221 Luddenham Road, Orchard Hills - Alspec Industrial Business Park

Traffic Impact Assessment for Bulk Earthworks DA

30 January 2025

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Traffic Impact Assessment

30 January 2025

Our Ref:

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3.0	04/04/2024	Updated report	BW	BB
3.1	20/06/2024	Updated report	BW	BB
4	26/08/2024	Updated report	BW	BB
4.1	25/11/2024	Updated report	NAT	BB
4.2	30/01/2025	Updated report	BW	NV

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Acronyms and Abbreviations

Acronym	Definition
AIBP	Alspec Industrial Business Park
EIS	Environmental Impact Statement
PLM	Parklife Metro
SSTOM	Stations, Systems, Trains, Operations and Maintenance (Sydney Metro)
TfNSW	Transport for NSW
TIA	Traffic Impact Assessment
VMs	Variable Message boards
GPEC	Greater Penrith to Eastern Creek

1 Introduction

1.1 Background

Arcadis has been engaged by HB&B Property Ltd to undertake a Traffic Impact Assessment for the proposed Alspec Industrial Business Park (AIBP) development at 221-227 and 289-317 Luddenham Road, Orchard Hills.

The proposal is to facilitate the bulk earthworks and the construction of the main estate road to enable the development of the site to accommodate a mix of warehouse, industrial and office land uses. Work is expected to commence in February 2025 for a duration of 12 months.

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 Report purpose

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 future changes to the transport network surrounding the site
- Section 4 describes the proposal as well as the traffic management services associated with the development
- Section 5 outlines the expected traffic generated during the construction of the facility, background traffic volumes and the associated impact on the transport network
- Section 6 specifies the proposed mitigation and management measures during the proposal
- Section 7 summarises the expected traffic impacts associated with the proposal

1.3 Revision from previous submission

Following consultation with Sydney Metro regarding a letter received on 21 January 2025, the following revisions have been made to the TIA since the previous submission (dated 25 November 2024) in Table 1-1 below:

Table 1-1 Sydney Metro comment responses to letter received on 21 January 2025

Sydney Metro comment	Descriptions of revisions	Report reference
The level of construction traffic generated is inconsistent throughout the reporting	AIBP cumulative construction data has been updated throughout the TIA to ensure consistency. AIBP construction program for 2025/ 2026 has been added, along with light and heavy vehicle volumes associated with each AIBP construction activity.	Section 3, Section 4.1.1, Section 4.5, Section 6
The proposed construction peak hours for Alspec Industrial Business Park (AIBP) bulk earthworks are now defined in Section 4.1.1 of the TIA as 7-8am (AM) and 5-6pm (PM). Sydney Metro's contractor Parklife Metro's construction hours are staggered by 30 minutes during each of the AM (7:30-8:30am)	Modelled scenarios have been updated to assess two conditions: Scenario A: Background traffic data + peak Sydney Metro EIS construction traffic Scenario B: Background traffic data + peak Sydney Metro EIS construction traffic + AIBP cumulative construction traffic SIDRA results in the updated assessment for Scenario A indicate that the existing	Section 4.4, Section 5

Sydney Metro comment	Descriptions of revisions	Report reference
and PM (4:30-5:30pm) peak hours.	intersection operates at LOS F with Sydney Metro's peak construction volumes, without AIBP construction traffic. Therefore, consideration of staggered peak construction hours for Sydney Metro were deemed to not have an impact on improving the existing intersections LOS for Scenario B. Traffic management measures as agreed with Sydney Metro on 23 January 2025 have been updated accordingly	
The SMF is an interfacing development that is currently in construction phase. The sole access for the SMF for construction and delivery of rolling stock is from Patons Lane and is therefore resolution of traffic issues related to the development of this site is essential to ensure the successful operation of the Metro in future.	Traffic management measures have been reviewed according to the updated SIDRA model scenario results. Sydney Metro's construction traffic will be given priority during peak hour periods, with traffic being monitored by traffic controllers on site.	Section 5
Sydney Metro has been advised that TfNSW does not support the temporary traffic signal arrangement at Luddenham Road/ Patons Lane and hence this option should be excluded from the traffic assessment unless approval is obtained from TfNSW (noting that TfNSW have concurrence).	Reference to temporary traffic signals as a traffic management solution has been removed from the TIA.	Section 4.4.1, Section 5, Section 6
Delivery of Sydney Metro rolling stock is planned during the first quarter of 2025 to early 2027 via Patons Lane. It is critical that the delivery of rolling stock is not impacted by the construction activities generated by the adjacent developments using Patons Lane during this period.	OSOM deliveries have been considered in the updated TIA. It is anticipated that OSOM deliveries will occur outside of general peak periods under full traffic control with escort vehicles. Sydney Metro will provide notice to AIBP's site team for any OSOM deliveries so priority access to Patons Lane can be provided and unimpeded for Sydney Metro deliveries. AIBP construction traffic is expected to operate between 6am to 6pm, maintaining access to Patons Lane for Sydney Metro outside of these hours. During constructions hours for AIBP, full traffic control will be provided to manage all traffic associated with AIBP's works.	Section 4.2

Sydney Metro comment	Descriptions of revisions	Report reference
Patons Lane traffic volume has been updated on page 4, section 2.3 of the TIA using Parklife Metro commissioned automatic traffic tube count data. The applicant did not commission any turning movement counts at the Patons Lane / Luddenham Road intersection to validate the turning movement splits. The applicant also did not commission traffic surveys at the gate of Patons Lane Resource Recovery Centre, located at the termination of Patons Lane to establish baseline traffic generated by the resource recovery centre.	Traffic counts were conducted on Patons Lane in 2021 when the AIBP masterplan was submitted and approved by council. After consultation with Sydney Metro in September 2024, Patons Lane tube counts conducted in 2024 were provided and advised to be used in the updated TIA for the bulk earthworks. Between the peak hours (7-8am and 5-6pm), the most recent traffic survey provided by Sydney Metro recorded 59 (36 heavy vehicles) heading eastbound on Patons Lane in the AM peak and 48 (5 heavy vehicles) heading eastbound on Patons Lane in the PM peak. The heavy vehicles were all considered to turn left onto Luddenham Road due to existing signage restricting a right turn for vehicles over five tonnes. The turning movements for the remaining light vehicles was split using the traffic distribution assumptions outlined in the TIA. The updated TIA recommends full time traffic control and traffic monitoring on site at the Patons Lane access and Luddenham Road access to the site. Traffic surveys will be conducted on site during works to assess the traffic using Luddenham Road and Patons Lane to/ from the AIBP site.	Section 2.3, Section 4.2, Section 5
It is understood the proposal is for bulk earthworks and the construction of the main estate road at 221-227 and 289-317 Luddenham Road, Orchard Hills. The proposal is programmed for 12 months, with works proposed to commence in January 2025 and completed by December 2025.	Updated TIA provides a construction program of works for AIBP. The program was used to determine the peak cumulative construction period, with peak construction volumes from that period considered in the updated assessment (Scenario B)	Section 3.1, Section 4.4.1
As discussed during the meeting on 12 December 2024, only vehicles under 5 tonnes are allowed to perform a right turn out of Patons Lane into Luddenham Road. This restriction is further reinforced by an additional sign implemented by the SSTOM Contractor forming part of the approved SMF and Construction Traffic Management Plan (CTMP). A review of SIDRA	The SIDRA assessment in the TIA has been updated to address the existing signage preventing vehicles over five tonnes from turning right from Patons Lane into Luddenham Road. All heavy vehicles and large trucks have been modelled to make a left turn onto Luddenham Road in the updated assessment scenarios.	Section 4.4.1

Sydney Metro comment	Descriptions of revisions	Report reference
movement summaries noted the west approach, assumed to be Patons Lane adopted a 50/50 split in left turn and right turn movements, which is inaccurate and does not account for both the permanent right turn ban for vehicles over 5 tonnes.		
SIDRA site layout diagrams are now included in the revised TIA with the layout of the intersection now generally aligned with the existing intersection layout. However, there is no indication in the report, or the site layout diagram of the lane width settings applied to the west approach (i.e. Patons Lane) of the intersection. Based on the SSTOM Contractors measurements of aerial images, the eastbound lane on approach to the intersection is approximately 5.8m in width. With high volumes of heavy vehicles, the lane width input can impact the performance of the intersection.	Sydney Metro's concerns regarding the previous modelled intersection layout for the Patons Lane approach has been revised. Previously, the existing eastbound Patons Lane approach to the intersection was modelled as separate left and right turn lanes. The updated TIA models the existing eastbound Patons Lane approach as a single wide approach lane with a wide of 5.8 metres, allowing LV to turn left/right onto Luddenham Road, with HV and large trucks only able to turn left onto Luddenham Road.	Section 4.4.1

2 Existing environment

2.1 Site location

The subject site is located on Luddenham Road, south of Patons Lane, in Orchard Hills. The site is irregular in shape, located approximately 30 kilometres west of Parramatta, with split frontages across both Luddenham Road and Patons Lane.

The site location is shown in Figure 2-1.

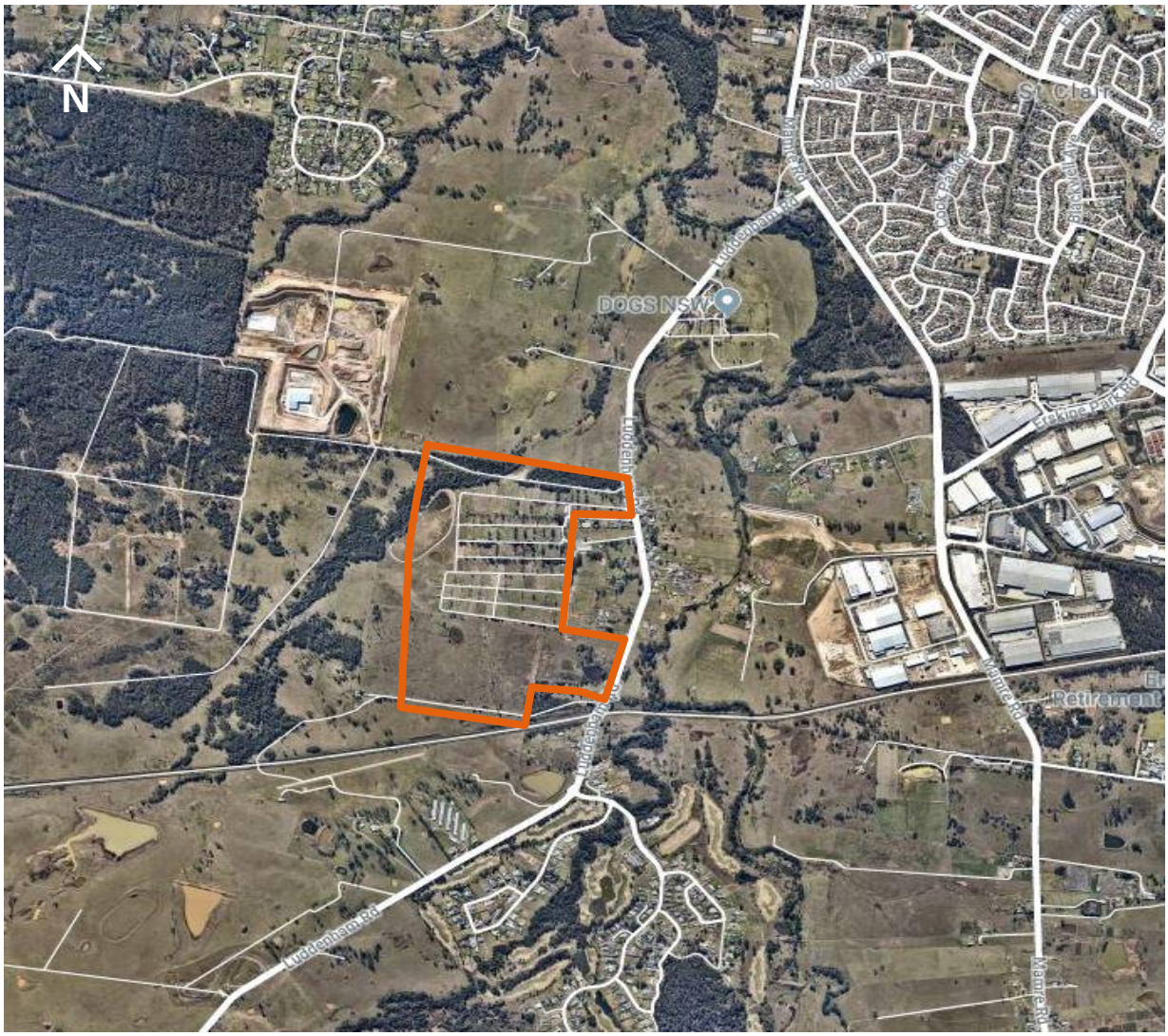


Figure 2-1 Site Location

2.2 Planning zones

As shown in Figure 2-2, the subject site is in a Rural Landscape Zone (RU2). The region surrounding the site is a mix of Environmental Conservation (E2) 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).

