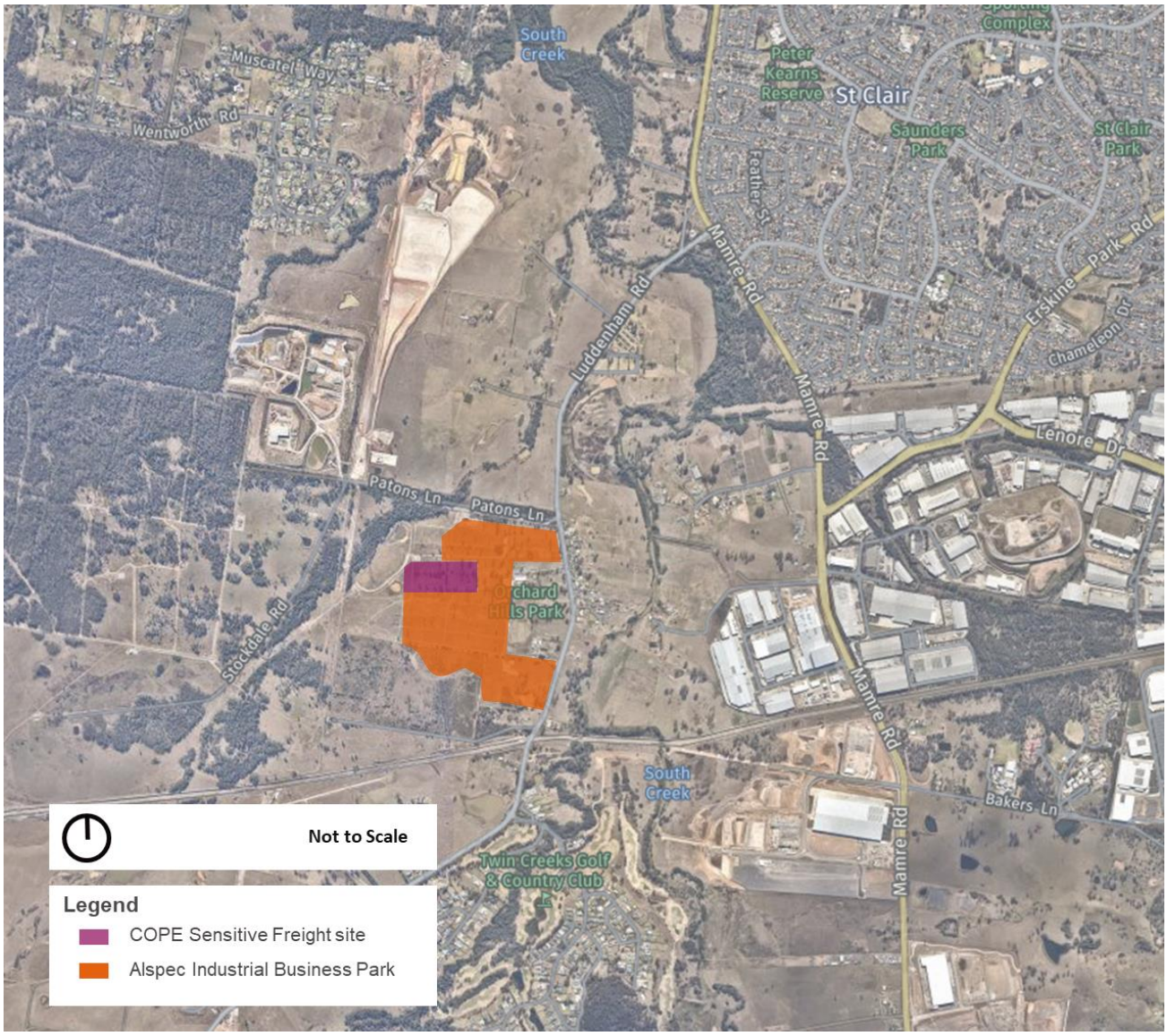


Figure 1-1 AIBP site location

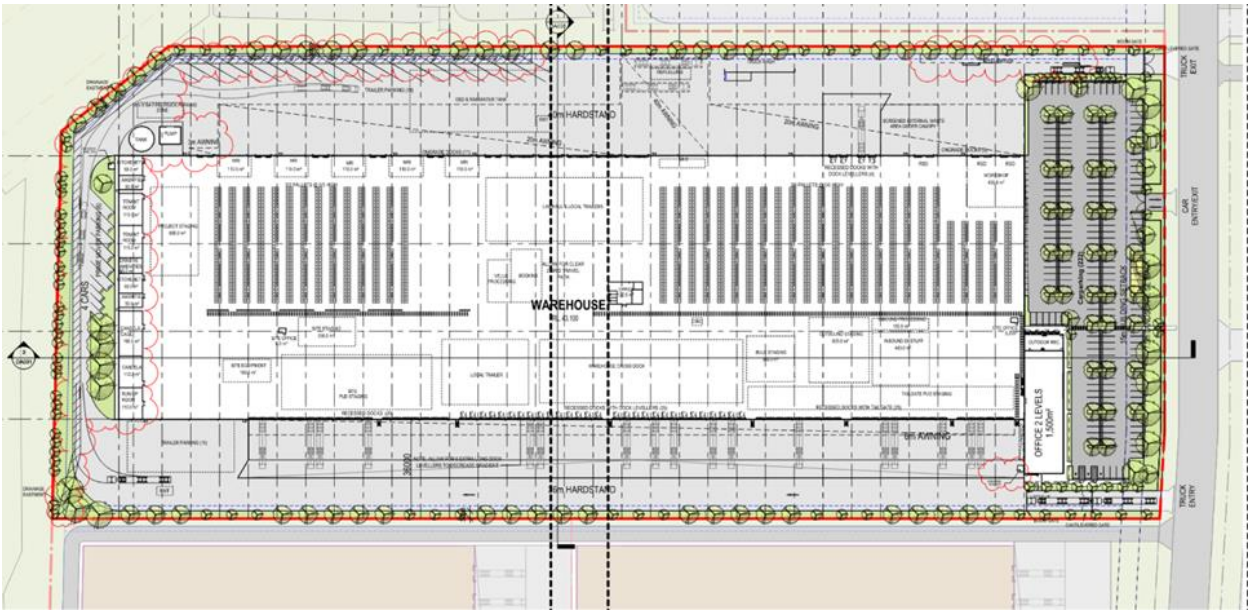


Figure 1-2 COPE Sensitive Freight warehouse proposal plan

1.2 Report purpose

The use of private vehicles is a major contributor towards both greenhouse gas emissions and traffic congestion on Sydney's roads, with significant environmental and social costs. As well as delivering better environmental outcomes such as reduced air and noise pollution, the promotion of sustainable travel options will provide both health and social benefits to the community and reduce traffic congestion.

The objective of this Green Travel Plan (GTP) is to provide information and recommendations on potential green travel options for commuters to the development site, and to provide, encourage and support the use of sustainable travel options.

1.3 Report structure

The report is structured as follows:

- **Section 2: Green Travel Plan Measures** provides an overview of the changes to the existing transport use due to the proposed development and summarises actions to encourage sustainable transport opportunities
- **Section 3: Monitoring and Review** provides an overview of ongoing monitoring actions to obtain maximum benefit from the GTP.

2 Subject site

The subject site is located at 221 Luddenham Road, Orchard Hills and has a surface area of 7.8 hectares. Currently, the site is largely a greenfield development with an underutilised surrounding network, which is expected to undergo significant changes over time.

2.1 Existing transport infrastructure

The following transport infrastructure is available at the subject site as of 22 October 2024.

2.1.1 Active transport infrastructure

There is limited pedestrian or cyclist infrastructure provided close to the site, mainly due to the nature of land use in the vicinity and the limited demand for such facilities at present.

2.1.2 Public transport

A review of the public transport available in the vicinity of the site indicates that there are three bus services (Routes 775, 776 and 779) that operate in the St Clair/ Erskine Park area to the northeast of the site. No bus services connect past the site to the south.

There are no rail stations close to the site.

Overall, the area is currently underserviced by public transport. Figure 2-1 shows a map of the existing public transport network for the Orchard Hills area and Table 2-1 shows the convenient transport services closest to the development.

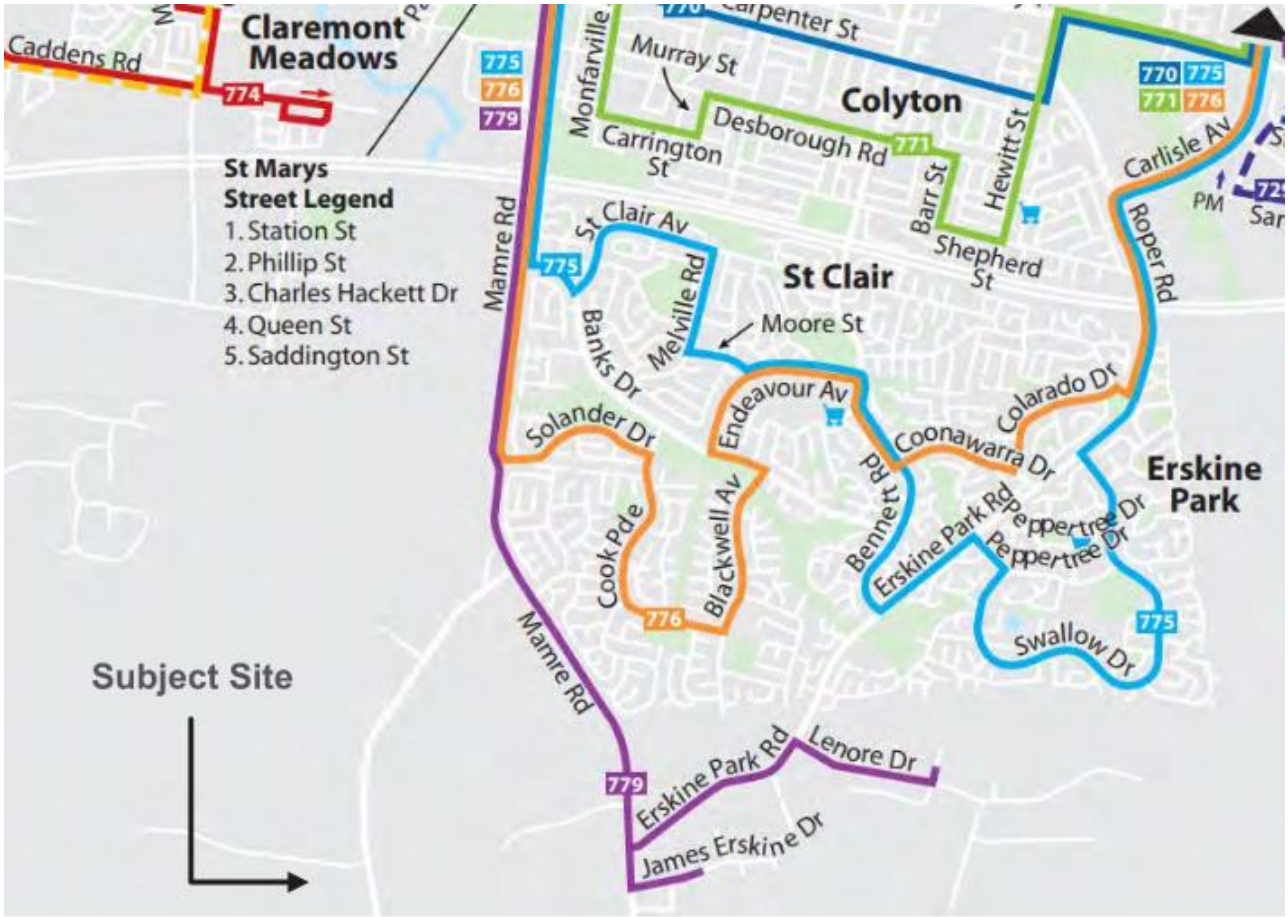


Figure 2-1 Existing Public Transport Network - Orchard Hills area

Table 2-1 Public transport services

Transport system	Closet stop	Route	Route Extents	Frequency
Train	St. Marys Station	Blue Mountains Line	Bathurst – Central	Peak: 30min Off Peak: 60min
Bus	St. Clair Avenue/Banks Drive	775	Mount Druitt Station – St Marys Station	Peak: 25min Off Peak: 35min
Bus	Solander Drive after Madison	776	St Marys Station – Mount Druitt Station	Peak: 15min Off Peak: 35min
Bus	Erskine Road/Mamre Road	779	St Marys Station – Emporium Avenue	Peak: 30min Off Peak: 45-60min

2.1.3 Car share and taxi service

Car share and taxi services are available close to the site. However, major centres where is such as Penrith and Blacktown, may be distant from the site to provide quick transport options.

3 Green Travel Plan

3.1 Targets

The area and road network around the site are expected to undergo significant changes over the next 20 years to support the broader Greater Penrith to Eastern Creek (GPEC) Growth Area, Western Sydney Employment Area (WSEA) and the Aerotropolis. The Aerotropolis precinct plan aims to ensure that all developments are within walking distance of the metro station and other public transport services available within proximity. While the site lies just to the north of the Aerotropolis, targets adopted by the area set a good benchmark.

Based on the site location, existing transport infrastructure and the aspirations of the adjacent Aerotropolis Precinct Plan, the following target is developed:

- ≤65% of employees commuting to work by single occupant vehicle by 2036.
- ≥30% of the primary mode of travel to be by public transport by 2036.

3.2 Actions

The following section provides recommendations to encourage the use of sustainable transport modes for the workers and visitors of the COPE Sensitive Freight development. The responsibility of implementing these actions is generally with either the developer or building management depending on the timeframe for the action.

A Transport Access Guide (TAG) will be provided to users of a building or facility, intended to inform of ways to access the site through walking, cycling or public transport. The objective of the TAG is to simplify the process of trip planning for visitors and can assist in increasing the proportion of trips made to the site through public and active transport modes. TAGs are typically updated annually to ensure the information is accurate and up to date.

A TAG has been specifically developed for the COPE warehouse and provided as Appendix A. This will be updated as part of the review process outlined in Section 3.

