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Kemps Creek Data Centre

Traffic and Transport Assessment Report

SYD05-06-07_Y-R-0011

Revision 4 | 10 August 2021

Job number 277863-00

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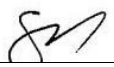
		Signature			
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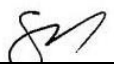
		Signature			
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Executive summary

The SYD05 Kemps Creek Data Centre is located within the Mamre Road Precinct that has been proposed by DPIE to provide industrial uses to support the growth of the Western Parkland City forming an extension of the Western Sydney Employment Area. Despite the greenfield nature of the Site appropriate infrastructure has been consented under the Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (SSD-9522) that will connect the proposal to the existing road network.

The key connection point is at the Mamre Road / Bakers Lane intersection. There are future plans to upgrade Mamre Road to accommodate growth in the Western Parkland City. As part of this the Mamre Road / Bakers Lane intersection will be expanded including signalising the western arm which provides access to the Mamre Road Precinct. Arrangements for this intersection were tested as part of SSD-9522 and this traffic assessment has considered the preferred layouts in 2025 and 2026, as presented in Transport Impact Assessment produced by Ason Group in 2020.

Construction and operational scenarios have been assessed to confirm the proposed future network can accommodate the traffic volumes relating to SYD05 adequately. The SIDRA modelling indicated that in all scenarios the Mamre Road / Bakers lane intersection could accommodate the proposed traffic volumes and maintain a Level of Service C. Within the precinct, delays are expected to be minimal particularly with the main access to the Site being located on a cul de sac.

The Site layout has been developed to accommodate Articulated Vehicles that will service the data centres within SYD05. In addition to this parking facilities are provided to service all buildings with suitable capacity for the expected number of staff and visitors. To support sustainable travel, cycle parking and end of trip facilities are provided commensurate to the relevant planning controls.

Contents

Appendices

Appendix C

Sidra Outputs

1 Introduction

1.1 Purpose of this report

The purpose of this report is to understand the traffic and transport impacts of the SYD05 Kemps Creek Data Centre (SYD05) and to identify appropriate mitigation and management measures where required. To satisfy the Secretary's Environmental Assessment Requirements (SEARs) this report contains the following information:

- An assessment of the existing transport network in the vicinity of the proposal;
- Consideration of future infrastructure and development that may impact the proposal;
- A quantitative assessment of the vehicle generation of the proposal in construction and operation;
- An assessment of the impact on the surrounding road network including traffic modelling of intersections directly impacted by the proposal;
- A description of the proposed Site layout including servicing vehicle routeing, staff and visitor parking;
- Outline designs for the proposed access arrangements; and
- Mitigation measures to manage the traffic impacts of the development and encourage sustainable travel patterns.

1.2 Proposal overview

1.2.1 Site context

The identified Site address that is the subject of this technical report is legally defined as 757-769 Mamre Road, Kemps Creek. The entire Site comprises a total area of approximately 17.38 hectares (ha) and is subject to the applicable provisions outlined within SEPP (WSEA) 2009. Access to the Site is currently obtained via the proposed Estate Access Roads (SSD 9522), which are accessed from Mamre Road. Access into the Site is made possible via Mamre Road, which is subject to future road widening as part of the Mamre Road Widening Project (Transport for NSW).

The Site is situated approximately 40.26 km west of the Sydney CBD, 22.11 km west of Parramatta and 11.97 km southeast of Penrith. It is within close proximity to transport infrastructure routes (predominantly the bus network), as well as sharing direct links with the wider regional road network, including Mamre Road and both the M4 & M7 Motorways. All of which provide enhanced connectivity to the Subject Site and immediate vicinity, as well as the wider locality.

Additionally, the Subject Site is located within close proximity to active transport links, such as bicycle routes, providing an additional mode of accessible transport available to the Subject Site. In its existing state, the Subject Site comprises an

undeveloped land portion; however, is subject to bulk earthworks and infrastructure works under a concurrent State Significant Development (SSD) Application – SSD 9522.

The Proponent is proposing to construct and operate a Data Centre on the Subject Site. The Site is located within the Penrith Local Government Area (LGA) and is zoned IN1 General Industrial under the provisions of State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP (WSEA) 2009). Development for the purpose of a Data Centre is permissible with consent within the IN1 General Industrial zone pursuant to the provisions outlined with Part 3, Division 3, Clause 27 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP).

The Site and surrounding context are illustrated below in Figure 1.

SEARs and DCP requirements relevant to this report

Table 1 identifies the SEARs and DCP requirements which are relevant to this technical assessment.