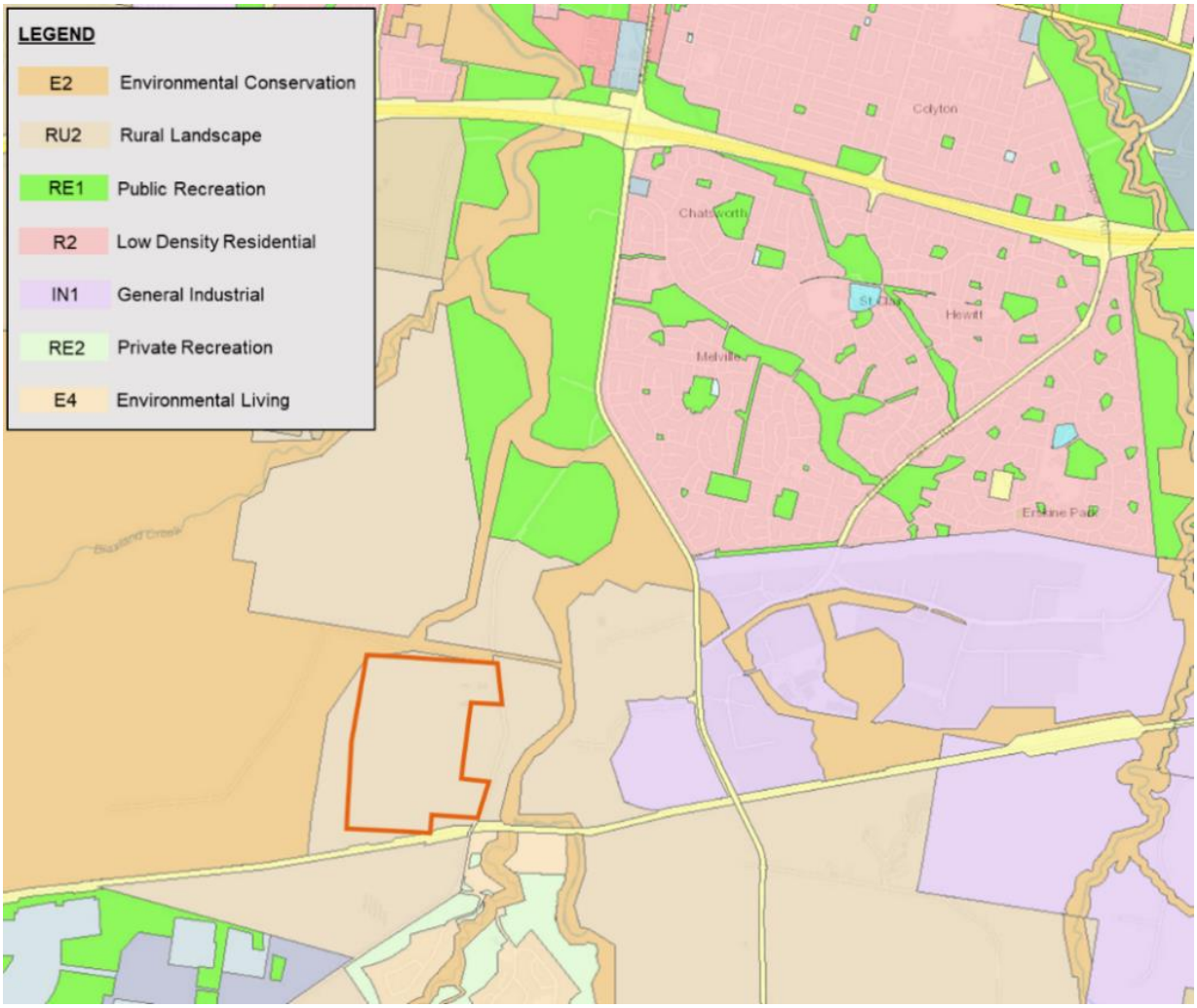


Figure 2-2 Land Zoning Map (Source: ePlanning Spatial Viewer - NSW Planning Portal)

2.3 Road network

A summary of the key roads influenced by the development application is provided 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.

Photos of Luddenham Road in the vicinity of the site are provided in Figure 2-3 and Figure 2-4.

Figure 2-3 Luddenham Road, facing north

Figure 2-4 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 has a posted speed limit of 50 km/h and 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.

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. 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 2-5 and Figure 2-6.

Figure 2-5 Patons Lane, facing west

Figure 2-6 Patons Lane, facing east

Mamre Road

Mamre Road is a state road under the control and management of Transport for NSW (TfNSW). Within the context of the study area, Mamre Road is aligned in a north/ south orientation and is currently configured as a two-lane undivided carriageway, set within a 45-metre-wide road reserve.

Mamre Road carries approximately 15,000 vehicles per day and has a posted speed limit of 80 km/h. Mamre Road passes through the Western Sydney Priority Growth Area and provides connections to the Western Sydney Employment Area (WSEA), making it a key route for regional trips.

Photos of Mamre Road close to the intersection with Luddenham Road are shown in *Figure 2-7* and *Figure 2-8*.

Figure 2-7 Mamre Road, facing north (Source: Google Earth)

Figure 2-8 Mamre Road, facing south (Source: Google Earth)

Elizabeth Drive

Elizabeth Drive is a state road under the control and management of TfNSW. It is aligned in an east/west orientation and carries approximately 11,000 vehicles per day.

Elizabeth Drive is configured as a two-lane undivided carriageway with unsealed shoulders and is set within a 35-metre-wide road reserve. The speed limit is posted as 80 km/h in both directions of travel. To the east, Elizabeth Drive connects to the Westlink M7 Motorway and to the west it connects with The Northern Road.

Photos of Elizabeth Drive near the intersection with Luddenham Road is shown in *Figure 2-9* and *Figure 2-10*.

Figure 2-9 Elizabeth Drive, facing east (Source: Google Earth)

Figure 2-10 Elizabeth Drive, facing west (Source: Google Earth)

2.4 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.

Overall, the area is currently underserviced by public transport. However, the level of service provision reflects the low travel demands of the locality.

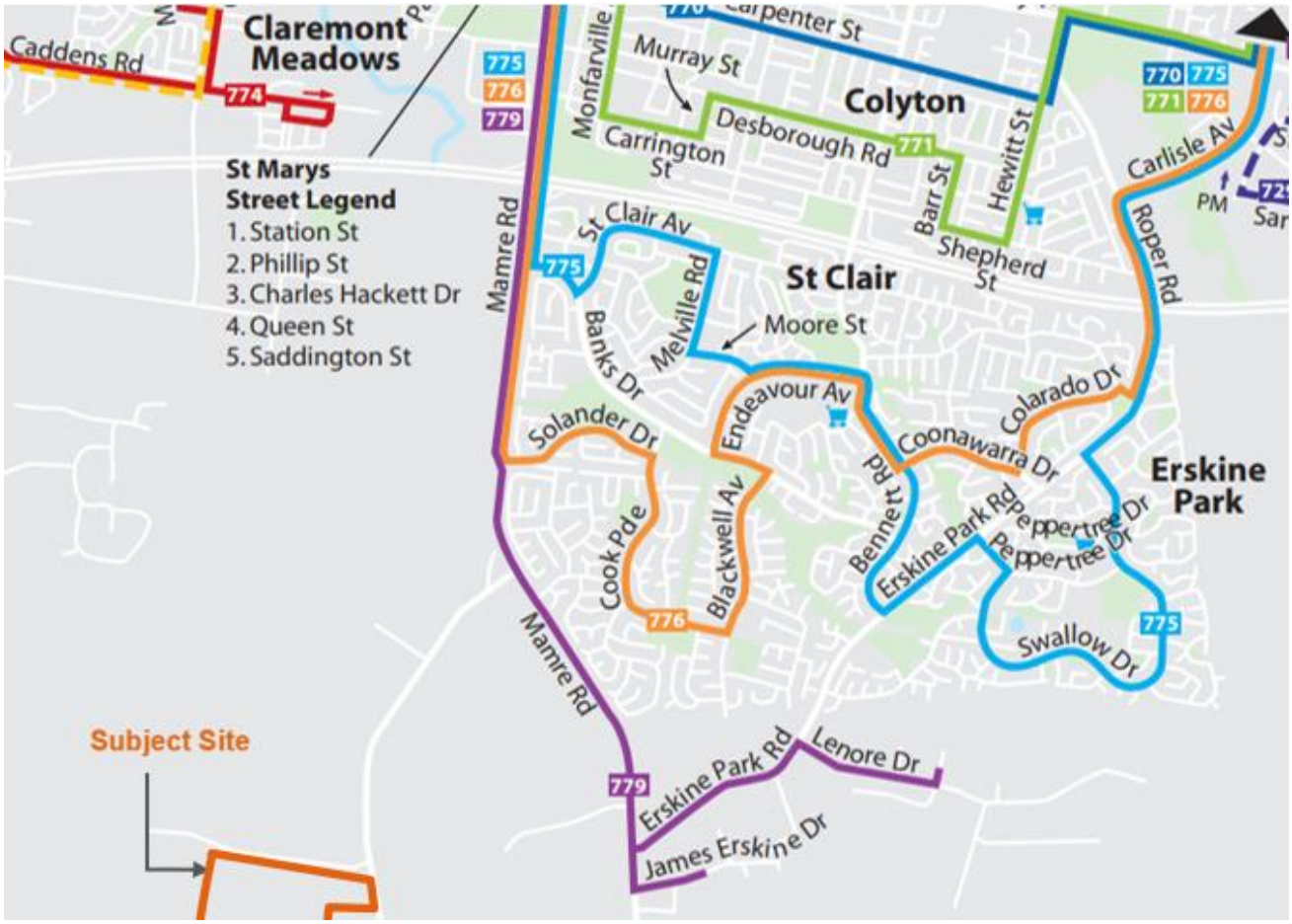


Figure 2-11 Current Public Transport Network – Orchard Hills area

2.5 Active transport

There is currently limited pedestrian and cyclist infrastructure provided around the project area, with no dedicated footpaths on either side of the road along Luddenham Road and Patons Lane. Cyclist movements currently share the road with cars. This is attributed mainly to the nature of land use in the direct vicinity of the site, which comprises of RU2 Rural Landscape and E2 Environmental Conservation. It is expected that there is limited demand for such facilities at present.

2.6 Road safety

Historical crash data has been evaluated between 2018-2022 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

Crash Severity	Year				
	2018	2019	2020	2021	2022
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 The proposal

The proposal is to undertake bulk earthworks and the construction of the main estate road at 221-227 and 289-317 Luddenham Road, Orchard Hills to accommodate a mix of warehouse and office land uses. The proposal is programmed for 12 months with works proposed to commence in February 2025 and completed by February 2026.

The bulk earthworks project is expected to generate up to 100 heavy vehicle (50 IN, 50 OUT) and 160 light vehicle (80 IN, 80 OUT) movements per day during peak construction, not inclusive of concurrent AIBP construction activities.

3.1 AIBP construction timeline

The bulk earthworks construction activity will be in conjunction with other infrastructure works as part of the AIBP development. Figure 3-1 shows an expected timeline for 2025/2026 construction period of AIBP, inclusive of the bulk earthworks and other concurrent DA construction works.