General measures	Timeframe	Responsible party
Introduce a travel coordinator role to execute the recommendations of this plan. This could potentially be incorporated into the facilities management function.	Prior to occupation	Building Management
Utilise social media opportunities to inform tenants and visitors of available sustainable transport options and facilities. To increase the use of the social media site this could be combined with other useful information including local events and building maintenance activities.	During operation	Building Management
Monitor the mode share, use and demand of facilities to inform future updates of the GTP.	During operation	Building Management
Prepare a Transport Access Guide that is provided to building occupants that details transport options to the site, a public transport map surrounding the site area, and site specific transport provisions. The TAG is recommended to be updated annually with the latest transport details.	Prior to and during operation	Building Management
Hold Travel Smart Get to Work days in the form of workshops encouraging employees to travel by walking, cycling and public modes of transport.	During operation	Building Management

Walking measures	Timeframe	Responsible party
Work with other stakeholders to improve wayfinding signage to public transport (bus stops, future rail networks) between the development and nearby infrastructure hubs such as St Clair and Erskine Park.	Prior to occupation	Building Management
Produce a walking map showing safe and pleasurable walking routes to and from the building with times, to local facilities, such as shops and bus stops	Prior to and during operation	Building Management
As part of building management activities, promote walking for short trips in lieu of using a private vehicle.	During operation	Building Management

Cycling measures	Timeframe	Responsible party
Provide 40 secure bicycle parking spaces to meet employee and visitor needs. Bicycle spaces to be easily accessible, well-lit and secure.	Prior to occupation	Architect / Contractor
Supply a communal bicycle repair toolkit for employees and visitors.	Prior to occupation	Building Management
Maintain a TAG (updated annually) that effectively informs employees and visitors of: • Safe and accessible cycling routes as well as end-of-trip facilities provided by the building. • Cycling clubs and bicycle user groups (BUGs) that may be lobbying for the improvement of cycle facilities in the surrounding area.	Prior to and during operation	Building Management
Ensure the bicycle parking and end of trip facilities within the building are maintained.	During operation	Building Management
Come to an arrangement with a local bicycle retailer for servicing of bikes and other incentives.	During operation	Building Management
Participate in annual events such as 'Ride to Work Day'.	During operation	Building Management

Public transport measures	Timeframe	Responsible party
Provide employees and visitors a map showing public transport stops in the surrounding area and expected walk times needed to access the locations.	Prior to and during operation	Building Management
Provide train and bus timetables for services in the local area as part of household welcome packs for all new employees.	During operation	Building Management

Carpooling and Car Share measures	Timeframe	Responsible party
Promote the cost savings of car share over commuting via private vehicle to employees through the TAG.	During operation	Building Management
Allocate spaces as required for car-sharing within the COPE Sensitive Freight warehouse.	During operation	Building Management

Car parking measures	Timeframe	Responsible party
Provide electric car charging stations within the site.	Prior to occupation	Architect / Contractor
Provide clear signage for and advertisement (within the TAG) of electric car charging stations within the site.	Prior to occupation	Architect / Contractor

4 Monitoring and Review

4.1 Updates to the Green Travel Plan

For this GTP to be effective, it should be reviewed by building management regularly to ensure that the objectives are being met. Travel surveys should be conducted, and the GTP and TAGs should be updated annually to achieve sustainable travel targets more effectively.

The following approach will be adopted for reviewing and updating this GTP:

- Prior to occupation:
    - Existing transportation options, infrastructure and potential amenities that support sustainable commuting will be evaluated and reviewed.
    - New employees/ relocated employees will be provided comprehensive information on sustainable travel options and incentives.
- Three to six months after occupation:
    - Travel surveys will be conducted to gather data on commuting habits, preferences and challenges faced by employees and visitors to identify areas for improvement. An example travel survey is provided in Appendix B.
    - Based on the survey findings, challenges will be addressed through sit specific initiatives including carpooling, cycling or public transport system.
- Annual reviews:
    - The GTP and TAGs should be updated with the latest data, trends and best practices pertaining to sustainable transportation.
    - Regular travel surveys can help assess employee commuting patterns to identify areas for improvement.
    - Implemented measures should be reviewed to evaluate the effectiveness of initiatives introduced, identify successes and areas needing improvement for continual enhancement of the green travel plan.

4.2 Responsibility

To ensure that the goals of this GTP are achieved, it is necessary to identify an individual or committee responsible for monitoring and managing various aspects of the plan. This group will monitor travel patterns and the effectiveness of the GTP, conduct ongoing travel surveys, and carry out the initiatives outlined in this plan.

Appendix A - Transport Access Guide

Getting to and from COPE SENSITIVE FREIGHT

The Alspec Industrial Business Park (AIBP) is approximately 6.8 kilometres from St Marys Train Station. The walking route from the Station (Station Street) to AIBP takes you along Mamre Road to Luddenham Road, and then along Luddenham Road to Patons Lane and the COPE site. Walking time from St Marys Station to AIBP is approximately 2 hours and is marked on the map in this TAG.

Bus services

The nearest bus services to the site are:

Route 775 which runs run from Mount Druitt to Penrith via St Clair and Erskine Park. The nearest bus stop is approximately 5 km away from the site, on St Clair Avenue just after Banks Drive.

Route 776 runs from Mt Druitt to Penrith via St Clair and Erskine Park. The nearest bus stop is approximately 3.7 km away from the site. The nearest bus stop is at Solander Drive after Madison Circuit.

Route 779 services run from Mount Druitt to Kemps Creek along Erskine Park. The nearest stop is on Erskine Road after Mamre Road.

For more information on bus timetables, see https://transportnsw.info/

Rail and Metro services

The nearest train station to AIBP is St Marys Station, located 6.8km north of AIBP.

A future Metro Station, Luddenham, is located 2km south of the site, and is anticipated to open in 2026.

Parking

All employee car parking is located on site. Entry to the parking area is on the AIBP access road, south of Patons Lane.

Electric vehicle charging infrastructure is available on site.

Accessible parking is provided on site, near the main building entrance.

Bicycle parking

Secure and visible parking spaces are available for bicycles and electric bicycles with charging stations and storage facilities available on site.

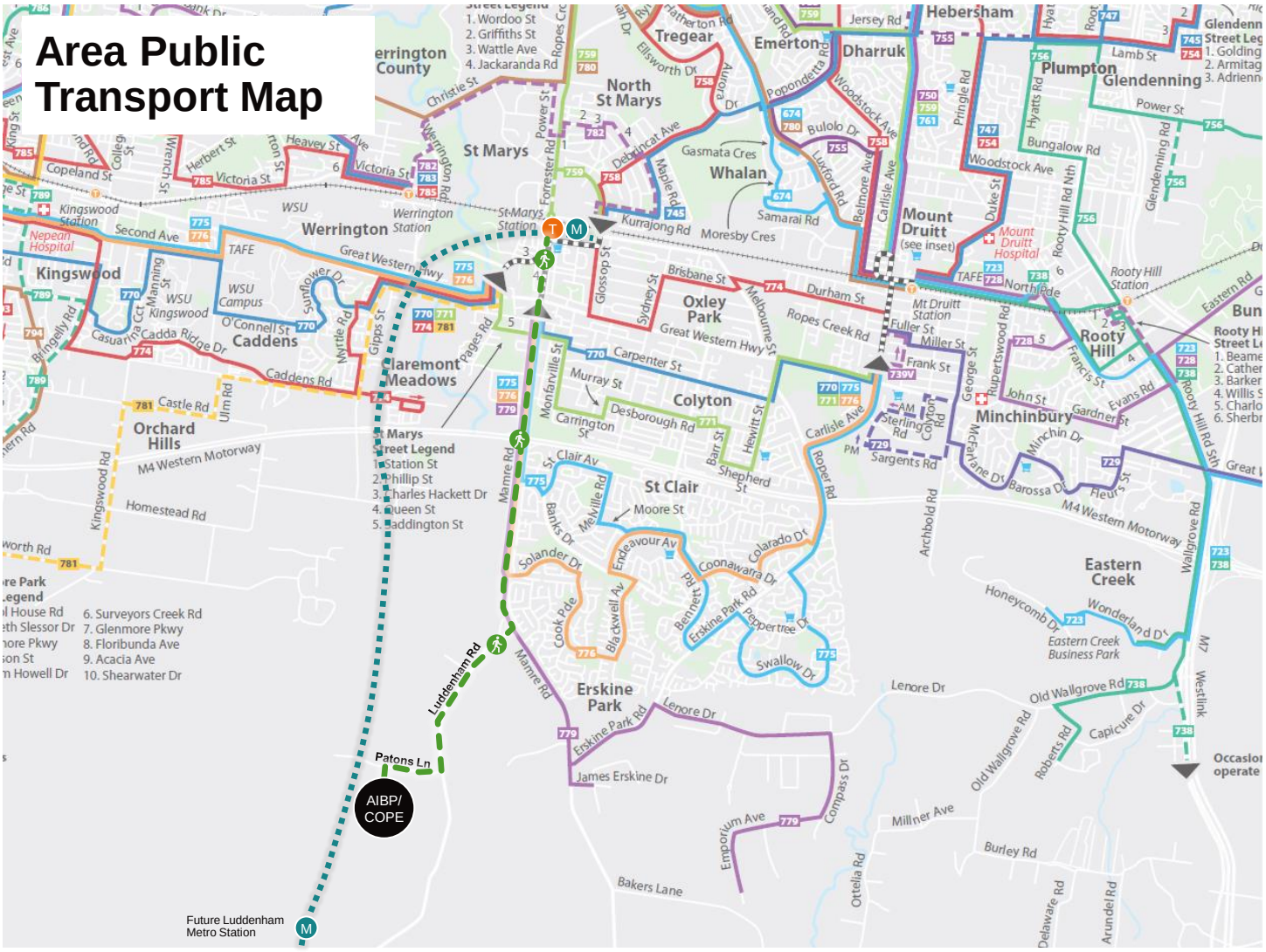
End of trip facilities are conveniently located close to bicycle storage areas.

For more information speak to the Facilities Manager at XXXX XXXX or at (email)

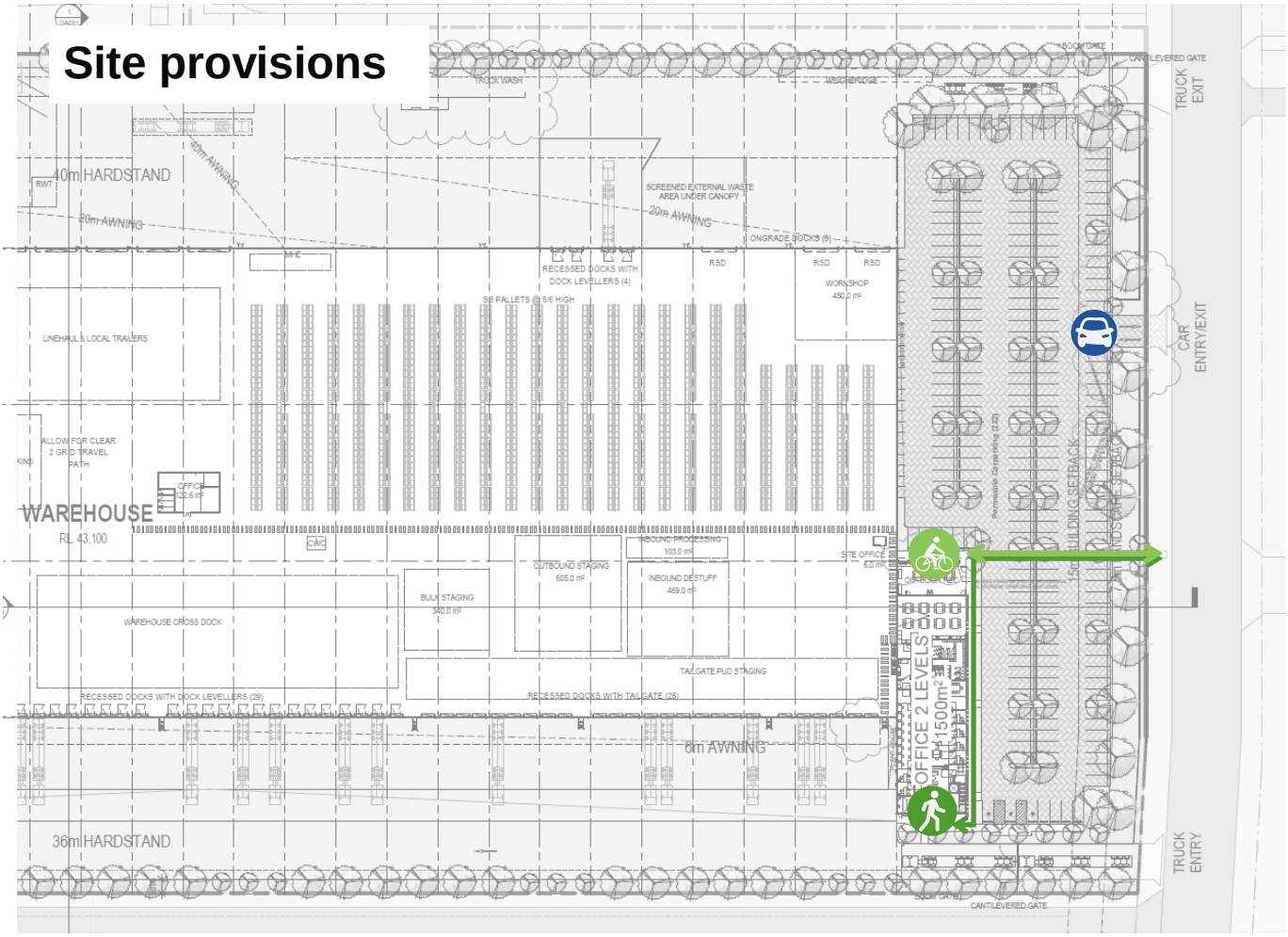
PRELIMINARY INFORMATION

This draft Transport Access Guide will be updated prior to occupation

Area Public Transport Map



Site provisions



Appendix B - Employee Commute Survey

The purpose of a travel survey is to understand the reasons for which commuters to and from the site select their preferred travel modes. In turn, this allows for more effective incentives and initiatives to be developed in increasing the mode share of sustainable travel options.

An example of a travel survey has been provided below.

You are invited to participate in the Employee Commute Survey being conducted by xxx. The purpose of this survey is to anticipate the transport related environmental impacts of the establishment and encourage the use of sustainable transport.

The survey will take about 5-10 minutes to complete.

Q1. Which of the following do you identify as?

- ☐ *Resident*
- ☐ *Employee*
- ☐ *Visitor*

Q2. What is your postcode? _____

Q3. How did you travel here today?

- ☐ *Walk only*
- ☐ *Bicycle*
- ☐ *Bus*
- ☐ *Train*
- ☐ *Light rail*
- ☐ *Combination of public transport*
- ☐ *Car driver*
- ☐ *Car passenger*
- ☐ *Other (please state)* _____

Q4. . If you travelled via car (as a single driver), what was the primary reason for you to travel this way?

- ☐ *Only option*
- ☐ *More comfortable*
- ☐ *Safety concerns with other types of transport options*
- ☐ *Poor end to end connectivity*
- ☐ *Cost effective*
- ☐ *Poor infrastructure/information for other modes of transport*
- ☐ *Other (please state)* _____

Q5. If your general mode of commuting is by car (single driver); what services could be provided to you to use other modes of travelling such as car share or car pool or biking.