1.2.2 Description of the proposed development

The Site will form part of the new Kemps Creek Warehouse, Logistics and Industrial Facilities Hub being developed as a joint venture between Frasers Property and Altis Property Partner under the recently approved SSD 9522 as of 21st December 2020.

The Site layout has been developed for three data centres for a total of (3 x 48MW) 144MW capacity. Full detailed design is currently underway for two 48MW centres, with the third data centre being designated as a future build. The design of these which are based on the end-client's reference design as well as applicable Australian standards.

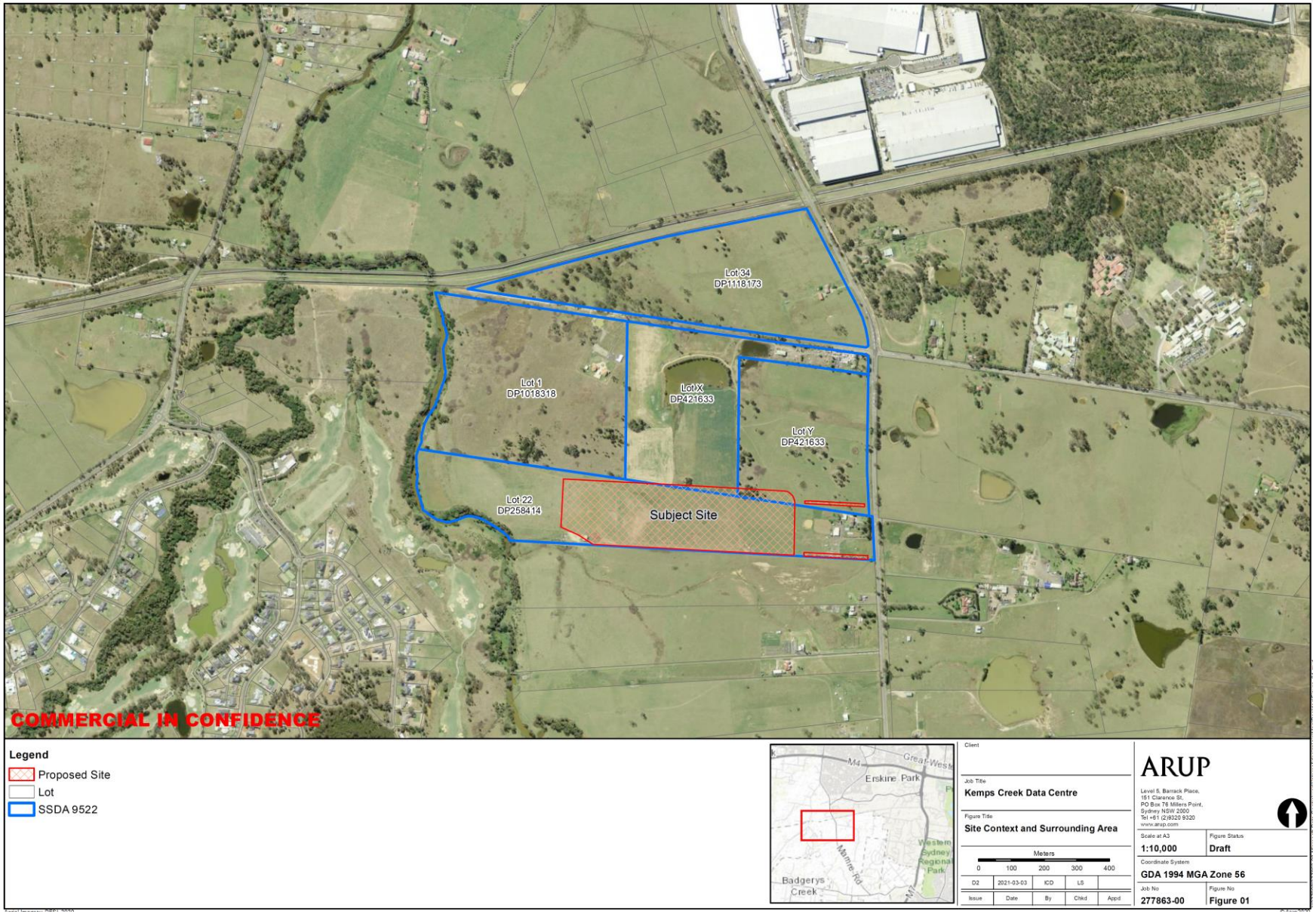

Figure 1: Proposal overview

Table 1: SEARs and DCP requirements for traffic and transport

SEARs relevant to this technical report	Where addressed in this technical report
Details of all traffic types and volumes likely to be generated during construction and operation, including a description of key access routes and any road upgrades or new road alignments proposed under SSD-9522	Section 5.1 (traffic generation) Section 5.6 (access routes)
An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar modelling. This is to include the identification and consideration of approved, proposed and future developments/road upgrades in the vicinity	Section 5.6
An options analysis for different Site access points with consideration of access restrictions from potential distributor roads	Section 5.2
Details of the largest vehicle anticipated to access and move within the Site, including swept path analysis	Section 5.1 (design vehicles) Appendix B (technical drawings)
Details and plans of the internal road network, loading dock servicing and provisions, on-Site parking provisions, and sufficient pedestrian and cyclist facilities, in accordance with the relevant Australian Standards	Section 5.4
Transport for NSW comments	
Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required)	Section 5.1 (traffic generation)
Vehicle movements by time of day for heavy vehicles by vehicle type, including dangerous goods vehicles	Section 5.1 Refer to Risk Report for details on dangerous goods vehicles
A clearly illustrated Site access and circulation plan, including swept paths, loading, storage and handling facilities and lines of sight for heavy vehicles	Section 5.2 (Site access) Section 5.4 (Site layout) Appendix B (technical drawings) Refer to Hazard & Risk Report (SYD05-06-07_Z-R-0009) for details on storage and handling facilities
Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (ie: turn paths, sight distance requirements, aisle width, etc)	Section 5.2 (Site access) Section 5.4 (parking provisions) Appendix B (technical drawings)

Proposed number of car parking spaces and compliance with the appropriate parking codes	Section 5.4.4
An assessment of the capacity of the proposed road network to accommodate the development	Section 5.6
Details of options for emergency services vehicles, with details on dangerous goods handling and storage areas	Section 5.3 (emergency vehicle access) Refer to Hazard & Risk Report for details on dangerous goods handling and storage areas