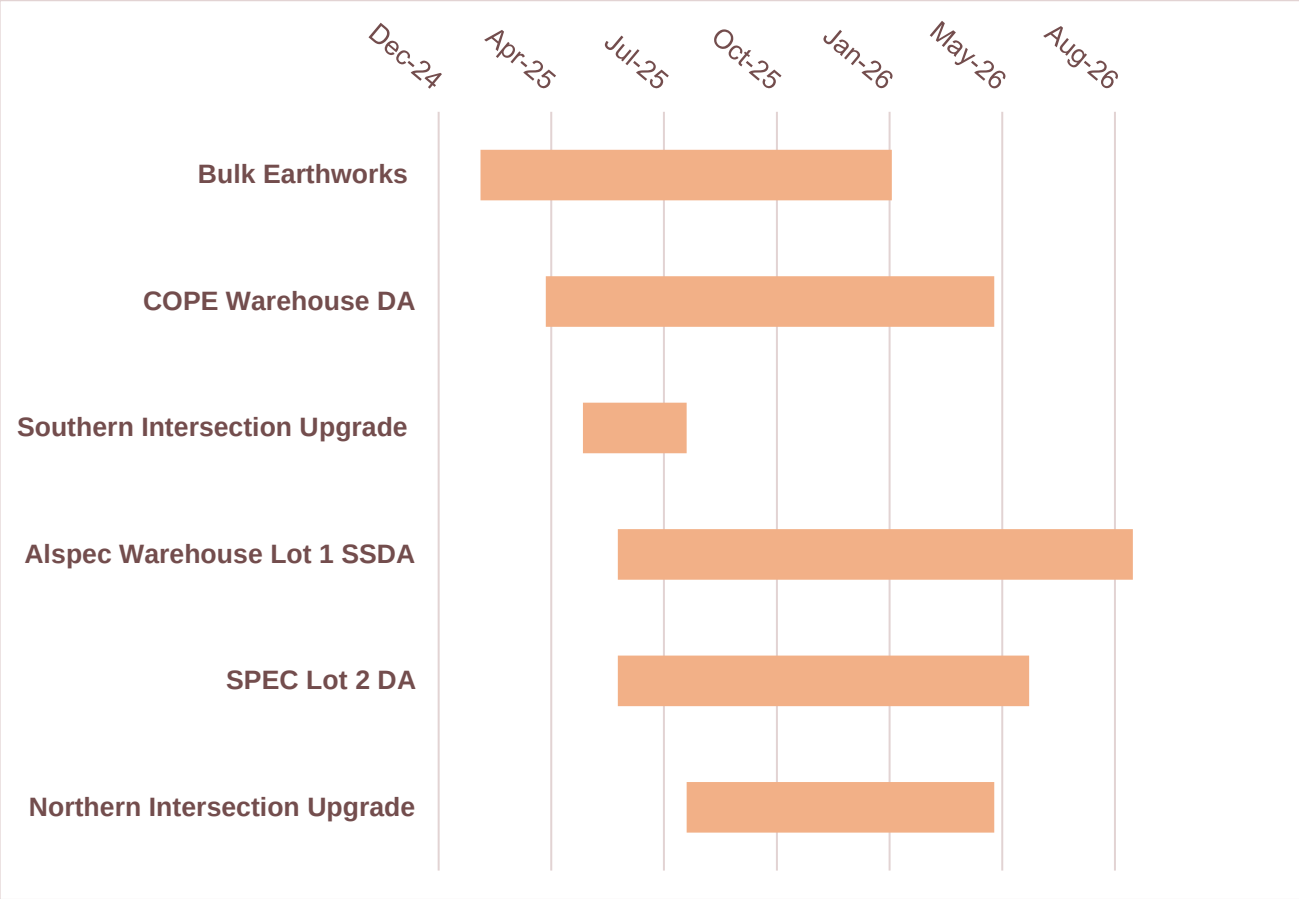


Figure 3-1 Indicative AIBP construction timeline

3.2 Site access

The subject site has three existing access points (Figure 3-2):

- Patons Lane, on the northern boundary of the site
- A secondary access point located on Luddenham Road, approximately 200 metres south of the Luddenham Road and Patons Lane intersection
- A third access point located via an existing driveway on Luddenham Road, approximately one kilometre south of the Luddenham Road and Patons Lane intersection

Figure 3-2 Existing access points to the site

The main vehicular access will be via Patons Lane. It is proposed that construction vehicles will enter the site using the Patons Lane site access via the priority-controlled intersection at Luddenham Road and Patons Lane. Heavy vehicles will exit the site via the third access point, located one kilometre south of the Luddenham Road and Patons Lane intersection. The intensity of the vehicular movements onto Patons Lane will be reduced by enabling heavy vehicles to exit directly onto Luddenham Road via a left turn. The proposed vehicular movement is shown in Figure 3-3.

Figure 3-3 Usage of the third site access point onto Luddenham Road

The secondary access point is located on the eastern boundary of the site. It will not be used for vehicular access as Pad 1 will be constructed first.

The third access point, located one kilometre south of the Luddenham Road and Patons Lane intersection, will be used for light and heavy vehicles accessing the site when there is traffic congestion observed at the existing Luddenham Road / Patons Lane intersection. The proposed construction vehicle movement for this instance is shown in Figure 3-4.

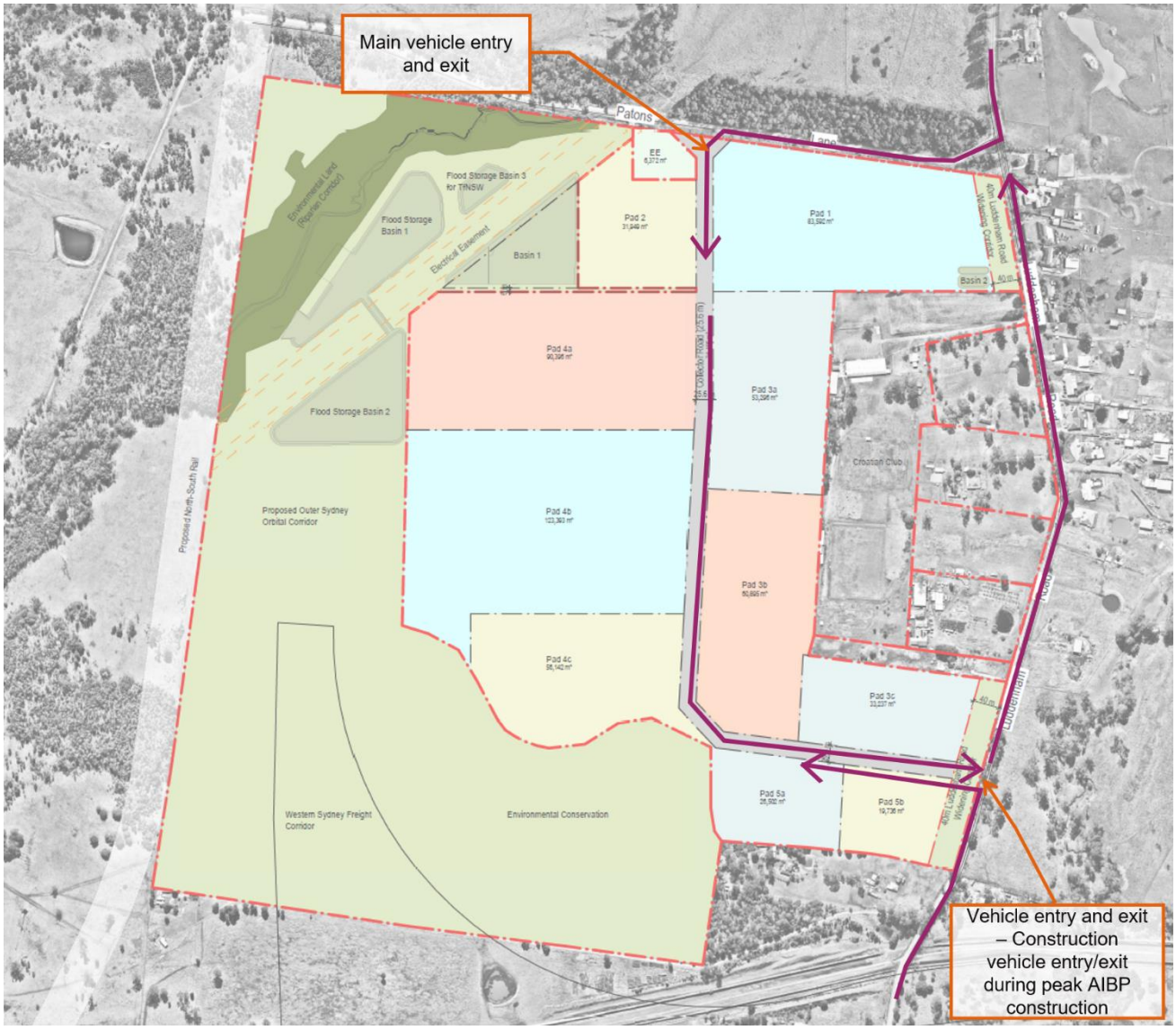


Figure 3-4 Peak AIBP construction phase site access

3.3 Parking

All parking will be contained within the subject site and will not affect the surrounding areas.

3.4 Heavy vehicle routes

Heavy vehicles accessing the site will only be permitted to travel to the site via Luddenham Road from the north using the M4 Western Motorway and Mamre Road. Departing heavy vehicles will exit onto Luddenham Road either via Patons Lane or the additional site access and then travel north to the M4 Western Motorway

4 Traffic impact assessment

4.1 Traffic generation and demand

4.1.1 Cumulative Construction traffic demand

Primary vehicular access to the proposed development site will be facilitated by Patons Lane. Light and heavy vehicles can additionally access and exit the site using the existing driveway located approximately one kilometre south of the intersection of Luddenham Road and Patons Lane.

A cumulative construction assessment has been conducted to consider the concurrent construction activities for the broader development site in 2025 to 2026 (refer to Figure 3-1). After assessment of the AIBP construction program, the cumulative assessment considers peak construction traffic from each project, which is expected to be between August 2025 to February 2026. As the Southern Intersection Upgrade works will be completed by this stage, traffic volumes from this construction activity have not been considered in the cumulative assessment. The estimated peak daily construction traffic for each project is summarised in Table 4-1.

Table 4-1 AIBP peak daily construction traffic volumes - 2025/26

	Daily peak construction traffic – two-way movements	
Project	**Light vehicles (LV)**	**Heavy vehicles (HV)**
Bulk Earthworks	160	100
COPE Warehouse DA	60	20
Southern Intersection Upgrade*	12	20
Alspec Warehouse Lot 1 SSDA	80	30
SPEC Lot 2 DA	50	16
Northern Intersection Upgrade	30	80
Total	**380**	**250**

**Southern Intersection Upgrade peak construction volumes have not been considered in the cumulative assessment*

The expected daily traffic profile during the peak construction period is presented in Figure 4-1. Subsequently, a summary of the cumulative AM (7and to 8am) and PM (5pm to 6pm) peak hour volumes is provided in Table 4-2.

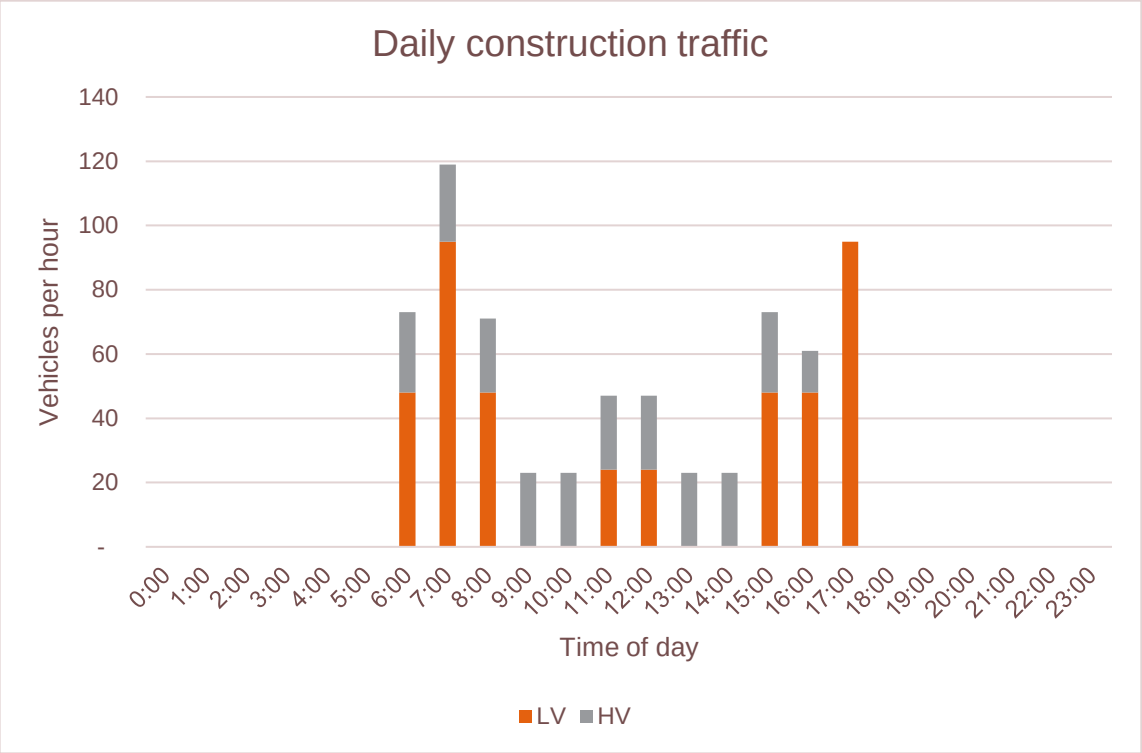


Figure 4-1 Cumulative AIBP construction traffic volume daily profile

Table 4-2 Estimated AIBP peak hour cumulative construction traffic volumes

Vehicle type	AM peak (7am to 8am)			PM peak (5pm to 6pm)		
	IN	OUT	Total	IN	OUT	Total
LV	95	0	**95**	0	95	**95**
HV	25	0	**25**	0	0	**0**
Total	**120**	**0**	**120**	**0**	**95**	**95**

The following assumptions have been made as part of this assessment:

- 50 per cent of construction worker employees will arrive and leave site during the peak hours, resulting in an increase of up to 95 light vehicle trips along Patons Lane and Luddenham Road in the AM and PM peak hours. These vehicles are assumed to consist exclusively of light vehicles
- Up to 250 heavy vehicle (125 IN, 125 OUT) movements transporting construction equipment, materials, and earthworks is expected per day. It is anticipated that 10 per cent of the heavy vehicles, 25 vehicles, will arrive during the AM peak hour, and no heavy vehicles are expected to leave in the PM peak hour.
- Light and heavy construction vehicles will preferentially enter the site via Patons Lane, if permitted by traffic controllers monitoring for congestion on site. Heavy vehicles will exit the site from the southern site access located on Luddenham Road and travel northbound. Alternatively, light and heavy construction vehicles will enter and exit the site from the existing southern access on Luddenham Road.
- During AM and PM peak hours, Sydney Metro's construction traffic will be given priority access to Patons Lane. Communication between AIBP's and Sydney Metro's site teams/ traffic controllers will assess the periods during which AIBP traffic can use Patons Lane in coordination with Sydney Metro's construction traffic.