About Arcadis

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Arcadis Australia Pacific Pty Ltd

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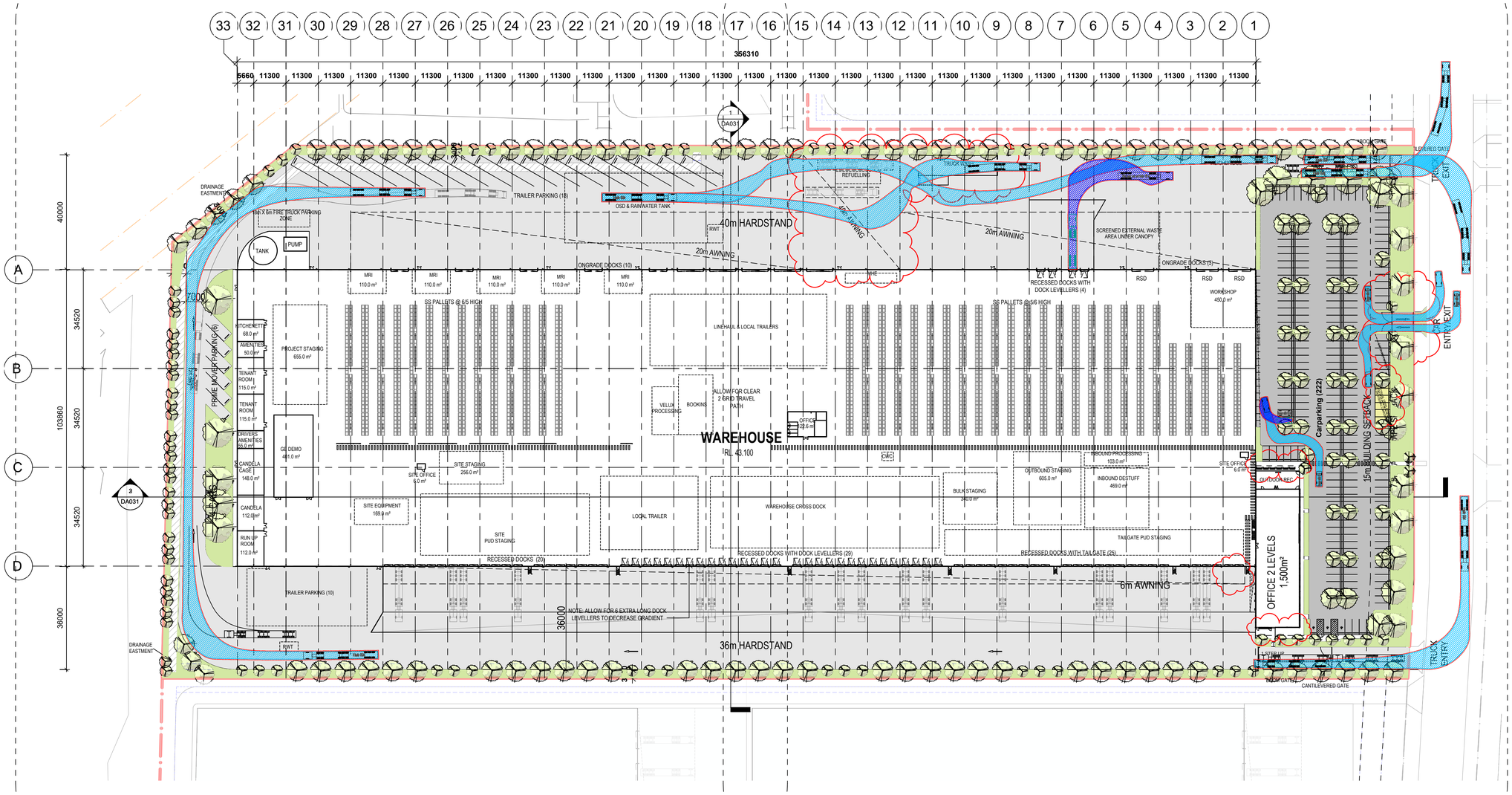
Appendix C – Swept Path Diagram

P:\13102_HB+B COPE\07 Current Drawings\DA\13102_HB+BCOPE_AR_ARCH_DA_V2-13102_HB+BCope_DA005[G]-595859.pdf



1 Site Plan
1 : 750

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16/10/2024 4:37:04 PM

Client

Issue		Description	Date
G	UPDATED FOR DA		15/08/2024
P1	UPDATED AREA TABLE		08/07/2024
F	UPDATED GATE		25/03/2024
E	FOR DA		13/02/2024
D	FOR DA		06/02/2024
C	FOR DA		11/12/2023
B	FOR DA		07/12/2023
A	FOR DA		29/11/2023

Project Name
Industrial Warehouse Development
Cope Sensitive Freight DC
Project Address
Alspec Industrial Business Park
221 - 227 Luddenham Road, Orchard Hills NSW

Key Plan
0 15000 37500

Drawing Title: **Site Plan**

Author:	Checker:	Sheet Size:	Scale:
MJ	NG	A1	1:750

Drawing Number: **13102_DA005** Issue: **G**

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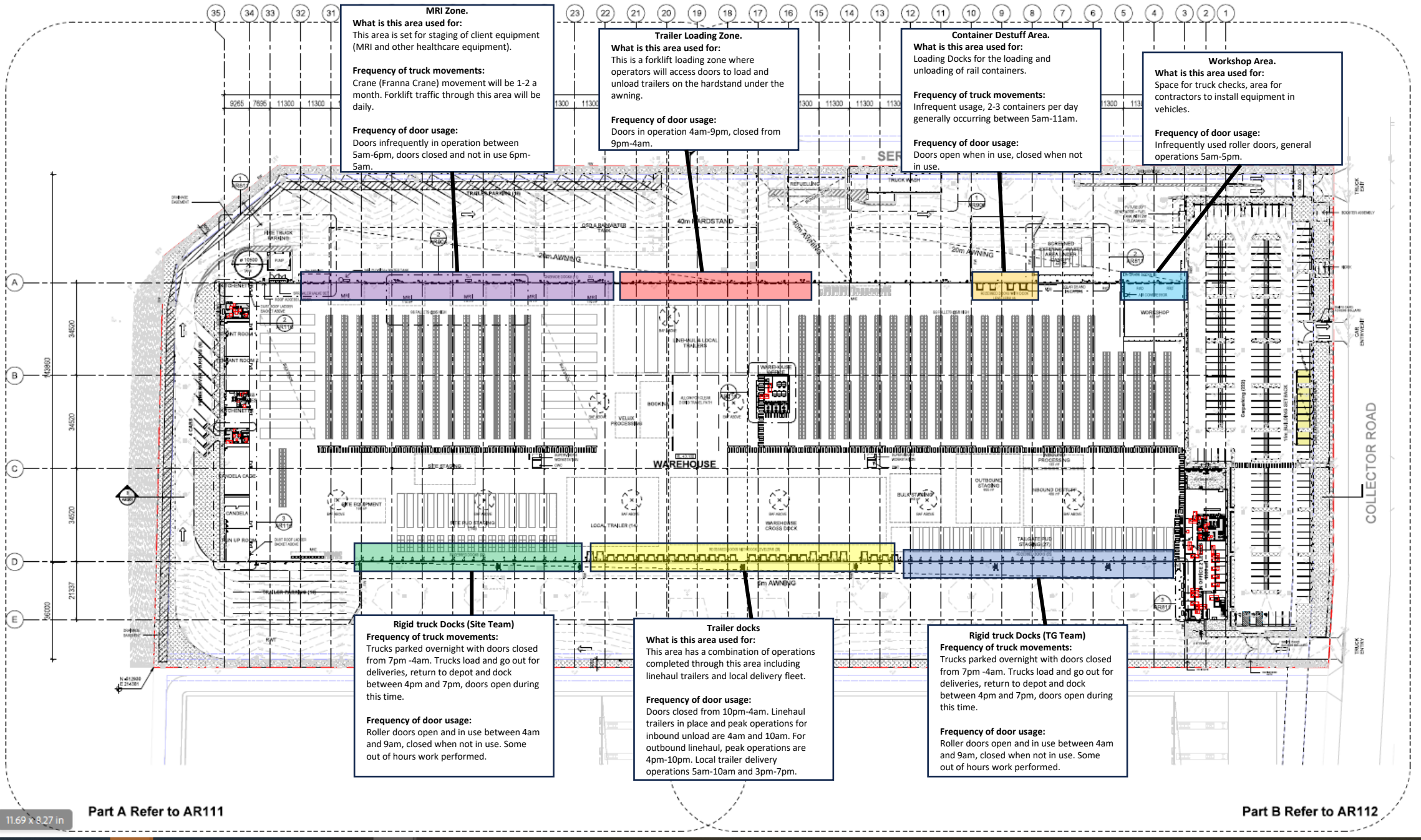
Appendix D – Dock Usage Drawing

Dock Usage



LANDSCAPE
EXPOSED AGGREGATE

COPE
SENSITIVE FREIGHT

Builders Logo

Project Name
Industrial Warehouse Development Cope Sensitive Freight DC

Project Address
Alspec Industrial Business Park
221 - 227 Luddenham Road, Orchard Hills NSW

11.69 x 8.27 in

Appendix E – SIDRA Model Outputs

USER REPORT FOR SITE

Project: 2023-03-03 Luddenham Road TIA_All Stages - SIDRA 9 - Copy

Template: New User Report

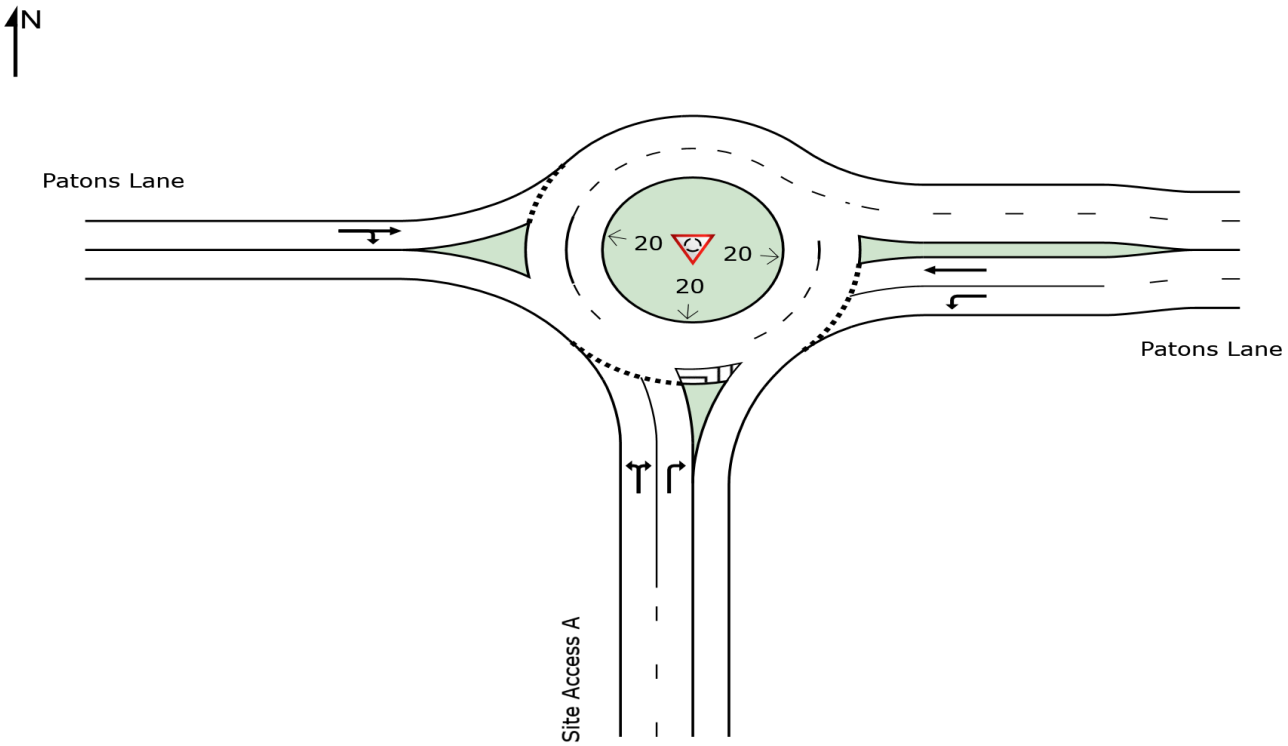
Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Site: [Patons Ln/Site Access A (Scenario A) - AM Peak (Site Folder: 2026 - COPE Warehouse (Scenario A) - AM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.048	8.0	LOS A	0.2	2.0	0.47	0.65	0.47	45.1
3	R2	All MCs	95	22.0	95	22.0	0.048	10.9	LOS A	0.2	2.0	0.48	0.65	0.48	44.9
Approach			96	22.9	96	22.9	0.048	10.9	LOS A	0.2	2.0	0.48	0.65	0.48	44.9
East: Patons Lane															
4	L2	All MCs	358	22.0	358	22.0	0.260	4.4	LOS A	1.3	10.9	0.02	0.49	0.02	51.1
5	T1	All MCs	389	9.0	389	9.0	0.233	4.2	LOS A	1.2	8.7	0.02	0.40	0.02	54.2
Approach			747	15.2	747	15.2	0.260	4.3	LOS A	1.3	10.9	0.02	0.44	0.02	52.9
West: Patons Lane															
11	T1	All MCs	116	14.0	116	14.0	0.112	4.7	LOS A	0.5	3.9	0.25	0.43	0.25	52.8
12	R2	All MCs	1	100.0	1	100.0	0.112	10.8	LOS A	0.5	3.9	0.25	0.43	0.25	47.4
Approach			117	14.8	117	14.8	0.112	4.8	LOS A	0.5	3.9	0.25	0.43	0.25	52.7
All Vehicles			960	15.9	960	15.9	0.260	5.0	LOS A	1.3	10.9	0.10	0.46	0.10	52.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