4.1.2 Operational traffic demand

Trip generation rates for the proposed development have been derived from specific data collected as part of the updated RMS *Trip generation surveys: business parks and industrial estates: analysis report* (2012) and associated updates. The estimated operational traffic movements over an average day are summarised in Table 4-3.

Table 4-3 Trip generation summary

Stage	Area (m^2)	AM trips	PM trips	Daily movements
Fully developed AIBP Masterplan	324,324	1362	1265	8,564

The heavy vehicle generation rate was determined to be 22 per cent of the warehouse traffic for both the morning and afternoon peak period. The volume of heavy vehicles was determined by averaging the heavy vehicle generation rates of the business park developments with a GFA over 25,000 m^2 in RMS *Trip generation surveys: business parks and industrial estates: analysis report* (2012).

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 and 2026. 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 one-hour peak volumes. Table 4-4 summarises the peak hour traffic volumes on Luddenham Road.

Table 4-4 Forecasted background traffic 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

A copy of the STFM outputs is provided in Appendix A.

Local traffic volumes

This section provides an overview of other construction projects near the proposed development that are likely to impact the operation of Patons Lane and Luddenham Road. The information was gathered from various project sites, and details for each project are documented accordingly.

Sydney Metro – Western Sydney Airport Stabling and Maintenance Facility

To assess the overall impact of traffic on the performance of Patons Lane and Luddenham Road, traffic generated by the Patons Lane Resource Recovery Centre (RRC) and the 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 4-5. In addition, peak hour construction movements as reported in the *Construction Traffic Management Plan – SSTOM – Orchard Hills Stabling and Maintenance Facility (Environmental Impact Statement (EIS) and Park Life Metro (PLM))* have been considered for the modelled scenarios, with traffic data shown in Table 4-6 and Table 4-7, respectively.

Table 4-5 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 4-6 Peak construction movements in 2024/ 2025 for the Sydney Metro – Western Sydney Airport stabling and maintenance facility (EIS)
Source: Construction Traffic Management Plan – Orchard Hills Stabling and Maintenance Facility (Table 10)

Vehicle Type*	AM peak (7:30-8:30am)			PM peak (4:30-5:30pm)		
	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 4-7 Peak construction movements in 2024/ 2025 for the Sydney Metro – Western Sydney Airport stabling and maintenance facility (PLM)
Source: Construction Traffic Management Plan – Orchard Hills Stabling and Maintenance Facility (Table 10)

Vehicle Type*	AM peak (7:30-8:30am)			PM peak (4:30-5:30pm)		
	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**

The cumulative construction assessment has incorporated background traffic volumes from Table 4-4 on Luddenham Road, along with Table 4-5, Table 4-6 and Table 4-7 on Patons Lane.

Oversize Overmass (OSOM) vehicles are expected to access the SSTOM site during 2025 and 2026, for deliveries of large items such as rolling stock, transformers and other large components. OSOM vehicles required for SSTOM's construction site are expected to be completed overnight or outside of general peak periods, under full traffic control and using escort vehicles. Sydney Metro will provide notice of their scheduled deliveries to ensure access via Patons Lane is maintained and potential conflicts are managed. AIBP construction vehicles will not be permitted to access the site overnight, with construction vehicle movements

anticipated to occur between 6am and 6pm only. Therefore, SSTOM's OSOM vehicles are not anticipated to experience any disruptions due to AIBP's construction vehicles.

M12 Motorway Project

The M12 Motorway Project expects its peak construction volumes to occur in 2024. However, within the M12 Motorway EIS, Section 6.2.3 of Traffic and Transport report describes the site access routes for the project, which is via Elizabeth Drive, Mamre Road, The Northern Road and Wallgrove Road (Source: *M12 Motorway Amendment Report, Section 6.2*) The construction traffic assessment did not include Luddenham Road and Patons Lane as an access route during construction. Therefore, the cumulative traffic impact for this TIA did not consider the expected traffic induced by the M12 Motorway.

Western Sydney Airport

Construction for the Western Sydney Airport (WSA) is underway and expected to be completed by 2026. The WSA EIS report describes the construction traffic accesses the site via Elizabeth Drive, Anton Road, The Northern Road, and Badgerys Creek Road (*Source: Western Sydney Airport EIS Report*). The construction traffic assessment did not include Luddenham Road and Patons Lane as an access route during construction. Therefore, the cumulative traffic impact for this TIA did not consider the expected traffic induced by WSA.

4.3 Modelling approach and assessment criteria

The assessment of the performance of the intersections were tested using SIDRA Intersection 9.1. Unless otherwise specified, the default model parameters were adopted for the intersection models.

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 4-8.

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 4-8 LOS criteria for intersection capacity analysis

Level of service	Give way and stop signs	Description of intersection operation
A	d ≤14	Good operation
B	15 ≤ d ≤ 28	Acceptable delays and spare capacity
C	29 ≤ d ≤ 42	Satisfactory, but crash study required
D	43 ≤ d ≤ 56	Near capacity and crash study required
E	57 < d ≤ 70	At capacity, require other control mode
F	d > 70	Unsatisfactory and requires other control mode or major treatment

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 4-9.

Table 4-9 Degree of saturation

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 sign-controlled intersections**
  - Less than 0.90 for signalised intersections.

4.4 Road network impacts

4.4.1 Construction traffic impact

For this assessment, the existing intersection of Luddenham Road and Patons Lane, with a through lane in each direction on Luddenham Road, a southbound right-turn lane from Luddenham Road into Patons Lane, and a left and right turn approach lane out of Patons Lane into Luddenham Road was modelled to assess:

- **Scenario A –** 2025 traffic conditions, including traffic data from the STFM model on Luddenham Road, Sydney Metro peak EIS construction traffic and 2024 Trans Traffic Survey on Patons Lane, without construction traffic from AIBP works.
- **Scenario B –** 2025 cumulative peak hour AIBP construction traffic demand combined with background traffic.

Peak hour, traffic flow diagrams for Scenario A and Scenario B are shown in Figure 4-2 and Figure 4-3, respectively.

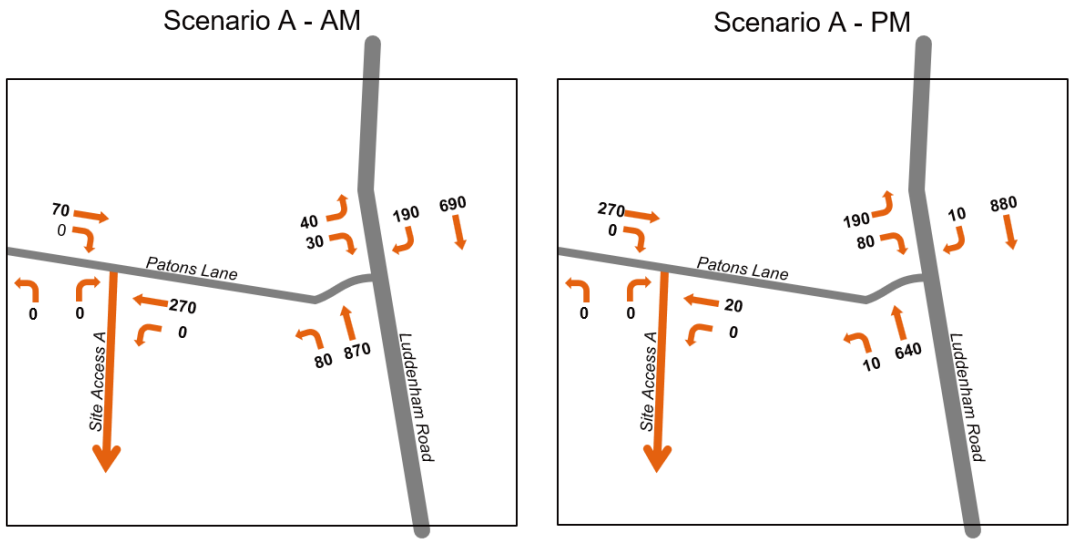


Figure 4-2 Scenario A – Traffic flow diagram

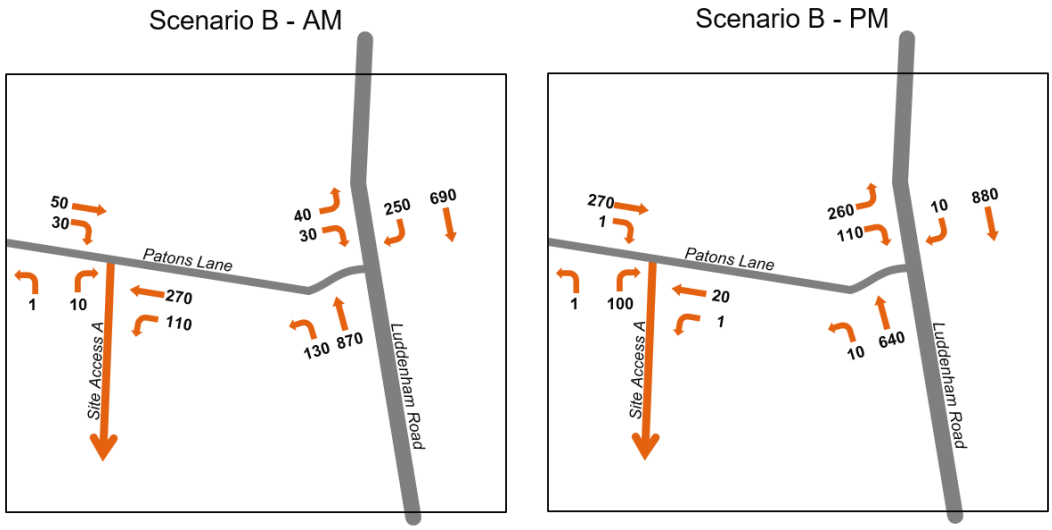


Figure 4-3 Scenario B – Traffic flow diagram

To account for the various types of heavy construction vehicles, the following modelling assumptions have been adopted for each assessed scenario:

- 30 per cent of construction heavy vehicles for Sydney Metro and AIBP (where applicable) have been modelled to be large trucks.
- Large trucks have been modelled with a slower approach and exit speed compared to other light and heavy vehicles, resulting in a 50 per cent reduction in speed for this portion of trucks.
- Heavy vehicles and large trucks approaching Patons Lane must turn left onto Luddenham Road due to existing signage restricting vehicles over 5 tonnes turning right onto Luddenham Road

The existing intersection configuration is provided in Figure 4-4.

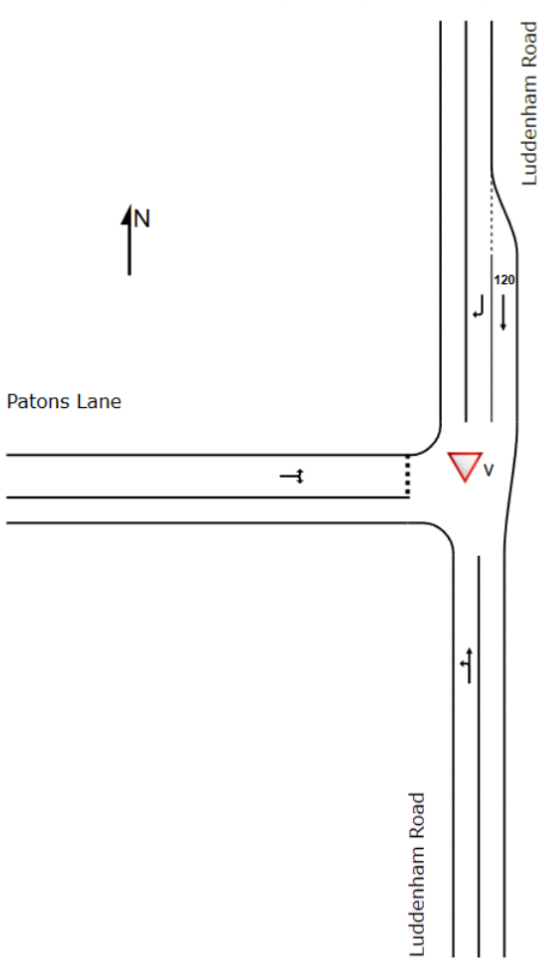


Figure 4-4 Assessed intersection layout – existing conditions

The results of the SIDRA assessment for the scenarios identified above is provided in Table 4-10.