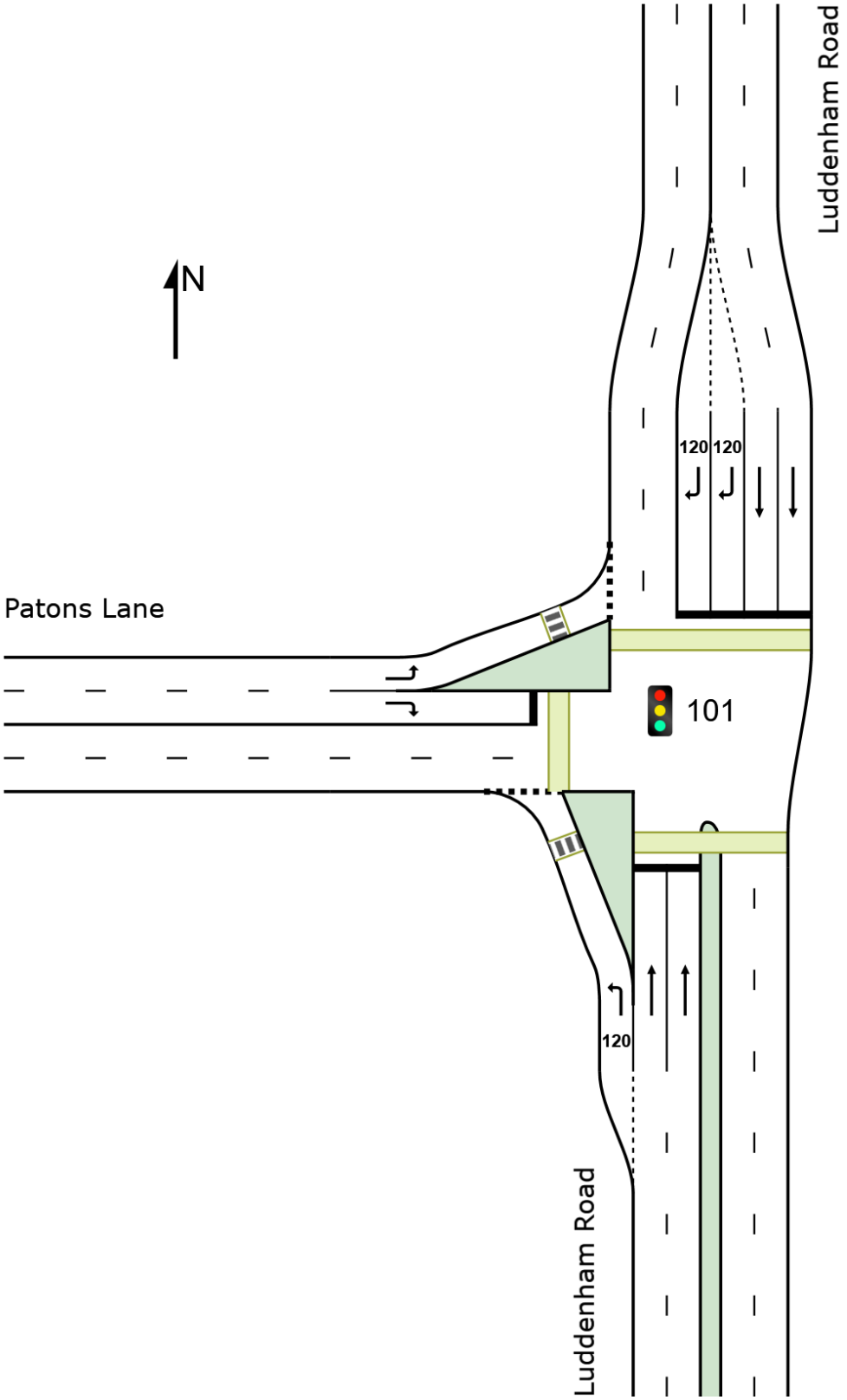
Site: 101 [Luddenham Rd/Patons Ln (Scenario A) AM Peak- 4 lane (Site Folder: 2026 - COPE Warehouse (Scenario A) - AM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	326	21.0	326	21.0	0.309	9.4	LOS A	4.3	35.2	0.40	0.67	0.40	51.3
2	T1	All MCs	937	10.0	937	10.0	* 0.695	28.2	LOS B	19.3	147.0	0.90	0.80	0.90	44.5
Approach			1263	12.8	1263	12.8	0.695	23.4	LOS B	19.3	147.0	0.77	0.76	0.77	45.9
North: Luddenham Road															
8	T1	All MCs	768	10.0	768	10.0	0.328	7.8	LOS A	8.0	60.9	0.47	0.41	0.47	54.7
9	R2	All MCs	463	22.0	463	22.0	* 0.701	46.9	LOS D	11.0	91.5	0.98	0.86	1.04	30.6
Approach			1232	14.5	1232	14.5	0.701	22.5	LOS B	11.0	91.5	0.66	0.58	0.68	44.8
West: Patons Lane															
10	L2	All MCs	116	21.0	116	21.0	0.146	11.2	LOS A	1.8	14.7	0.43	0.66	0.43	47.4
12	R2	All MCs	84	20.0	84	20.0	* 0.290	44.2	LOS D	3.6	29.7	0.90	0.76	0.90	36.3
Approach			200	20.6	200	20.6	0.290	25.1	LOS B	3.6	29.7	0.63	0.71	0.63	41.1
All Vehicles			2695	14.2	2695	14.2	0.701	23.1	LOS B	19.3	147.0	0.71	0.67	0.72	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

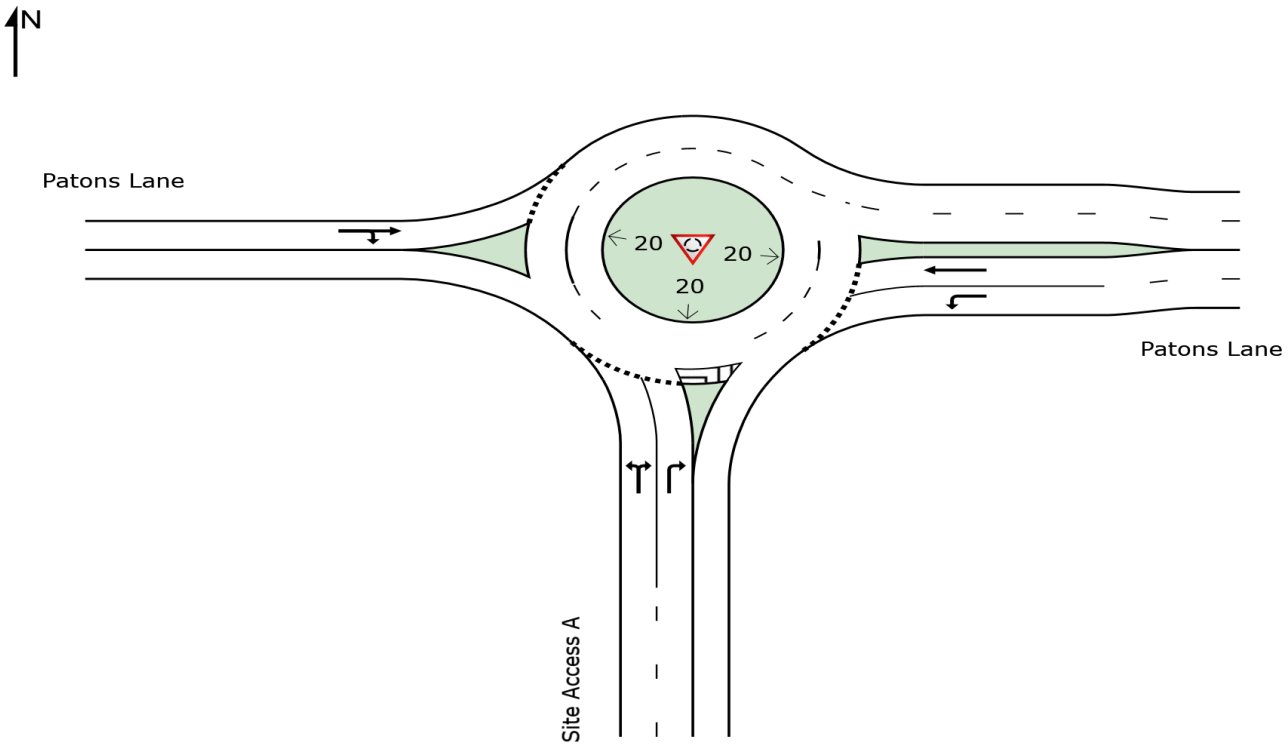
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Scenario A) - PM Peak (Site Folder: 2026 - Cope Warehouse (Scenario A) - PM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.095	5.6	LOS A	0.5	3.8	0.18	0.59	0.18	45.9
3	R2	All MCs	253	22.0	253	22.0	0.095	9.3	LOS A	0.5	3.8	0.19	0.59	0.19	45.9
Approach			254	22.3	254	22.3	0.095	9.3	LOS A	0.5	3.8	0.19	0.59	0.19	45.9
East: Patons Lane															
4	L2	All MCs	168	22.0	168	22.0	0.108	4.4	LOS A	0.5	4.3	0.02	0.49	0.02	51.1
5	T1	All MCs	63	9.0	63	9.0	0.050	4.2	LOS A	0.2	1.7	0.02	0.40	0.02	54.2
Approach			232	18.5	232	18.5	0.108	4.3	LOS A	0.5	4.3	0.02	0.47	0.02	52.1
West: Patons Lane															
11	T1	All MCs	389	14.0	389	14.0	0.417	6.0	LOS A	2.1	16.5	0.48	0.55	0.48	51.7
12	R2	All MCs	1	100.0	1	100.0	0.417	13.3	LOS A	2.1	16.5	0.48	0.55	0.48	46.5
Approach			391	14.2	391	14.2	0.417	6.0	LOS A	2.1	16.5	0.48	0.55	0.48	51.6
All Vehicles			876	17.7	876	17.7	0.417	6.5	LOS A	2.1	16.5	0.28	0.54	0.28	50.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

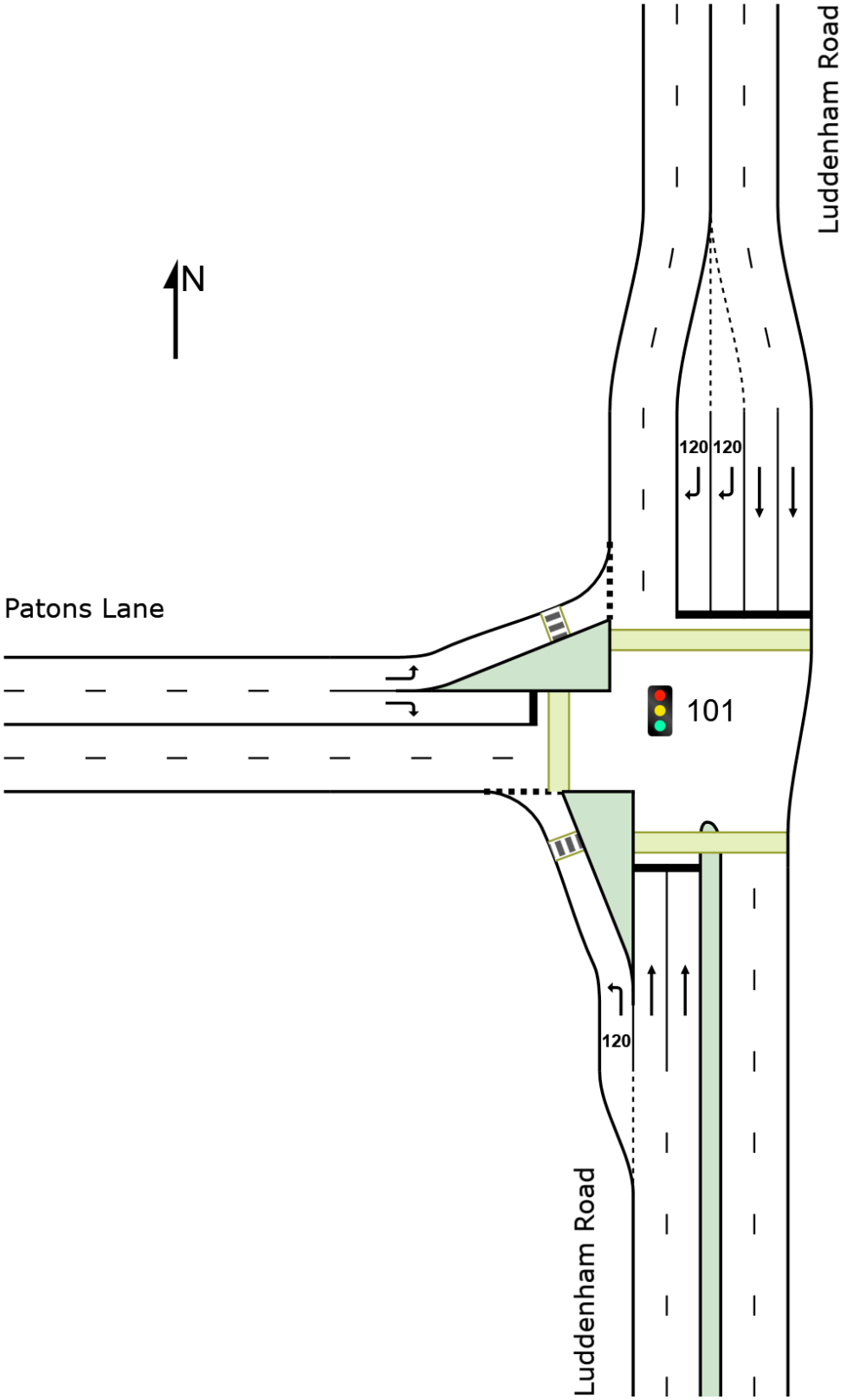
Site: 101 [Luddenham Rd/Patons Ln (Scenario A) PM Peak- 4 lane (Site Folder: 2026 - Cope Warehouse (Scenario A) - PM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road														
1	L2	All MCs	74	21.0	74	21.0	0.061	7.0	LOS A	0.4	3.1	0.21	0.59	0.21	52.8
2	T1	All MCs	705	10.0	705	10.0	* 0.538	26.7	LOS B	13.6	103.2	0.84	0.73	0.84	45.1
Approach			779	11.0	779	11.0	0.538	24.9	LOS B	13.6	103.2	0.78	0.71	0.78	45.7
North: Luddenham Road														
8	T1	All MCs	937	10.0	937	10.0	0.508	16.7	LOS B	14.8	112.6	0.70	0.62	0.70	49.7
9	R2	All MCs	147	22.0	147	22.0	* 0.545	56.1	LOS D	3.7	30.7	1.00	0.78	1.02	28.1
Approach			1084	11.6	1084	11.6	0.545	22.1	LOS B	14.8	112.6	0.74	0.64	0.74	46.4
West: Patons Lane														
10	L2	All MCs	368	21.0	368	21.0	0.421	10.4	LOS A	6.0	49.4	0.47	0.70	0.47	48.0
12	R2	All MCs	274	20.0	274	20.0	* 0.543	35.6	LOS C	11.0	90.5	0.87	0.82	0.87	39.1
Approach			642	20.6	642	20.6	0.543	21.1	LOS B	11.0	90.5	0.64	0.75	0.64	43.0
All Vehicles			2505	13.7	2505	13.7	0.545	22.7	LOS B	14.8	112.6	0.73	0.69	0.73	45.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

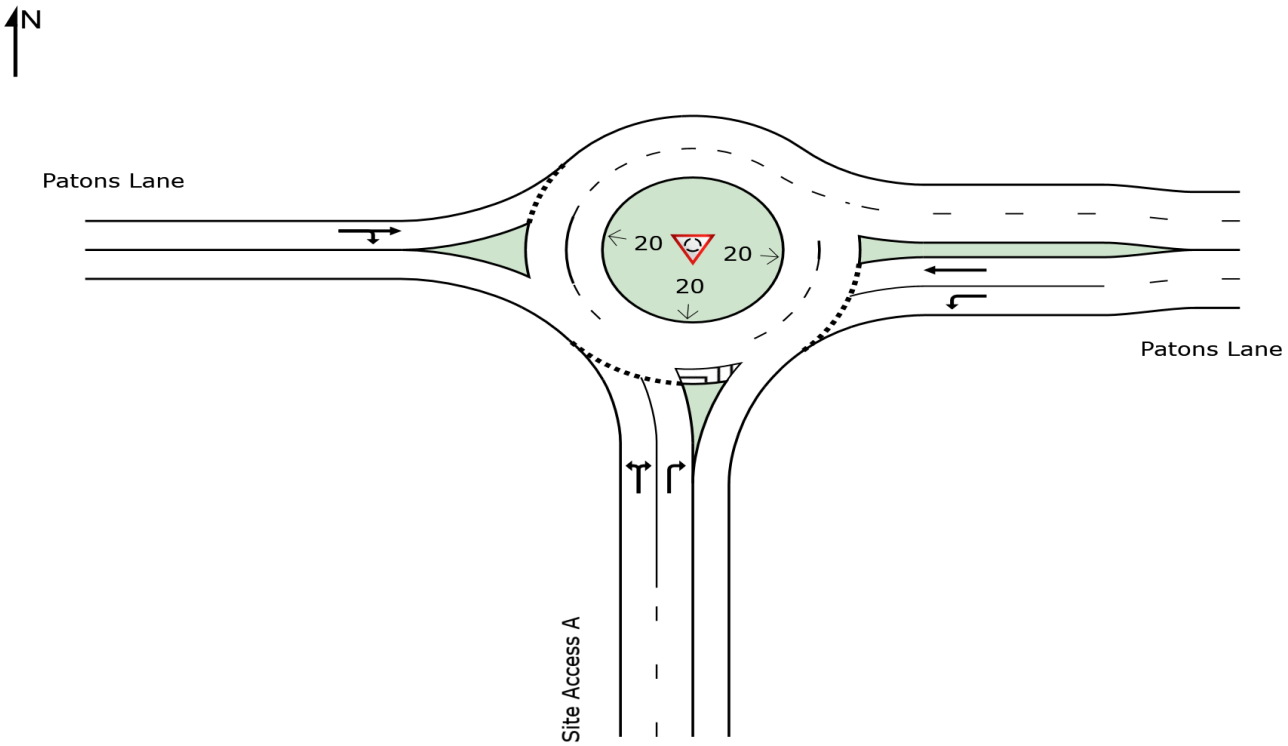
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Scenario B) - AM Peak (Site Folder: 2026 - Cope Warehouse (Scenario B) - AM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.058	8.1	LOS A	0.3	2.4	0.48	0.65	0.48	45.1
3	R2	All MCs	116	22.0	116	22.0	0.058	11.0	LOS A	0.3	2.4	0.48	0.66	0.48	44.9
Approach			117	22.7	117	22.7	0.058	10.9	LOS A	0.3	2.4	0.48	0.66	0.48	44.9
East: Patons Lane															
4	L2	All MCs	453	22.0	453	22.0	0.287	4.4	LOS A	1.5	12.7	0.02	0.49	0.02	51.1
5	T1	All MCs	389	11.0	389	11.0	0.270	4.2	LOS A	1.4	10.7	0.02	0.40	0.02	54.1
Approach			842	16.9	842	16.9	0.287	4.3	LOS A	1.5	12.7	0.02	0.45	0.02	52.7
West: Patons Lane															
11	T1	All MCs	116	10.0	116	10.0	0.112	4.8	LOS A	0.5	3.7	0.28	0.44	0.28	52.7
12	R2	All MCs	1	100.0	1	100.0	0.112	11.1	LOS A	0.5	3.7	0.28	0.44	0.28	47.3
Approach			117	10.8	117	10.8	0.112	4.8	LOS A	0.5	3.7	0.28	0.44	0.28	52.7
All Vehicles			1076	16.9	1076	16.9	0.287	5.1	LOS A	1.5	12.7	0.10	0.47	0.10	51.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

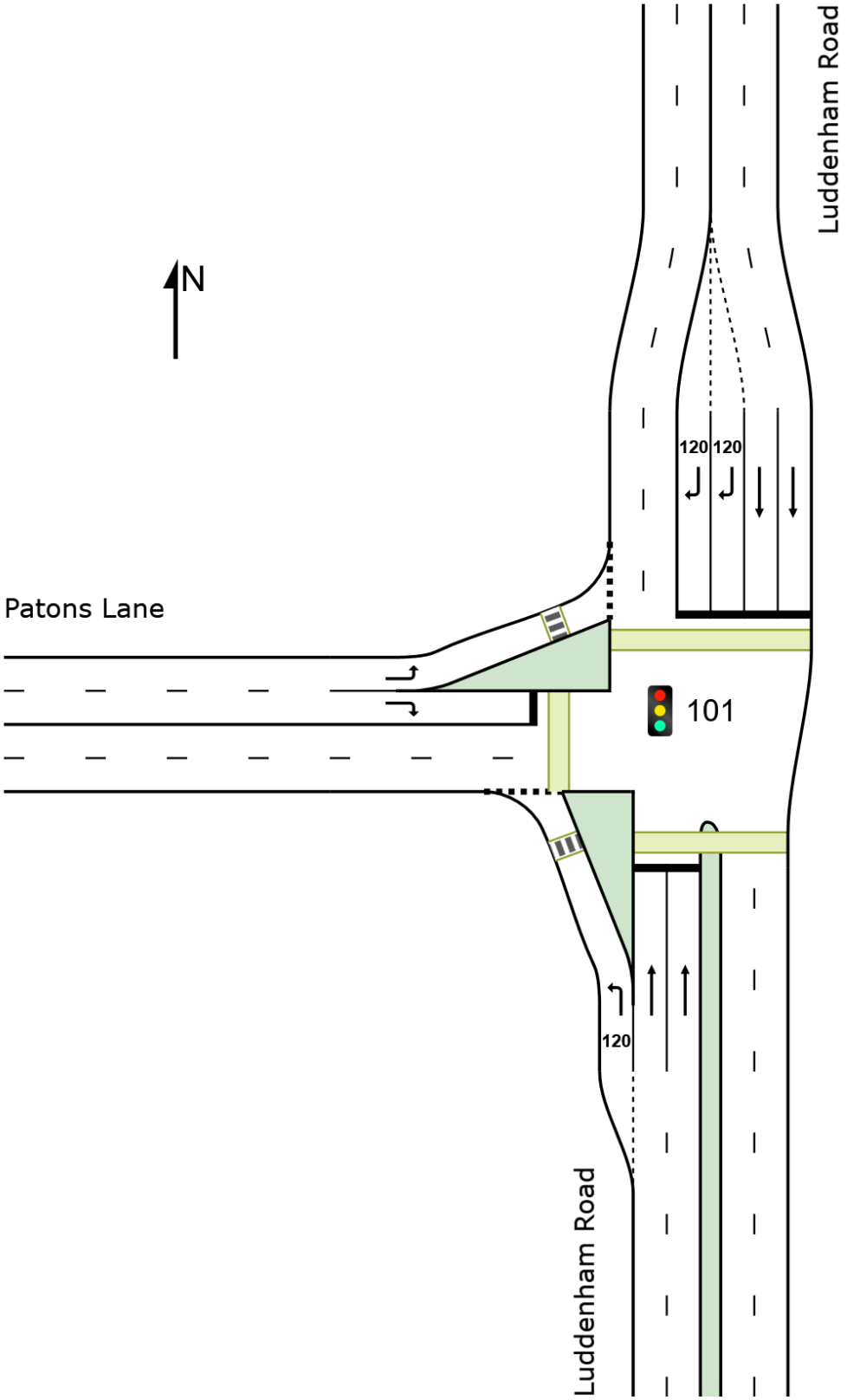
Site: 101 [Luddenham Rd/Patons Ln (Scenario B) AM Peak - 4 lane (Site Folder: 2026 - Cope Warehouse (Scenario B) - AM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	347	21.0	347	21.0	0.339	9.9	LOS A	4.9	40.7	0.43	0.68	0.43	51.1
2	T1	All MCs	937	10.0	937	10.0	* 0.734	30.7	LOS C	20.3	154.0	0.93	0.83	0.95	43.5
Approach			1284	13.0	1284	13.0	0.734	25.1	LOS B	20.3	154.0	0.80	0.79	0.81	45.1
North: Luddenham Road															
8	T1	All MCs	768	10.0	768	10.0	0.328	7.8	LOS A	8.0	60.9	0.47	0.41	0.47	54.7
9	R2	All MCs	526	21.0	526	21.0	* 0.724	46.1	LOS D	12.5	103.4	0.98	0.87	1.05	30.8
Approach			1295	14.5	1295	14.5	0.724	23.4	LOS B	12.5	103.4	0.67	0.60	0.70	44.2
West: Patons Lane															
10	L2	All MCs	137	21.0	137	21.0	0.170	11.3	LOS A	2.1	17.6	0.44	0.67	0.44	47.3
12	R2	All MCs	95	20.0	95	20.0	* 0.326	44.5	LOS D	4.1	33.7	0.91	0.77	0.91	36.2
Approach			232	20.6	232	20.6	0.326	24.9	LOS B	4.1	33.7	0.63	0.71	0.63	41.2
All Vehicles			2811	14.3	2811	14.3	0.734	24.3	LOS B	20.3	154.0	0.73	0.70	0.74	44.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

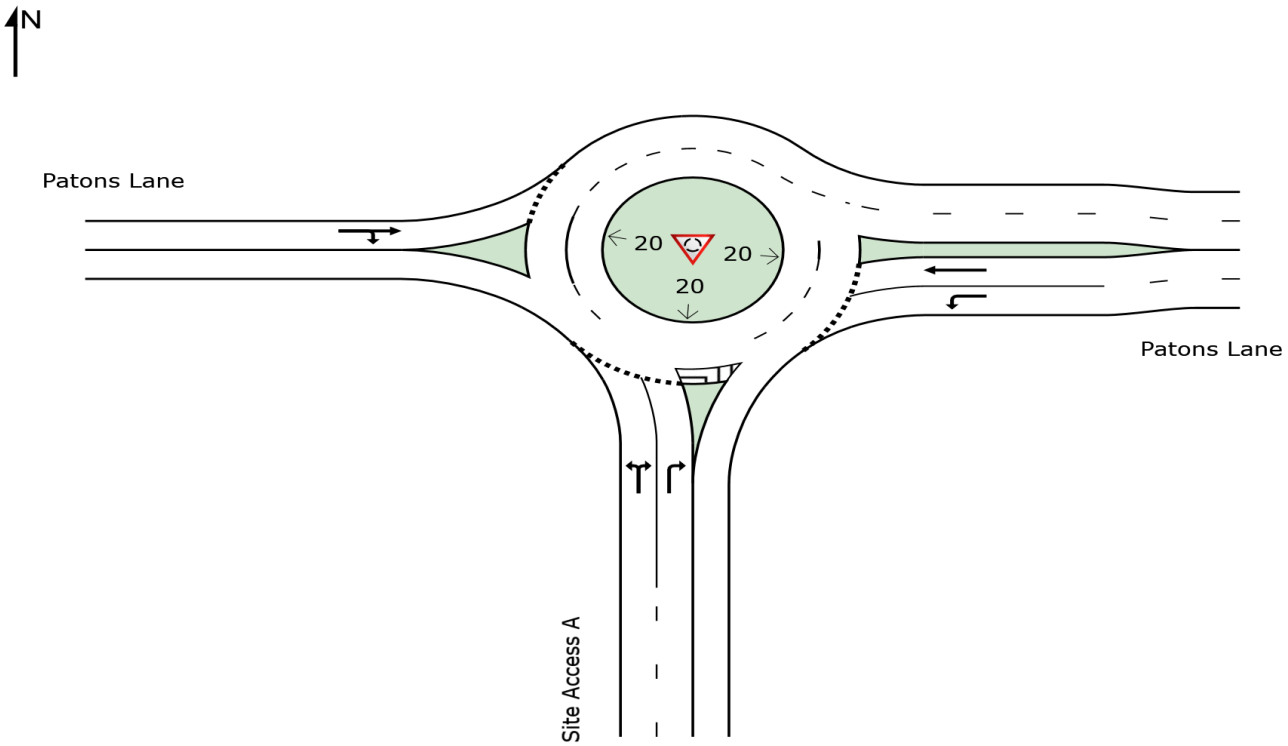
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Scenario B) - PM Peak (Site Folder: 2026 - Cope Warehouse (Scenario B) - PM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.118	5.6	LOS A	0.6	4.8	0.19	0.59	0.19	45.9
3	R2	All MCs	316	22.0	316	22.0	0.118	9.3	LOS A	0.6	4.8	0.19	0.59	0.19	45.9
Approach			317	22.3	317	22.3	0.118	9.3	LOS A	0.6	4.8	0.19	0.59	0.19	45.9
East: Patons Lane															
4	L2	All MCs	211	22.0	211	22.0	0.135	4.4	LOS A	0.7	5.6	0.02	0.49	0.02	51.1
5	T1	All MCs	63	11.0	63	11.0	0.054	4.2	LOS A	0.2	1.8	0.02	0.40	0.02	54.1
Approach			274	19.5	274	19.5	0.135	4.3	LOS A	0.7	5.6	0.02	0.47	0.02	51.9
West: Patons Lane															
11	T1	All MCs	389	10.0	389	10.0	0.432	6.3	LOS A	2.1	16.3	0.52	0.58	0.52	51.5
12	R2	All MCs	1	100.0	1	100.0	0.432	14.2	LOS A	2.1	16.3	0.52	0.58	0.52	46.3
Approach			391	10.2	391	10.2	0.432	6.3	LOS A	2.1	16.3	0.52	0.58	0.52	51.5
All Vehicles			981	16.7	981	16.7	0.432	6.7	LOS A	2.1	16.3	0.28	0.55	0.28	49.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