Table 4-10 SIDRA modelling outputs - construction

Year	Intersection	Intersection treatment	Peak hour	Volume	Average delay (sec)	DoS	LoS
2025	**Scenario A -** Luddenham Rd/Patons Lane	Sign controlled intersection	AM	2011	724.4	1.654	F
			PM	1905	227.2	1.164	F
	Scenario B - Luddenham Rd/Patons Lane	Sign controlled intersection	AM	2137	1633	2.652	F
			PM	2006	569.1	1.560	F

The assessment identified that, during the AM and PM peak hour for both modelled scenarios, traffic exiting Patons Lane may experience substantial delays to turn into Luddenham Road. It is noted that this assessment

has adopted standard gap acceptance parameters in accordance with the TfNSW Traffic Modelling guidelines, which may impact the modelled LoS at the intersection.

To manage traffic access at the intersection of Luddenham Road and Patons Lane, full time traffic control is recommended to be implemented at Patons Lane and the southern access driveway on Luddenham Road. Traffic control will constantly monitor traffic flow through these intersections and communicate on site to distribute construction vehicle access, avoiding congestion. In addition, to reduce the impact of construction traffic associated with AIBP's 2025 cumulative construction activities, vehicles exiting the site would be required to turn left out of Patons Lane and/ or the site onto Luddenham Road towards Mamre Road, as shown in Figure 4-5. This will reduce demand for right-turns out of Patons Lane.

A construction traffic management plan will be prepared outlining the required traffic routes and any additional traffic management measures, and would be developed in consultation with TfNSW, Council and adjacent property owners/ interested parties.

The SIDRA outputs of this assessment can be found in Appendix B.

Figure 4-5 Proposed left-out approach to redirect construction traffic

4.4.2 Operational traffic impact

An assessment of the fully developed AIBP site was previously undertaken using adopted warehouse traffic generation rates and the same modelling approach and assessment criteria as utilised for the construction phase of the AIBP site (Arcadis, April 2023). Considering potential upgrades of the Luddenham Road/ Patons Lane and Patons Lane/ Site Access A intersections, the following configurations of these intersections have been assessed:

- 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 4-6.

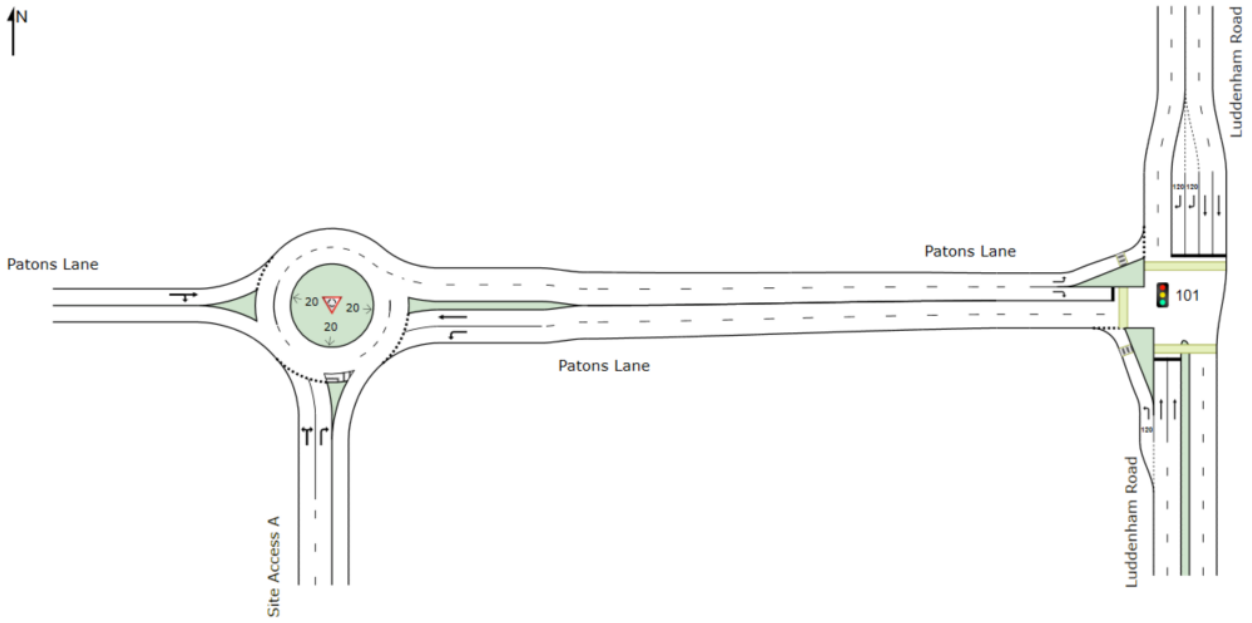


Figure 4-6 Signalised intersection at Luddenham Road and Patons Lane with Luddenham modelled as a two-lane configuration

Table 4-11 summarises the AM and PM peak performance results for the Patons Lane/ Site access A and Luddenham Road/ Patons Lane intersections. Both intersections are expected to operate at LOS C or better.

Table 4-11 SIDRA modelling outputs - operational

Intersection	Intersection treatment	Peak hour	Volume	DoS	LoS
Patons Lane/ Site Access A	Roundabout	AM	1,592	0.419	B
		PM	1,497	0.295	B
Luddenham Road/ Patons Lane	Signalised	AM	2,884	0.778	C
		PM	2,684	0.600	C

The SIDRA modelling results indicate that at the fully developed operational phase of the AIBP site, both Luddenham Road/ Patons Lane and Patons Lane/ Site Access A intersections meet the traffic performance criteria for capacity and delay. This assessment has considered the potential demand for the undeveloped sites adjacent to the current larger AIBP warehouse development.

4.5 Broader transport network impacts

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 contributed 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 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 formalised into 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.

Construction period traffic assessment

The site is expected to generate an estimated traffic demand of up to 25 heavy vehicles and 95 light vehicles during the cumulative peak construction hours, which is expected to last approximately 6 months according to the AIBP construction program. It is assumed that 10 per cent of heavy vehicles enter the site during the AM peak hour, no heavy vehicle movements are expected during the PM peak hour, and majority of light vehicles enter the site during the AM peak hour and exit during the PM peak hour.

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 4-7 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 1500 vehicles per hour.

The estimated total demand on Luddenham Road during the 2025 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 PCU assessment on Luddenham Road

Peak hour	Direction	2025 estimated demand			Capacity	Sufficient
		Background	Construction	Total		
AM peak	NB	950	60	1010	1500	✓
	SB	880	50	930	1500	✓
PM peak	NB	830	70	900	1500	✓
	SB	970	30	1000	1500	✓

5 Construction mitigation and management measurement

Traffic management

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

- A Construction Traffic Management Plan (CTMP) would be prepared and implemented in accordance with the Traffic control at work sites, version 6.1 (TfNSW, 2022). The construction traffic management plan would enable the safe management of traffic, provide for the safety of construction personnel, and minimise impacts on the local community. The plan would include as a minimum:
  - Hours of construction activity and haulage, which do not impose on peak periods and school drop-off and pick-up times
  - Haulage routes, including the source locations and their access points for the site
  - Design and construction of access points in accordance with Transport for NSW and Council requirements
  - The design of temporary works required to accommodate the heavy vehicle movements along the short sections of local roads required for access to ancillary sites
  - Designated areas within the proposal area for heavy vehicle turning movements, parking, loading and unloading
  - On-site parking arrangements for construction, supervisory and management personnel
  - Safety principles for construction activities, such as speed limits around the site and procedures for specific activities
  - Induction requirements for construction, supervisory and management personnel
  - Procedures for inspections and record keeping for maintaining traffic control measures
  - Contact details of key proposal personnel.
- For each stage of construction, detailed 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.
- Full time traffic controllers will be located at the Patons Lane site access, west of the existing Luddenham Road and Patons Lane intersection (refer to Figure 5-1). In addition, full time traffic controllers will be located at the existing site access driveway on Luddenham Road, south of the existing Luddenham Road and Patons Lane intersection. This will ensure that traffic movements to/ from the AIBP site are coordinated with Sydney Metro construction vehicle movements, minimising disruptions for Sydney Metro's construction activities and deliveries.
- During the AM and PM peak hours, Sydney Metro construction traffic will be given priority access via Patons Lane. To reduce congestion, traffic controllers will assess the traffic conditions and, if required, will divert any AIBP construction vehicles to access the site via the existing driveway on Luddenham Road.
- Traffic surveys are to be undertaken during construction around the site of works, to monitor how the site is being accessed by AIBP vehicles and to give confidence that AIBP construction traffic is not contributing to delays for Sydney Metro construction vehicles. These surveys will also enable AIBP to monitor their contribution to the traffic on the surrounding road network throughout the construction period.
- Patons Lane access must always be maintained to not impede on Sydney Metro's construction activities. AIBP construction vehicles are not permitted to access the site during critical OSOM deliveries for Sydney Metro. OSOM deliveries such as rolling stock and transformers will have priority access to Patons Lane overnight, with the Sydney Metro team providing notice to the AIBP site team of their delivery schedule.
- 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.

- 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.

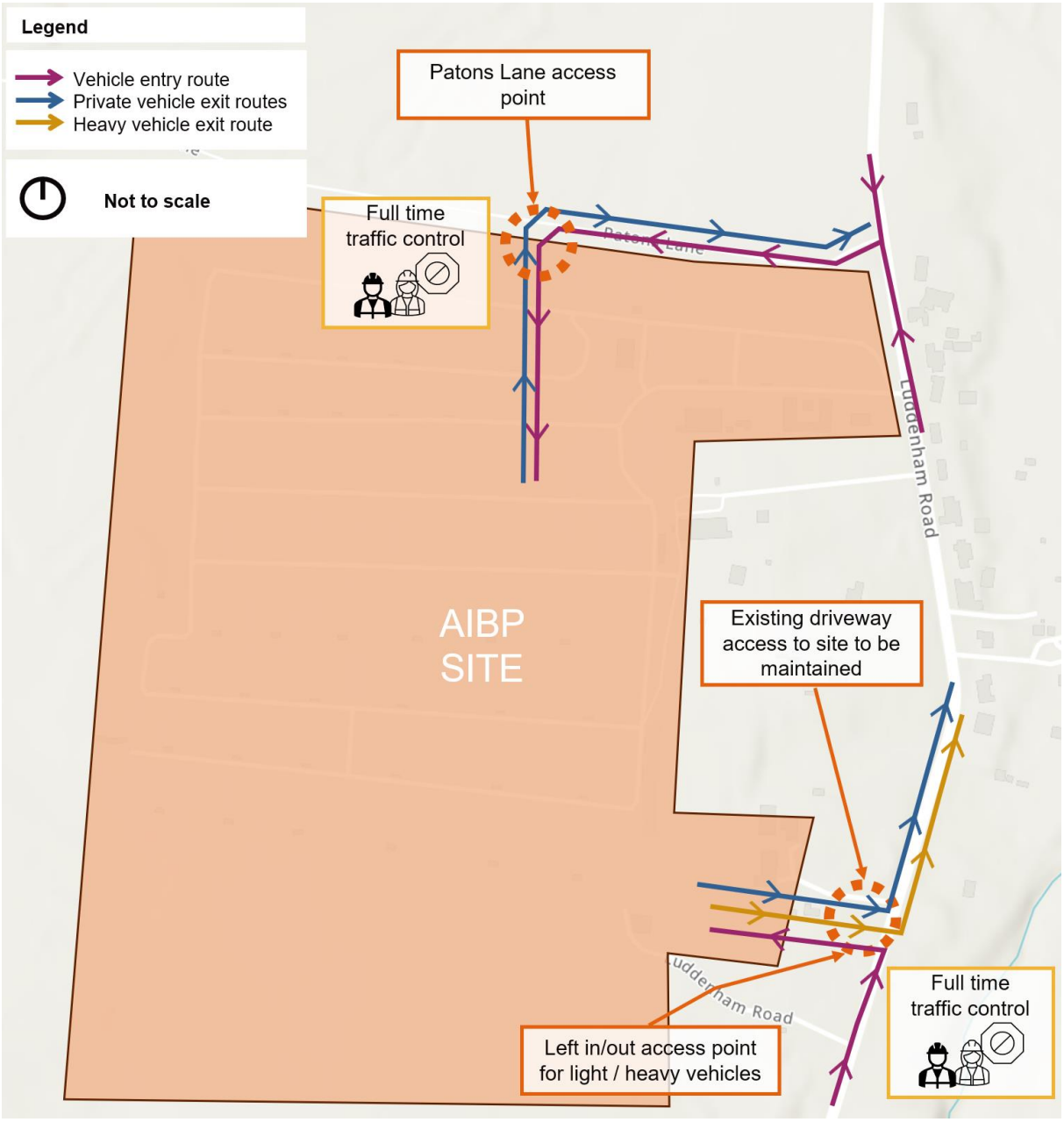


Figure 5-1 Access options and traffic control surrounding the site of works

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

Patons Lane is the sole 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. Ongoing stakeholder consultation with Sydney Metro's D&C is required during construction to understand the vehicular movements associated with the stabling and maintenance facility and to mitigate any reduction in access and negative traffic impacts.