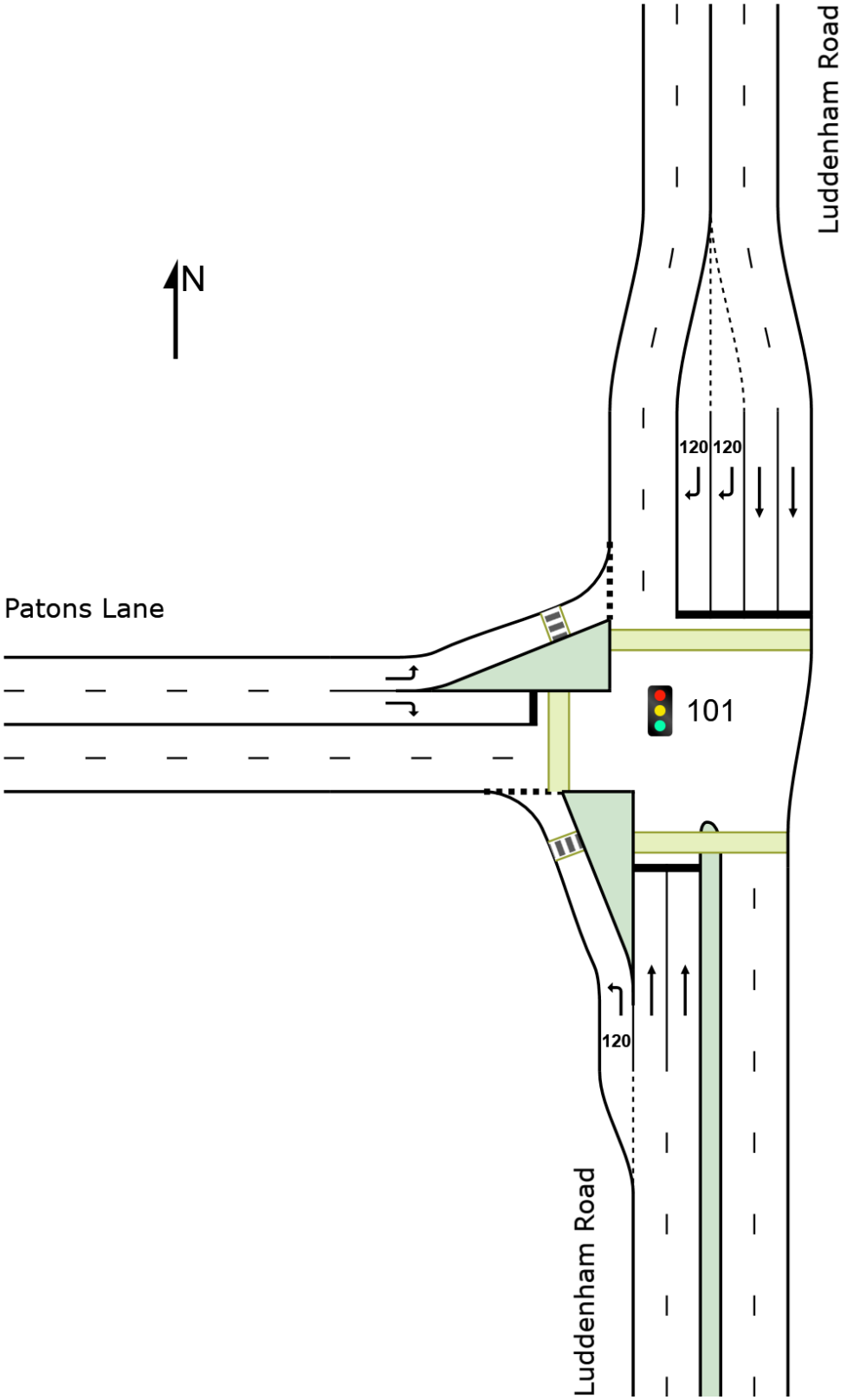
Site: 101 [Luddenham Rd/Patons Ln (Scenario B) PM Peak - 4 lane (Site Folder: 2026 - Cope Warehouse (Scenario B) - PM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	84	21.0	84	21.0	0.070	7.1	LOS A	0.5	3.9	0.22	0.60	0.22	52.7
2	T1	All MCs	705	10.0	705	10.0	* 0.553	27.6	LOS B	13.8	104.9	0.85	0.74	0.85	44.7
Approach			789	11.2	789	11.2	0.553	25.4	LOS B	13.8	104.9	0.79	0.72	0.79	45.4
North: Luddenham Road															
8	T1	All MCs	937	10.0	937	10.0	0.508	16.7	LOS B	14.8	112.6	0.70	0.62	0.70	49.7
9	R2	All MCs	168	21.0	168	21.0	* 0.556	55.0	LOS D	4.2	34.5	1.00	0.78	1.01	28.4
Approach			1105	11.7	1105	11.7	0.556	22.6	LOS B	14.8	112.6	0.75	0.65	0.75	46.1
West: Patons Lane															
10	L2	All MCs	411	21.0	411	21.0	0.467	10.6	LOS A	7.0	58.2	0.50	0.71	0.50	47.8
12	R2	All MCs	284	20.0	284	20.0	* 0.564	35.9	LOS C	11.6	94.8	0.88	0.82	0.88	39.0
Approach			695	20.6	695	20.6	0.564	21.0	LOS B	11.6	94.8	0.65	0.76	0.65	43.1
All Vehicles			2589	13.9	2589	13.9	0.564	23.0	LOS B	14.8	112.6	0.73	0.70	0.73	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

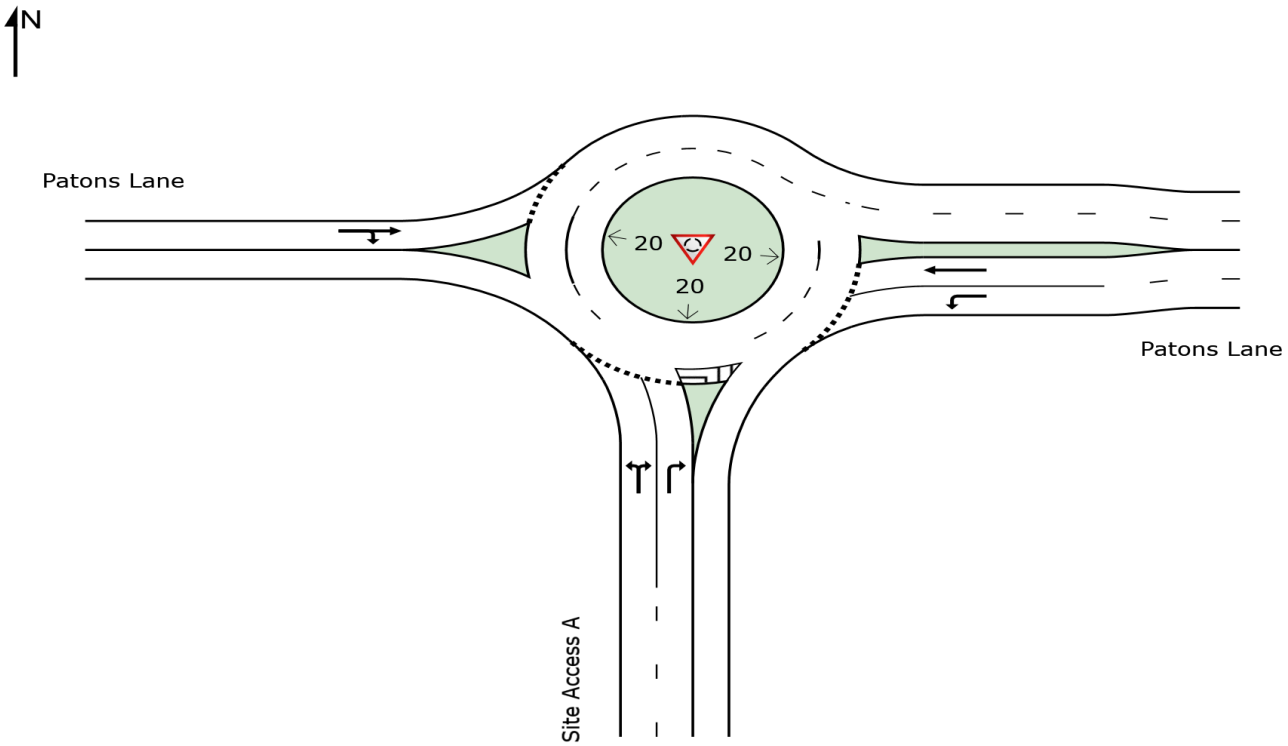
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Secnario C) - AM Peak (Site Folder: 2036 - Cope Warehouse (Secnario C) - AM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.113	5.8	LOS A	0.6	4.6	0.22	0.59	0.22	45.8
3	R2	All MCs	295	22.0	295	22.0	0.113	9.4	LOS A	0.6	4.6	0.23	0.59	0.23	45.8
Approach			296	22.3	296	22.3	0.113	9.4	LOS A	0.6	4.6	0.23	0.59	0.23	45.8
East: Patons Lane															
4	L2	All MCs	1168	22.0	1168	22.0	0.740	4.4	LOS A	9.8	81.9	0.05	0.48	0.05	50.9
5	T1	All MCs	84	11.0	84	11.0	0.074	4.2	LOS A	0.3	2.4	0.02	0.40	0.02	54.1
Approach			1253	21.3	1253	21.3	0.740	4.4	LOS A	9.8	81.9	0.05	0.47	0.05	51.2
West: Patons Lane															
11	T1	All MCs	53	10.0	53	10.0	0.059	5.5	LOS A	0.2	1.7	0.38	0.52	0.38	52.2
12	R2	All MCs	1	100.0	1	100.0	0.059	12.6	LOS A	0.2	1.7	0.38	0.52	0.38	46.8
Approach			54	11.8	54	11.8	0.059	5.7	LOS A	0.2	1.7	0.38	0.52	0.38	52.1
All Vehicles			1602	21.1	1602	21.1	0.740	5.3	LOS A	9.8	81.9	0.09	0.50	0.09	50.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

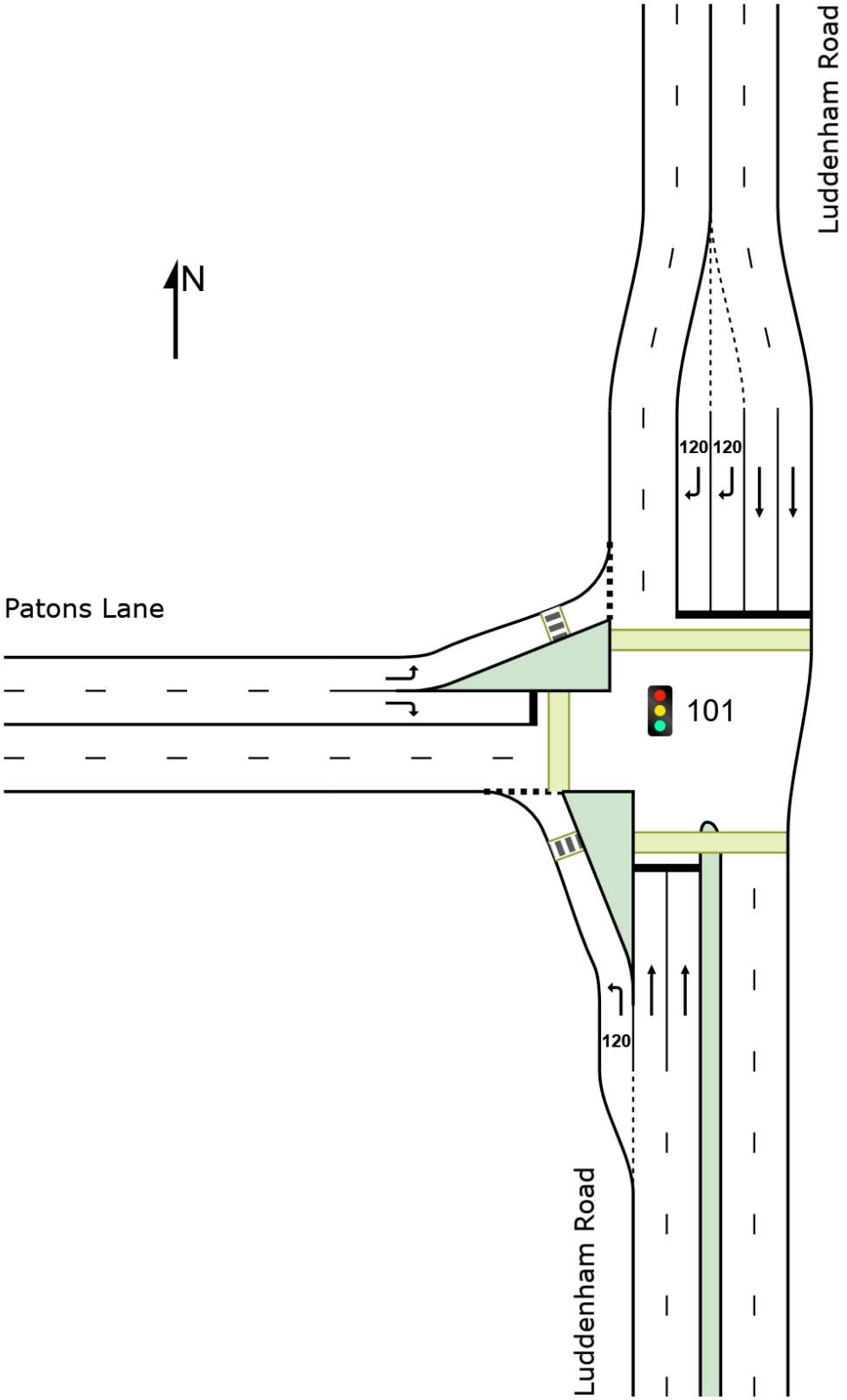
Site: 101 [Luddenham Rd/Patons Ln (Secnario C) AM Peak - 4 lane (Site Folder: 2036 - Cope Warehouse (Secnario C) - AM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	400	21.0	400	21.0	0.467	14.8	LOS B	9.2	76.2	0.62	0.75	0.62	48.3
2	T1	All MCs	800	10.0	800	10.0	* 0.836	43.7	LOS D	20.6	156.3	1.00	0.98	1.16	38.9
Approach			1200	13.7	1200	13.7	0.836	34.0	LOS C	20.6	156.3	0.87	0.91	0.98	41.4
North: Luddenham Road															
8	T1	All MCs	495	10.0	495	10.0	0.211	7.1	LOS A	4.7	35.6	0.42	0.36	0.42	55.2
9	R2	All MCs	863	21.0	863	21.0	* 0.863	49.8	LOS D	23.1	191.2	1.00	0.96	1.20	29.8
Approach			1358	17.0	1358	17.0	0.863	34.3	LOS C	23.1	191.2	0.79	0.74	0.92	37.9
West: Patons Lane															
10	L2	All MCs	232	21.0	232	21.0	0.258	11.3	LOS A	3.7	30.6	0.46	0.68	0.46	47.3
12	R2	All MCs	116	20.0	116	20.0	* 0.399	45.2	LOS D	5.1	41.8	0.92	0.78	0.92	36.0
Approach			347	20.7	347	20.7	0.399	22.6	LOS B	5.1	41.8	0.61	0.72	0.61	42.0
All Vehicles			2905	16.1	2905	16.1	0.863	32.8	LOS C	23.1	191.2	0.80	0.81	0.91	39.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