6 Summary

The proposal involves the construction of a main estate road located within the subject site and bulk earthworks to facilitate the industrial, warehouse and office land uses for the Alspec Industrial Business Park. The site will be accessed through the new access point on Patons Lane on the northern boundary with an additional heavy vehicles egress point. The heavy vehicle egress point is a left-turn only onto Luddenham Road located one kilometre south of the intersection of Patons Lane and Luddenham Road to reduce the intensity of the vehicular movements along Patons Lane.

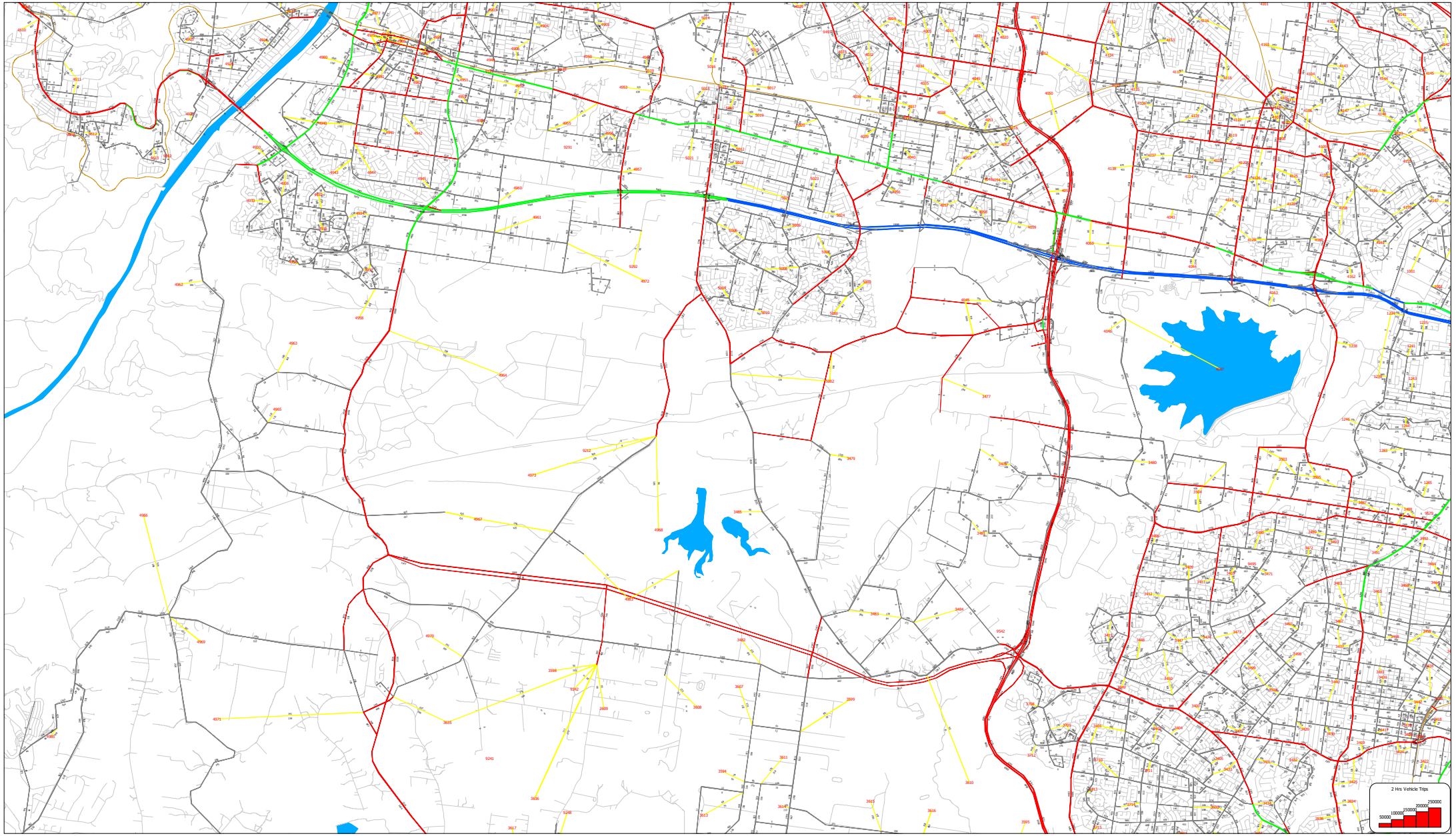
An assessment of the projected cumulative traffic demand during the construction phase of the proposal suggests minimal impact on traffic and the broader road network with an additional 95 light vehicle movements and 25 heavy vehicle movements during the AM peak hour, and 95 light vehicle movements during the PM peak hour. Temporary localised impacts on Patons Lane are likely during construction, with the following mitigation measures proposed to reduce impacts:

- Minimising construction and haulage activity during peak traffic periods
- Stakeholder consultation with Sydney Metro to maintain vehicular access to the stabling and maintenance facility by understanding the daily profile and the peak periods for the generated construction traffic volumes
- Sydney Metro construction traffic to be given priority Patons Lane access during the AM and PM peak hours, with daily communication conducted between AIBP and Sydney Metro's site teams.
- Full time traffic control to be provided along Patons Lane, and the existing driveway on Luddenham Road (third access point)
- Provision of adequate sight distances related to the posted speed limit.

Further documentation will be developed to manage traffic impacts including a Construction Traffic Management Plan that addresses and includes the identified traffic mitigation and management measures.

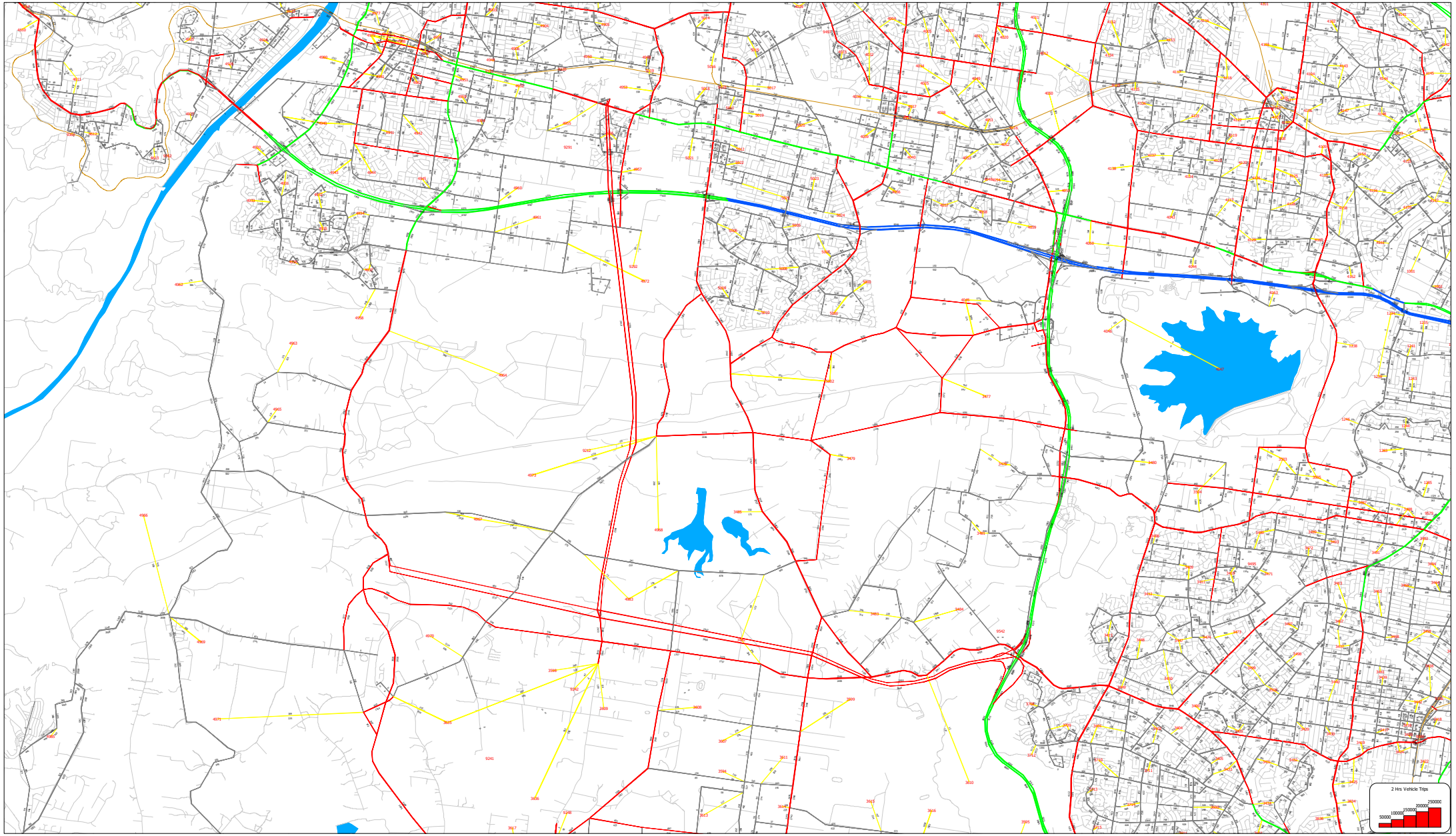
Appendix A STFM Outputs

TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 2026: 2026 ROAD NETWORK MODEL(TZP19STMV3.8FMMV7.1)-7-9AM(mf34)
2021-12-10 07:09

TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 20360: 2036 ROAD NETWORK MODEL(TZP19STMV3.8FMMV7.1)-4-6PM(mf56)
2021-12-10 07:10

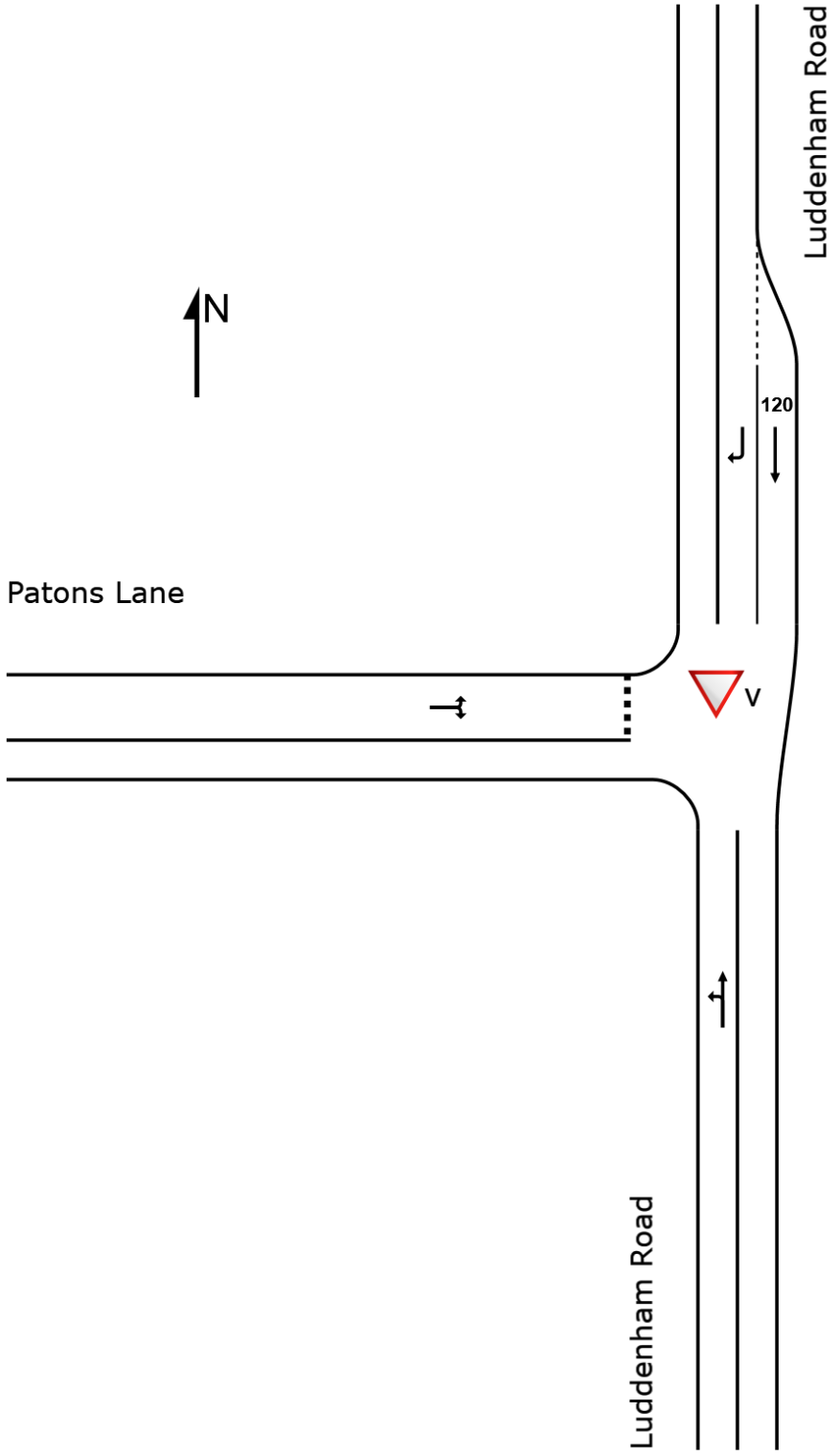
Appendix B SIDRA Outputs

SITE LAYOUT

Site: v [Luddenham Rd/Patons Ln (2025) - AM Peak - Scenario A (Site Folder: Stage 0 - AM Bulk Earth Works - Background + Metro)]

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

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



MOVEMENT SUMMARY

Site: v [Luddenham Rd/Patons Ln (2025) - AM Peak - Scenario A (Site Folder: Stage 0 - AM Bulk Earth Works - Background + Metro)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

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

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	88	28.6	88	28.6	0.575	6.3	LOS A	0.0	0.0	0.00	0.05	0.00	55.5
		LV	63		63		0.575	6.3	LOS A	0.0	0.0	NA	NA	NA	55.5
		HV	17		17		0.575	6.3	LOS A	0.0	0.0	NA	NA	NA	55.5
		TR	8		8		0.575	6.3	LOS A	0.0	0.0	NA	NA	NA	55.5
2	T1	All MCs	916	10.0	916	10.0	0.575	0.5	LOS A	0.0	0.0	0.00	0.05	0.00	58.6
		LV	824		824		0.575	0.5	LOS A	0.0	0.0	NA	NA	NA	58.6
		HV	92		92		0.575	0.5	LOS A	0.0	0.0	NA	NA	NA	58.6
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			1004	11.6	1004	11.6	0.575	1.0	NA	0.0	0.0	0.00	0.05	0.00	58.4
North: Luddenham Road															
8	T1	All MCs	726	10.0	726	10.0	0.405	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
		LV	654		654		0.405	0.2	LOS A	0.0	0.0	NA	NA	NA	59.7
		HV	73		73		0.405	0.2	LOS A	0.0	0.0	NA	NA	NA	59.7
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
9	R2	All MCs	206	1.0	206	1.0	0.524	19.4	LOS B	2.5	17.4	0.88	1.07	1.32	42.1
		LV	204		204		0.524	19.1	LOS B	2.5	17.4	NA	NA	NA	42.3
		HV	2		2		0.524	48.6	LOS D	2.5	17.4	NA	NA	NA	30.3
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			933	8.0	933	8.0	0.524	4.4	NA	2.5	17.4	0.19	0.24	0.29	56.1
West: Patons Lane															
10	L2	All MCs	42	90.0	42	90.0	1.654	688.2	LOS F	20.7	251.9	1.00	2.65	6.82	4.1
		LV	4		4		1.654	626.9	LOS F	20.7	251.9	NA	NA	NA	4.4
		HV	25		25		1.654	644.0	LOS F	20.7	251.9	NA	NA	NA	4.3
		TR	13		13		1.654	797.0	LOS F	20.7	251.9	NA	NA	NA	3.6
12	R2	All MCs	32	0.0	32	0.0	1.654	724.4	LOS F	20.7	251.9	1.00	2.65	6.82	5.6
		LV	32		32		1.654	724.4	LOS F	20.7	251.9	NA	NA	NA	5.6
Approach			74	51.4	74	51.4	1.654	703.7	LOS F	20.7	251.9	1.00	2.65	6.82	4.7
All Vehicles			2011	11.4	2011	11.4	1.654	28.3	NA	20.7	251.9	0.13	0.23	0.39	43.3

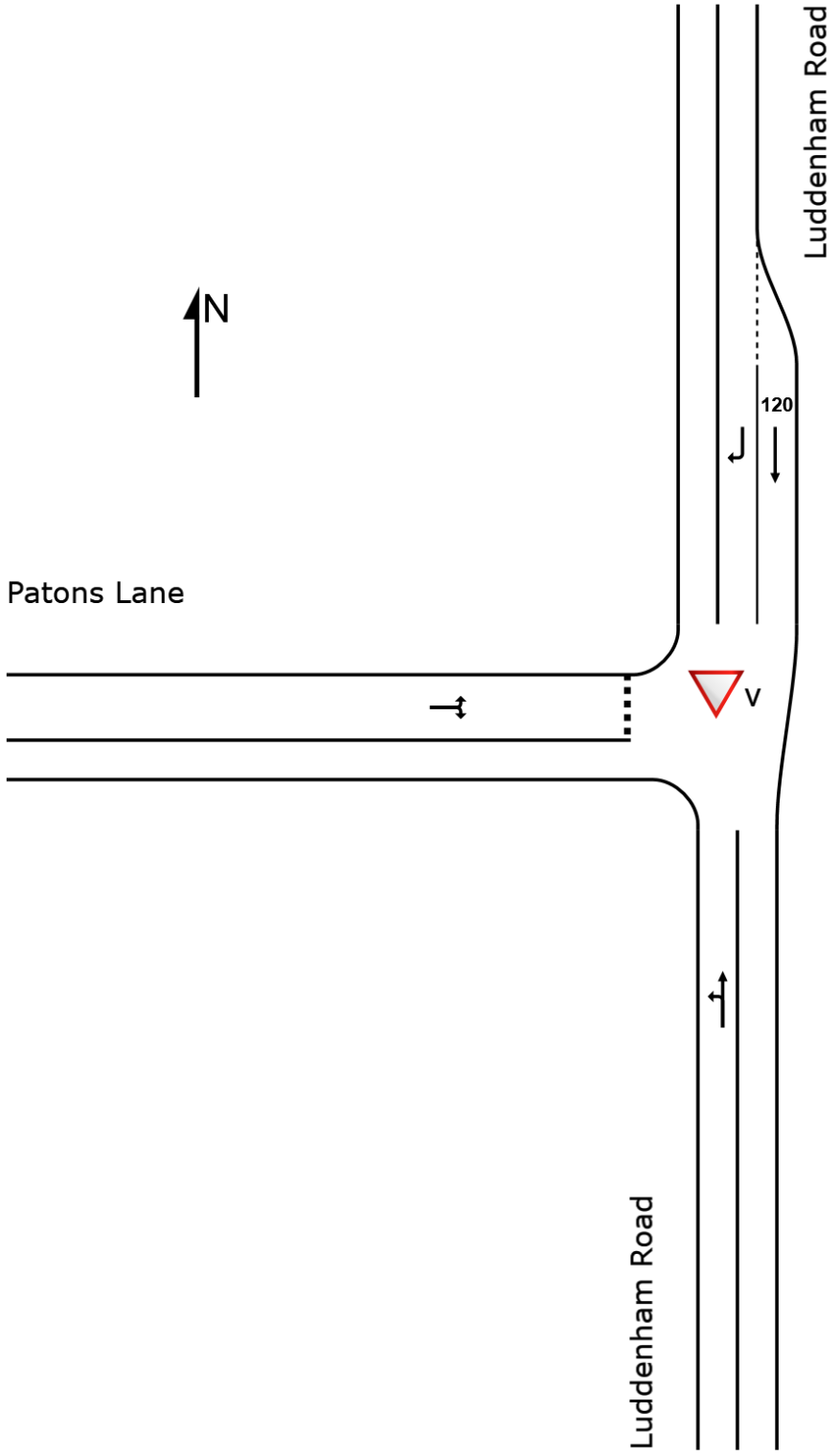
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control 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 LAYOUT

Site: v [Luddenham Rd/Patons Ln (2025) - PM Peak - Scenario A (Site Folder: Stage 0 - PM Bulk Earth Works - Background + Metro)]

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

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



MOVEMENT SUMMARY

Site: v [Luddenham Rd/Patons Ln (2025) - PM Peak - Scenario A (Site Folder: Stage 0 - PM Bulk Earth Works - Background + Metro)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

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

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	11	90.0	11	90.0	0.388	6.8	LOS A	0.0	0.0	0.00	0.01	0.00	53.9
		LV	1		1		0.388	6.8	LOS A	0.0	0.0	NA	NA	NA	53.9
		HV	6		6		0.388	6.8	LOS A	0.0	0.0	NA	NA	NA	53.9
		TR	3		3		0.388	6.8	LOS A	0.0	0.0	NA	NA	NA	53.9
2	T1	All MCs	674	10.0	674	10.0	0.388	0.2	LOS A	0.0	0.0	0.00	0.01	0.00	59.4
		LV	606		606		0.388	0.2	LOS A	0.0	0.0	NA	NA	NA	59.4
		HV	67		67		0.388	0.2	LOS A	0.0	0.0	NA	NA	NA	59.4
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			684	11.2	684	11.2	0.388	0.3	NA	0.0	0.0	0.00	0.01	0.00	59.4
North: Luddenham Road															
8	T1	All MCs	926	10.0	926	10.0	0.517	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.5
		LV	834		834		0.517	0.2	LOS A	0.0	0.0	NA	NA	NA	59.5
		HV	93		93		0.517	0.2	LOS A	0.0	0.0	NA	NA	NA	59.5
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
9	R2	All MCs	11	0.0	11	0.0	0.012	8.5	LOS A	0.0	0.3	0.58	0.69	0.58	49.4
		LV	11		11		0.012	8.5	LOS A	0.0	0.3	NA	NA	NA	49.4
		HV	0		0		-	-	-	-	-	NA	NA	NA	-
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			937	9.9	937	9.9	0.517	0.3	NA	0.0	0.3	0.01	0.01	0.01	59.4
West: Patons Lane															
10	L2	All MCs	199	6.9	199	6.9	1.164	178.9	LOS F	31.9	238.1	1.00	3.51	9.37	12.7
		LV	185		185		1.164	177.5	LOS F	31.9	238.1	NA	NA	NA	12.8
		HV	9		9		1.164	185.1	LOS F	31.9	238.1	NA	NA	NA	12.4
		TR	4		4		1.164	227.2	LOS F	31.9	238.1	NA	NA	NA	10.6
12	R2	All MCs	85	0.0	85	0.0	1.164	222.4	LOS F	31.9	238.1	1.00	3.51	9.37	16.2
		LV	85		85		1.164	222.4	LOS F	31.9	238.1	NA	NA	NA	16.2
Approach			284	4.8	284	4.8	1.164	191.9	LOS F	31.9	238.1	1.00	3.51	9.37	13.8
All Vehicles			1905	9.6	1905	9.6	1.164	28.9	NA	31.9	238.1	0.15	0.53	1.40	43.3