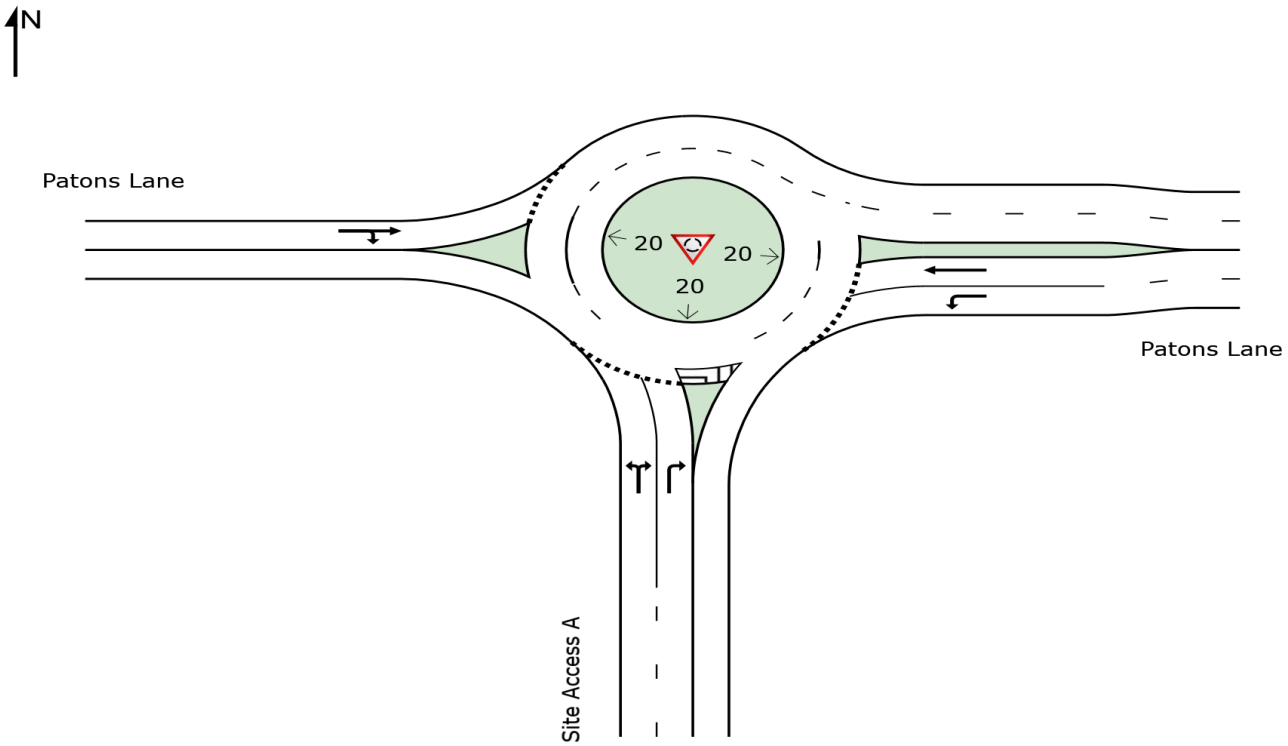
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Secnario C) - PM Peak (Site Folder: 2036 - Cope Warehouse (Secnario C) - PM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.300	5.8	LOS A	1.8	14.7	0.24	0.59	0.24	45.7
3	R2	All MCs	811	22.0	811	22.0	0.300	9.4	LOS A	1.8	14.7	0.25	0.59	0.25	45.7
Approach			812	22.1	812	22.1	0.300	9.4	LOS A	1.8	14.7	0.25	0.59	0.25	45.7
East: Patons Lane															
4	L2	All MCs	537	22.0	537	22.0	0.340	4.4	LOS A	2.2	18.4	0.03	0.49	0.03	51.1
5	T1	All MCs	74	11.0	74	11.0	0.065	4.2	LOS A	0.3	2.3	0.02	0.40	0.02	54.1
Approach			611	20.7	611	20.7	0.340	4.3	LOS A	2.2	18.4	0.03	0.48	0.03	51.5
West: Patons Lane															
11	T1	All MCs	84	10.0	84	10.0	0.127	7.5	LOS A	0.5	3.6	0.58	0.70	0.58	51.2
12	R2	All MCs	1	100.0	1	100.0	0.127	16.6	LOS B	0.5	3.6	0.58	0.70	0.58	46.0
Approach			85	11.1	85	11.1	0.127	7.6	LOS A	0.5	3.6	0.58	0.70	0.58	51.2
All Vehicles			1507	20.9	1507	20.9	0.340	7.3	LOS A	2.2	18.4	0.18	0.55	0.18	48.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

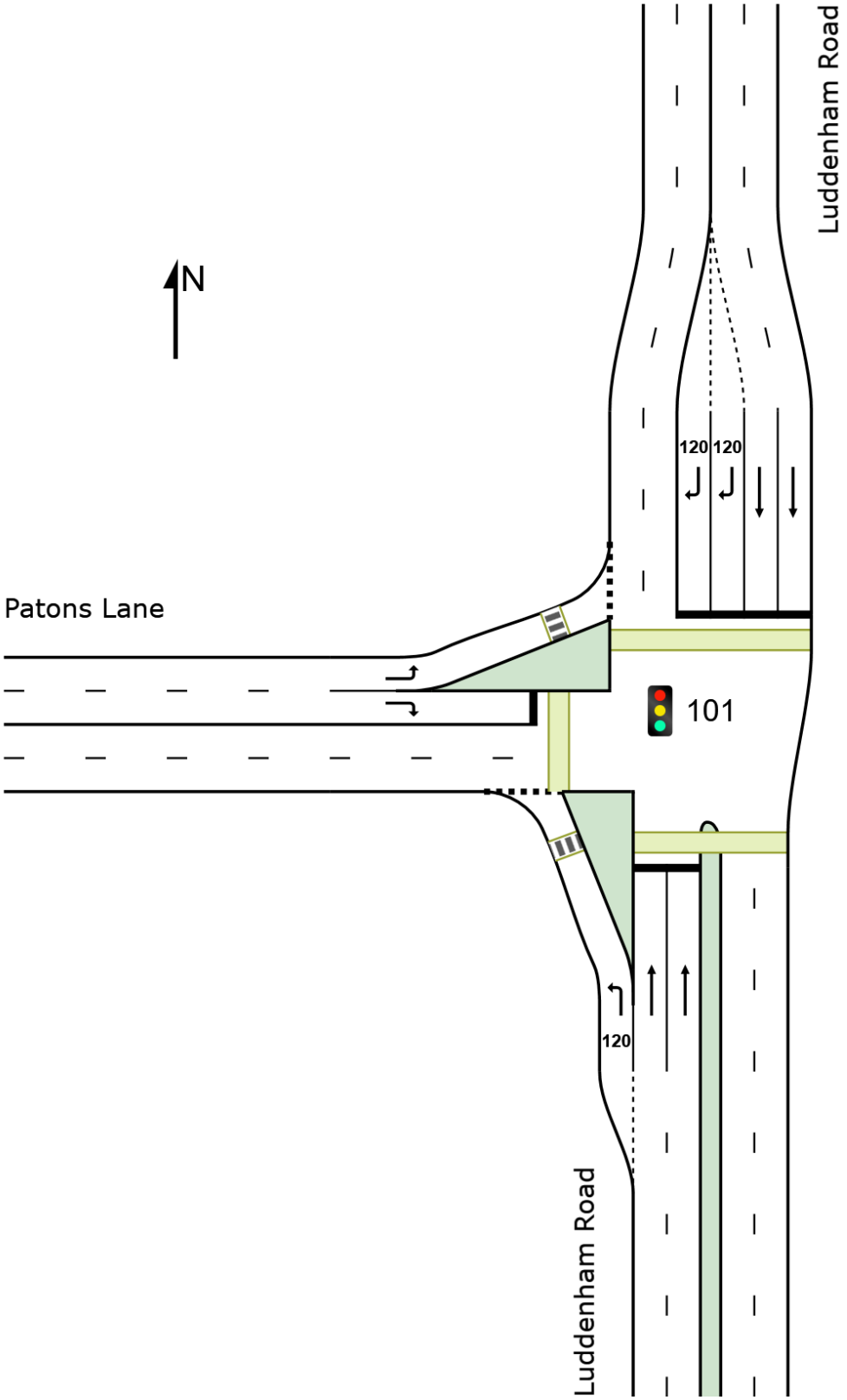
Site: 101 [Luddenham Rd/Patons Ln (Secnario C) PM Peak - 4 lane (Site Folder: 2036 - Cope Warehouse (Secnario C) - PM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	200	21.0	200	21.0	0.190	8.5	LOS A	2.1	17.0	0.33	0.64	0.33	51.8
2	T1	All MCs	505	10.0	505	10.0	* 0.594	36.9	LOS C	11.1	84.5	0.94	0.79	0.94	41.2
Approach			705	13.1	705	13.1	0.594	28.9	LOS C	11.1	84.5	0.77	0.75	0.77	43.5
North: Luddenham Road															
8	T1	All MCs	895	10.0	895	10.0	0.476	15.8	LOS B	13.6	103.5	0.67	0.60	0.67	50.2
9	R2	All MCs	411	21.0	411	21.0	* 0.589	43.7	LOS D	9.2	75.7	0.94	0.82	0.94	31.6
Approach			1305	13.5	1305	13.5	0.589	24.6	LOS B	13.6	103.5	0.76	0.67	0.76	44.2
West: Patons Lane															
10	L2	All MCs	611	21.0	611	21.0	0.610	10.2	LOS A	10.4	85.6	0.53	0.74	0.53	48.2
12	R2	All MCs	284	20.0	284	20.0	* 0.581	36.8	LOS C	11.7	96.3	0.89	0.82	0.89	38.7
Approach			895	20.7	895	20.7	0.610	18.7	LOS B	11.7	96.3	0.65	0.76	0.65	44.0
All Vehicles			2905	15.6	2905	15.6	0.610	23.8	LOS B	13.6	103.5	0.73	0.72	0.73	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

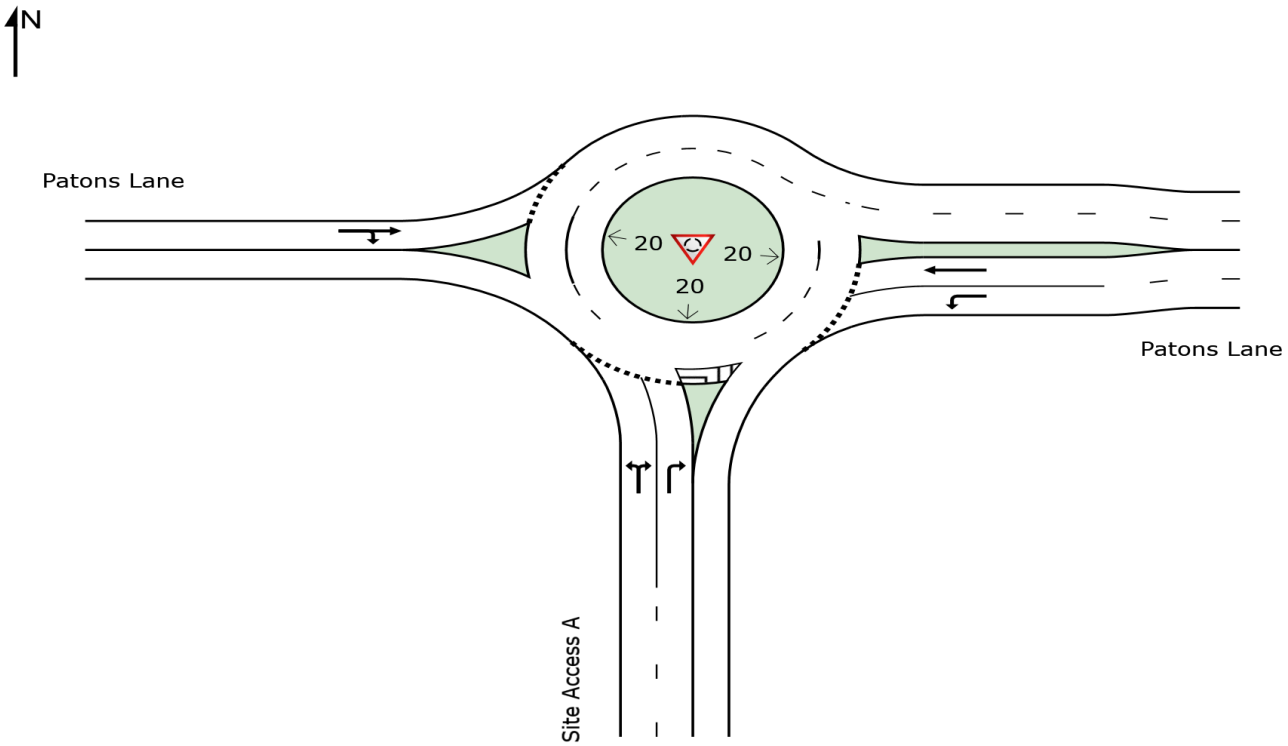
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Scenario D) - AM Peak (Site Folder: 2036 - Cope Warehouse (Scenario D) - AM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.121	5.8	LOS A	0.6	5.0	0.22	0.59	0.22	45.8
3	R2	All MCs	316	22.0	316	22.0	0.121	9.4	LOS A	0.6	5.0	0.23	0.59	0.23	45.8
Approach			317	22.3	317	22.3	0.121	9.4	LOS A	0.6	5.0	0.23	0.59	0.23	45.8
East: Patons Lane															
4	L2	All MCs	1263	22.0	1263	22.0	0.800	4.4	LOS A	13.9	115.3	0.06	0.47	0.06	50.9
5	T1	All MCs	84	11.0	84	11.0	0.074	4.2	LOS A	0.3	2.4	0.02	0.40	0.02	54.1
Approach			1347	21.3	1347	21.3	0.800	4.4	LOS A	13.9	115.3	0.06	0.47	0.06	51.1
West: Patons Lane															
11	T1	All MCs	53	10.0	53	10.0	0.060	5.6	LOS A	0.2	1.7	0.40	0.53	0.40	52.1
12	R2	All MCs	1	100.0	1	100.0	0.060	12.7	LOS A	0.2	1.7	0.40	0.53	0.40	46.8
Approach			54	11.8	54	11.8	0.060	5.7	LOS A	0.2	1.7	0.40	0.53	0.40	52.0
All Vehicles			1718	21.2	1718	21.2	0.800	5.3	LOS A	13.9	115.3	0.10	0.49	0.10	50.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

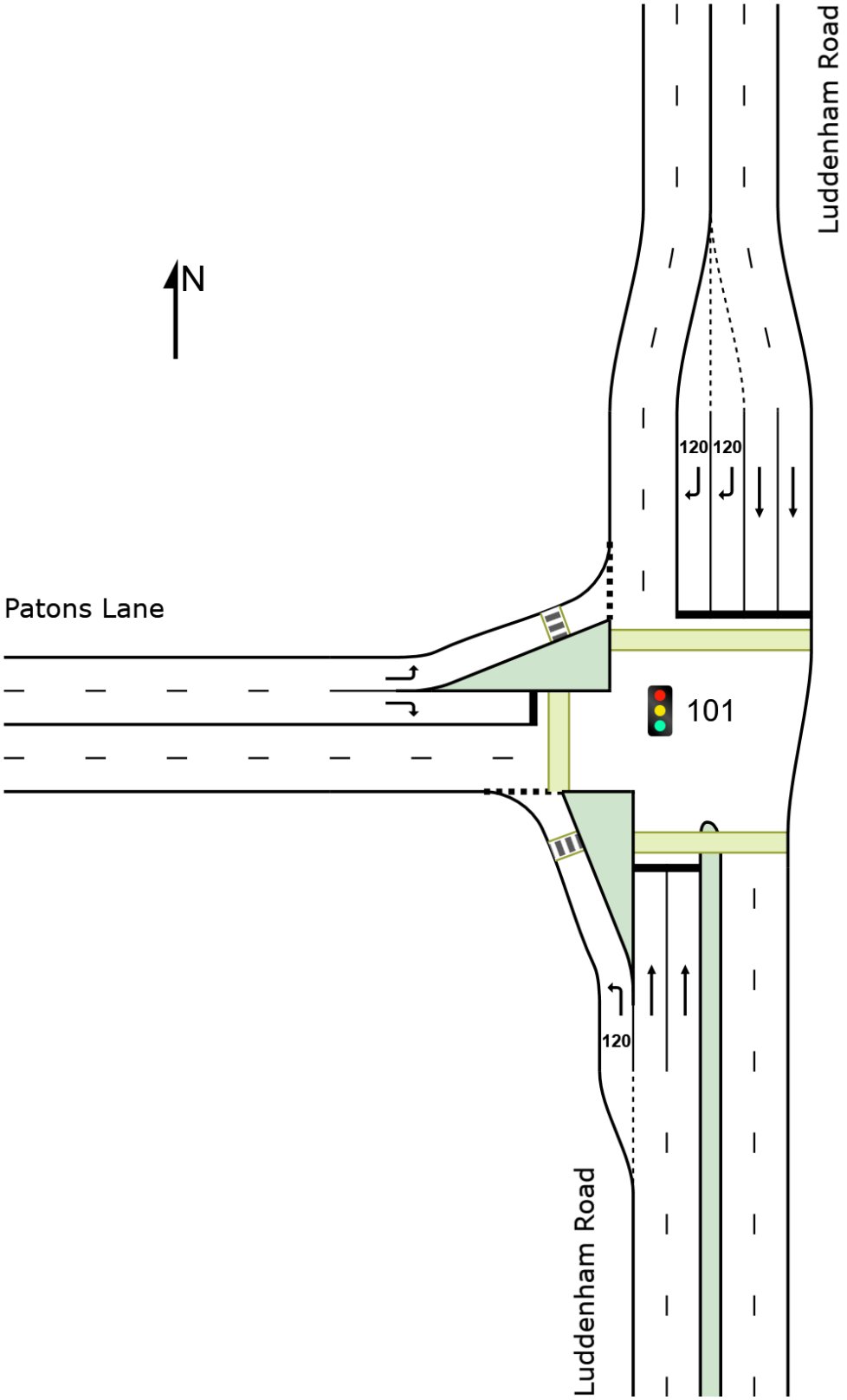
Site: 101 [Luddenham Rd/Patons Ln (Scenario D) AM Peak - 4 lane (Site Folder: 2036 - Cope Warehouse (Scenario D) - AM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	421	21.0	421	21.0	0.506	16.4	LOS B	10.7	88.4	0.67	0.77	0.67	47.4
2	T1	All MCs	800	10.0	800	10.0	* 0.868	47.6	LOS D	21.6	164.1	1.00	1.04	1.22	37.7
Approach			1221	13.8	1221	13.8	0.868	36.9	LOS C	21.6	164.1	0.89	0.94	1.03	40.4
North: Luddenham Road															
8	T1	All MCs	495	10.0	495	10.0	0.211	7.1	LOS A	4.7	35.6	0.42	0.36	0.42	55.2
9	R2	All MCs	926	21.0	926	21.0	* 0.899	55.0	LOS D	26.6	219.7	1.00	1.01	1.27	28.4
Approach			1421	17.2	1421	17.2	0.899	38.3	LOS C	26.6	219.7	0.80	0.79	0.98	36.3
West: Patons Lane															
10	L2	All MCs	242	21.0	242	21.0	0.268	11.3	LOS A	3.9	32.2	0.46	0.69	0.46	47.3
12	R2	All MCs	116	20.0	116	20.0	* 0.399	45.2	LOS D	5.1	41.8	0.92	0.78	0.92	36.0
Approach			358	20.7	358	20.7	0.399	22.3	LOS B	5.1	41.8	0.61	0.72	0.61	42.1
All Vehicles			3000	16.2	3000	16.2	0.899	35.8	LOS C	26.6	219.7	0.81	0.84	0.95	38.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

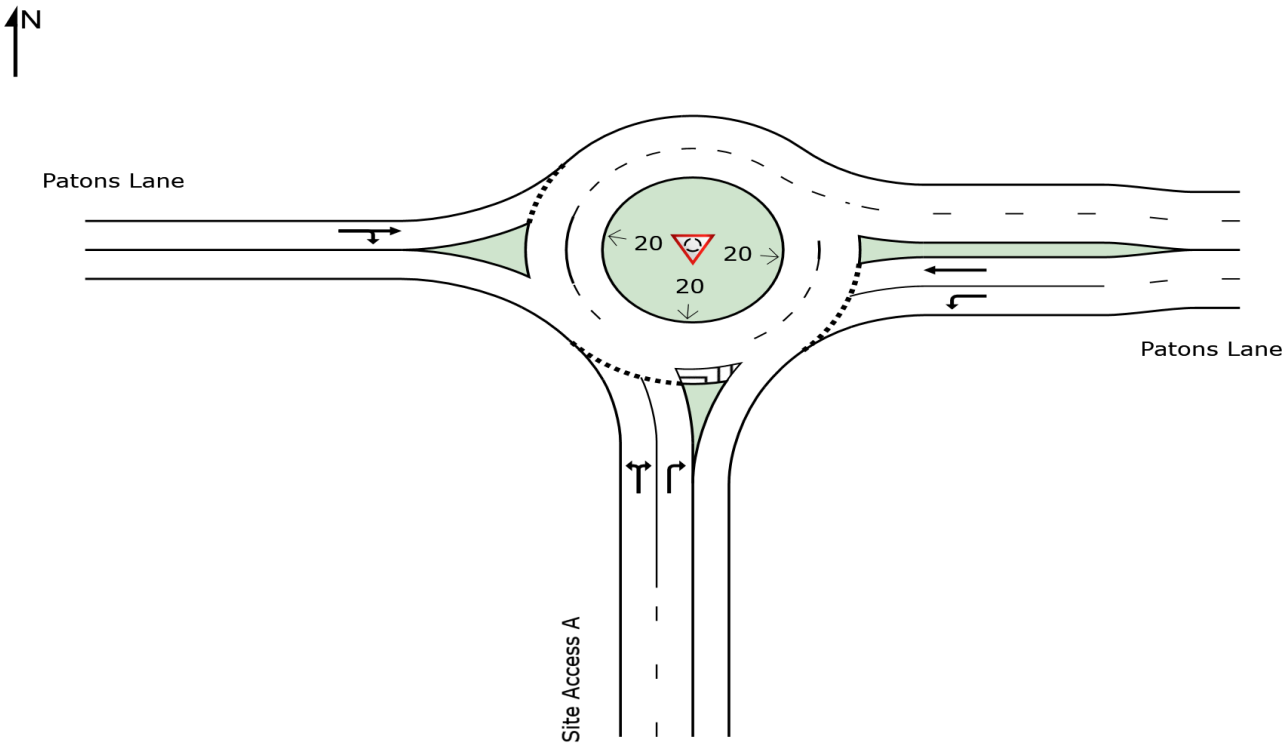
* Critical Movement (Signal Timing)

Site: [Patons Ln/Site Access A (Scenario D) - PM Peak (Site Folder: 2036 - Cope Warehouse (Scenario D) - PM Peak - SIG - 4lane)]

NA
Site Category: NA
Roundabout

Site Layout

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



Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Site Access A															
1	L2	All MCs	1	100.0	1	100.0	0.322	5.9	LOS A	2.0	16.3	0.25	0.59	0.25	45.7
3	R2	All MCs	874	22.0	874	22.0	0.322	9.4	LOS A	2.0	16.3	0.26	0.59	0.26	45.7
Approach			875	22.1	875	22.1	0.322	9.4	LOS A	2.0	16.3	0.26	0.59	0.26	45.7
East: Patons Lane															
4	L2	All MCs	579	22.0	579	22.0	0.367	4.4	LOS A	2.5	20.7	0.03	0.49	0.03	51.1
5	T1	All MCs	74	11.0	74	11.0	0.065	4.2	LOS A	0.3	2.3	0.02	0.40	0.02	54.1
Approach			653	20.8	653	20.8	0.367	4.4	LOS A	2.5	20.7	0.03	0.48	0.03	51.5
West: Patons Lane															
11	T1	All MCs	84	10.0	84	10.0	0.131	7.7	LOS A	0.5	3.8	0.59	0.71	0.59	51.1
12	R2	All MCs	1	100.0	1	100.0	0.131	17.0	LOS B	0.5	3.8	0.59	0.71	0.59	45.9
Approach			85	11.1	85	11.1	0.131	7.8	LOS A	0.5	3.8	0.59	0.71	0.59	51.1
All Vehicles			1613	21.0	1613	21.0	0.367	7.3	LOS A	2.5	20.7	0.18	0.55	0.18	48.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.

Roundabout Capacity Model: SIDRA Standard.

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

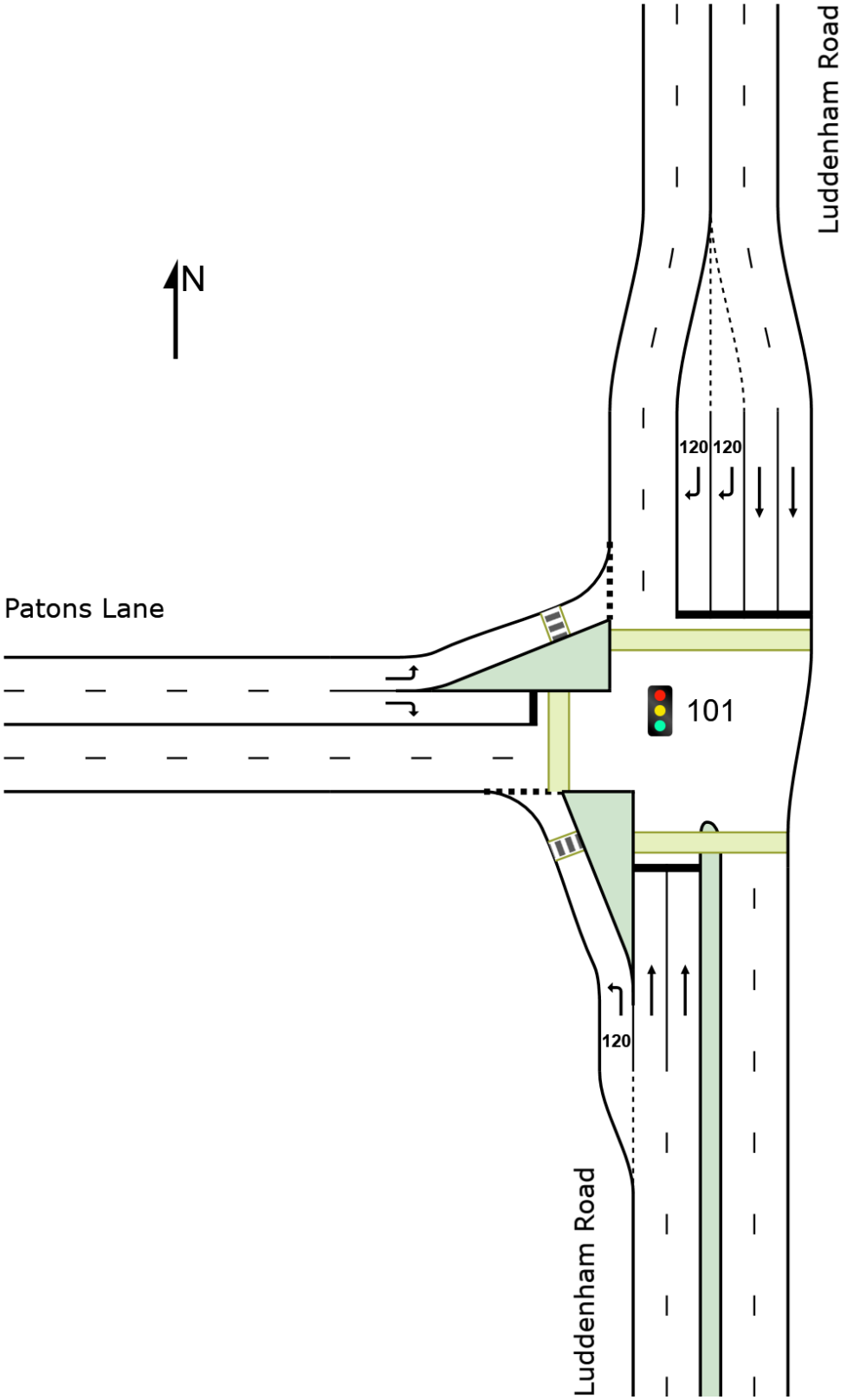
Site: 101 [Luddenham Rd/Patons Ln (Scenario D) PM Peak - 4 lane (Site Folder: 2036 - Cope Warehouse (Scenario D) - PM Peak - SIG - 4lane)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

Site Layout

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



Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Luddenham Road															
1	L2	All MCs	211	21.0	211	21.0	0.204	8.6	LOS A	2.2	18.2	0.34	0.64	0.34	51.8
2	T1	All MCs	505	10.0	505	10.0	* 0.620	38.0	LOS C	11.3	85.8	0.95	0.80	0.95	40.8
Approach			716	13.2	716	13.2	0.620	29.3	LOS C	11.3	85.8	0.77	0.75	0.77	43.3
North: Luddenham Road															
8	T1	All MCs	684	10.0	684	10.0	0.364	14.6	LOS B	9.6	73.2	0.62	0.54	0.62	50.8
9	R2	All MCs	442	21.0	442	21.0	* 0.608	43.1	LOS D	9.8	81.3	0.94	0.82	0.94	31.8
Approach			1126	14.3	1126	14.3	0.608	25.8	LOS B	9.8	81.3	0.75	0.65	0.75	43.2
West: Patons Lane															
10	L2	All MCs	653	21.0	653	21.0	0.650	10.5	LOS A	11.7	96.8	0.56	0.75	0.56	48.0
12	R2	All MCs	305	20.0	305	20.0	* 0.624	37.4	LOS C	12.8	105.3	0.91	0.83	0.91	38.5
Approach			958	20.7	958	20.7	0.650	19.0	LOS B	12.8	105.3	0.67	0.77	0.67	43.8
All Vehicles			2800	16.2	2800	16.2	0.650	24.4	LOS B	12.8	105.3	0.73	0.72	0.73	43.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

About Arcadis

Arcadis is the leading global Design & Consultancy firm for natural and built assets. Applying our deep market sector insights and collective design, consultancy, engineering, project and management services we work in partnership with our clients to deliver exceptional and sustainable outcomes throughout the lifecycle of their natural and built assets. We are 27,000 people, active in over 70 countries that generate €3.3 billion in revenues. We support UN-Habitat with knowledge and expertise to improve the quality of life in rapidly growing cities around the world.

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