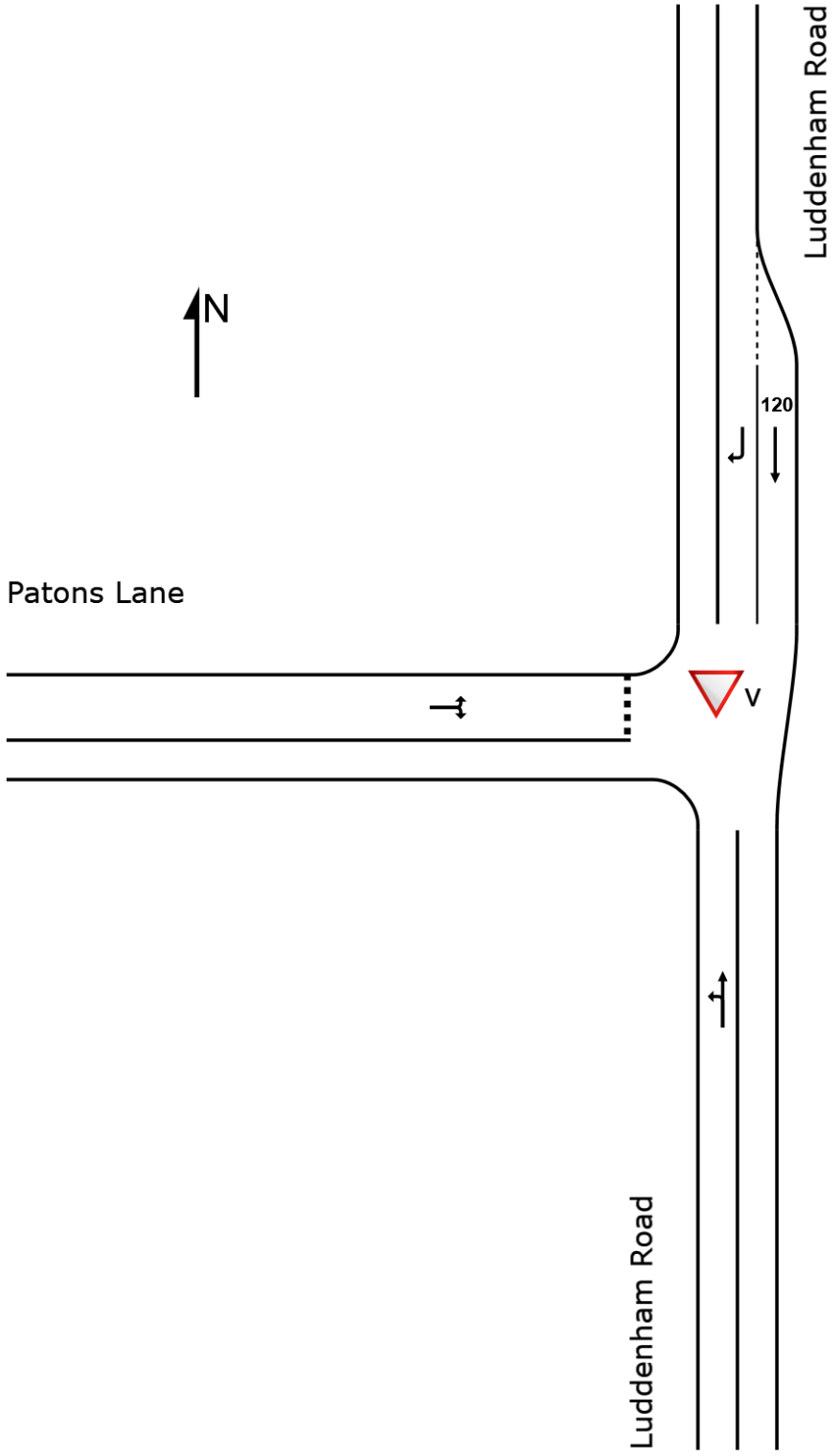
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control 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 LAYOUT

Site: v [Luddenham Rd/Patons Ln (2025) - AM Peak - Scenario B (Site Folder: Stage 0 - AM Bulk Earth Works - Sensitivity)]

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

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



MOVEMENT SUMMARY

Site: v [Luddenham Rd/Patons Ln (2025) - AM Peak - Scenario B (Site Folder: Stage 0 - AM Bulk Earth Works - Sensitivity)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

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

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	132	28.8	132	28.8	0.607	6.3	LOS A	0.0	0.0	0.00	0.07	0.00	55.1
		LV	94		94		0.607	6.3	LOS A	0.0	0.0	NA	NA	NA	55.1
		HV	25		25		0.607	6.3	LOS A	0.0	0.0	NA	NA	NA	55.1
		TR	13		13		0.607	6.3	LOS A	0.0	0.0	NA	NA	NA	55.1
2	T1	All MCs	916	10.0	916	10.0	0.607	0.6	LOS A	0.0	0.0	0.00	0.07	0.00	58.2
		LV	824		824		0.607	0.6	LOS A	0.0	0.0	NA	NA	NA	58.2
		HV	92		92		0.607	0.6	LOS A	0.0	0.0	NA	NA	NA	58.2
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			1047	12.4	1047	12.4	0.607	1.3	NA	0.0	0.0	0.00	0.07	0.00	57.8
North: Luddenham Road															
8	T1	All MCs	726	10.0	726	10.0	0.405	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
		LV	654		654		0.405	0.2	LOS A	0.0	0.0	NA	NA	NA	59.7
		HV	73		73		0.405	0.2	LOS A	0.0	0.0	NA	NA	NA	59.7
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
9	R2	All MCs	277	0.8	277	0.8	0.799	31.5	LOS C	5.2	36.6	0.95	1.32	2.26	36.2
		LV	275		275		0.799	31.2	LOS C	5.2	36.6	NA	NA	NA	36.3
		HV	2		2		0.799	70.8	LOS F	5.2	36.6	NA	NA	NA	24.9
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			1003	7.5	1003	7.5	0.799	8.8	NA	5.2	36.6	0.26	0.37	0.62	52.9
West: Patons Lane															
10	L2	All MCs	55	92.3	55	92.3	2.652	1607.5	LOS F	35.8	522.4	1.00	3.12	7.85	1.9
		LV	4		4		2.652	1510.9	LOS F	35.8	522.4	NA	NA	NA	2.0
		HV	21		21		2.652	1527.7	LOS F	35.8	522.4	NA	NA	NA	2.0
		TR	29		29		2.652	1678.3	LOS F	35.8	522.4	NA	NA	NA	1.8
12	R2	All MCs	32	0.0	32	0.0	2.652	1633.1	LOS F	35.8	522.4	1.00	3.12	7.85	2.6
		LV	32		32		2.652	1633.1	LOS F	35.8	522.4	NA	NA	NA	2.6
Approach			86	58.5	86	58.5	2.652	1616.8	LOS F	35.8	522.4	1.00	3.12	7.85	2.1
All Vehicles			2137	11.9	2137	11.9	2.652	70.1	NA	35.8	522.4	0.16	0.33	0.61	30.8

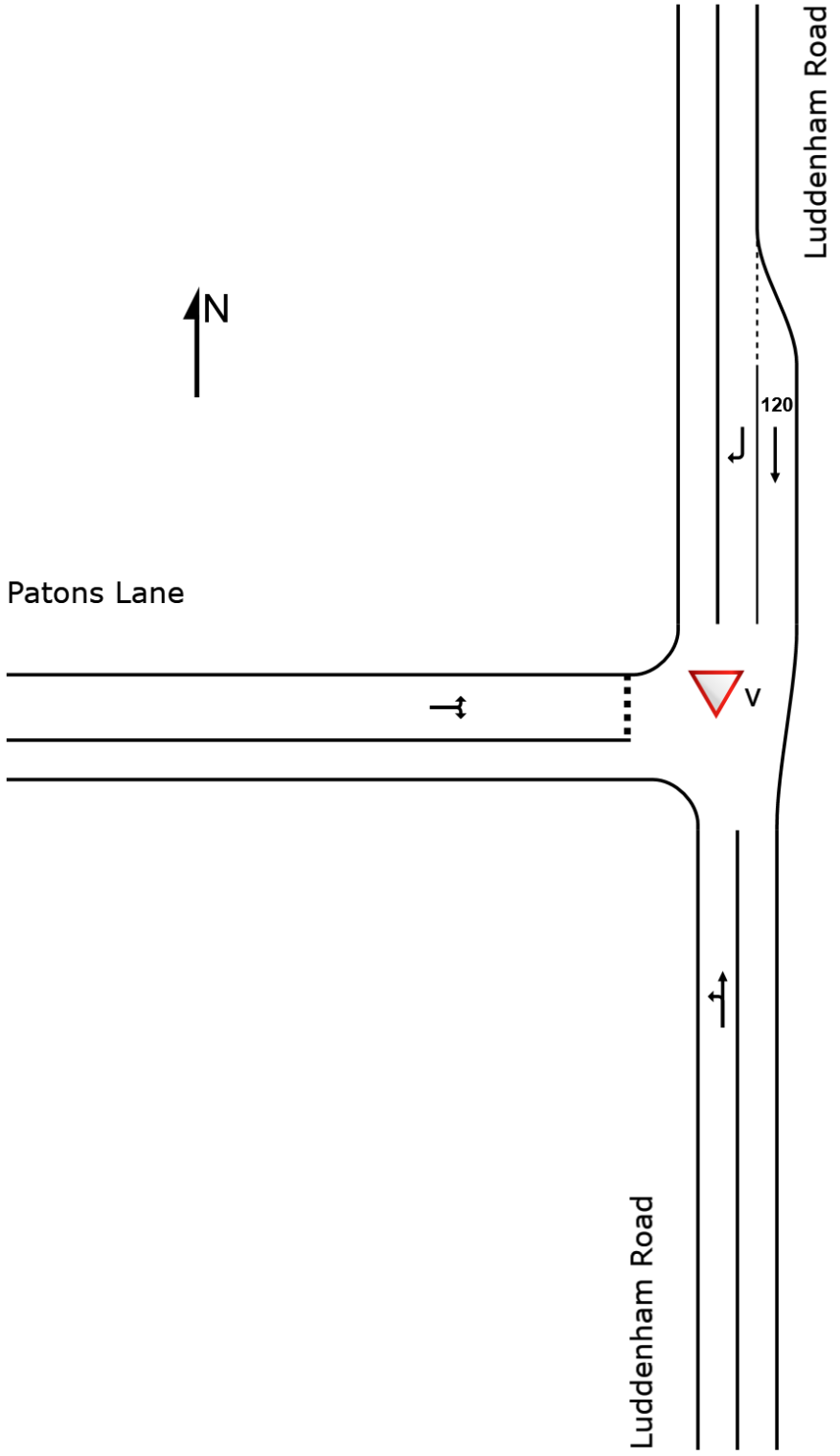
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control 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 LAYOUT

Site: v [Luddenham Rd/Patons Ln (2025) - PM Peak - Scenario B (Site Folder: Stage 0 - PM Bulk Earth Works - Sensitivity)]

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

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



MOVEMENT SUMMARY

Site: v [Luddenham Rd/Patons Ln (2025) - PM Peak - Scenario B (Site Folder: Stage 0 - PM Bulk Earth Works - Sensitivity)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

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

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	11	90.0	11	90.0	0.388	6.8	LOS A	0.0	0.0	0.00	0.01	0.00	53.9
		LV	1		1		0.388	6.8	LOS A	0.0	0.0	NA	NA	NA	53.9
		HV	6		6		0.388	6.8	LOS A	0.0	0.0	NA	NA	NA	53.9
		TR	3		3		0.388	6.8	LOS A	0.0	0.0	NA	NA	NA	53.9
2	T1	All MCs	674	10.0	674	10.0	0.388	0.2	LOS A	0.0	0.0	0.00	0.01	0.00	59.4
		LV	606		606		0.388	0.2	LOS A	0.0	0.0	NA	NA	NA	59.4
		HV	67		67		0.388	0.2	LOS A	0.0	0.0	NA	NA	NA	59.4
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			684	11.2	684	11.2	0.388	0.3	NA	0.0	0.0	0.00	0.01	0.00	59.4
North: Luddenham Road															
8	T1	All MCs	926	10.0	926	10.0	0.517	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.5
		LV	834		834		0.517	0.2	LOS A	0.0	0.0	NA	NA	NA	59.5
		HV	93		93		0.517	0.2	LOS A	0.0	0.0	NA	NA	NA	59.5
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
9	R2	All MCs	11	0.0	11	0.0	0.012	8.5	LOS A	0.0	0.3	0.58	0.69	0.58	49.4
		LV	11		11		0.012	8.5	LOS A	0.0	0.3	NA	NA	NA	49.4
		HV	0		0		-	-	-	-	-	NA	NA	NA	-
		TR	0		0		-	-	-	-	-	NA	NA	NA	-
Approach			937	9.9	937	9.9	0.517	0.3	NA	0.0	0.3	0.01	0.01	0.01	59.4
West: Patons Lane															
10	L2	All MCs	269	5.1	269	5.1	1.560	520.4	LOS F	90.8	667.2	1.00	6.35	18.95	5.3
		LV	256		256		1.560	519.3	LOS F	90.8	667.2	NA	NA	NA	5.4
		HV	9		9		1.560	526.9	LOS F	90.8	667.2	NA	NA	NA	5.3
		TR	4		4		1.560	569.1	LOS F	90.8	667.2	NA	NA	NA	4.9
12	R2	All MCs	116	0.0	116	0.0	1.560	564.3	LOS F	90.8	667.2	1.00	6.35	18.95	7.1
		LV	116		116		1.560	564.3	LOS F	90.8	667.2	NA	NA	NA	7.1
Approach			385	3.6	385	3.6	1.560	533.5	LOS F	90.8	667.2	1.00	6.35	18.95	5.9
All Vehicles			2006	9.1	2006	9.1	1.560	102.7	NA	90.8	667.2	0.20	1.23	3.64	25.4

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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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