Road safety assessment and proposed mitigation measures	Section 5.6
Proposed fuels and other dangerous goods required, their sources and vehicles to be used	Refer to Hazard & Risk Report
Plans for the proposed storage and handling facilities for dangerous goods within Site	Refer to Hazard & Risk Report
Demonstrate actions undertaken (and to be undertaken) to comply with the legislative and regulatory compliance associated with movement of dangerous goods including incident management	Refer to Hazard & Risk Report
Draft Construction Traffic Management Plan for consideration, including: - Planned construction vehicle movements by time of day, hourly, including the type of vehicle used for the main construction tasks - Intersection performance impacts for times of peak construction activity - Road safety assessment including the impact of truck movements on public transport, pedestrian connectivity and cycling	Appendix A
DCP Requirements	
Mamre Road Precinct Draft DCP key transport controls	Section 5.6
Mamre Road Precinct DCP vehicle parking requirement	Section 5.4.4

2 Policy and planning context

2.1 Policy context

The following relevant legislation, regulations and policies have guided the traffic and transport assessment:

- Roads Act 1993;
- State Environmental Planning Policy (Infrastructure) 2007;
- Guide to Traffic Generating Development (RTA, 2002 as updated);
- Road Design Guide (RMS, 2015-2017);
- Guide to Traffic Management – Pt 12: Traffic Impacts of Development (Austroads, 2016);
- Guidelines for Planning and Assessment of Road Freight Access in Industrial Areas (Austroads, 2014);
- Bicycle Parking Facilities: Guidelines for Design and Installation (AS 2890.3:2015);
- Integrated Public Transport Service Planning Guidelines: Sydney Metropolitan Area (TfNSW, 2013);
- Future Transport Strategy 2056 (TfNSW, 2018);
- Greater Sydney Services and Infrastructure Plan (TfNSW, 2018);
- NSW Freight & Ports Plan 2018-2023 (TfNSW, 2018); and
- Mamre Road Precinct Draft Development Control Plan (DPIE, 2020).

2.2 Planning context

In addition to the above policy context, the traffic and transport assessment is cognisant of the planning priorities and objectives and broader context surrounding SYD05. This includes conditions outlined in the Mamre Road Precinct Draft Development Control Plan (see Section 2.2.3) and the SSD Consent issued to Altis-Frasers in December 2020 for the Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (see Section 2.2.4). The key strategic traffic and transport planning context is summarised in the following sections.

2.2.1 Mamre Road Upgrade

Mamre Road is a key transport corridor passing through the Western Sydney Priority Growth Area and providing connections to the Western Sydney Employment Area. In response to this, Transport for NSW (TfNSW) is planning to upgrade a 10 kilometre section of Mamre Road between the M4 Motorway and Kerrs Road. The latest concept design for the upgrade works is shown in Figure 3. Mamre Road in the vicinity of the Site is planned to be upgraded to two lanes in each direction and at Bakers Lane a new signalised intersection will be installed.

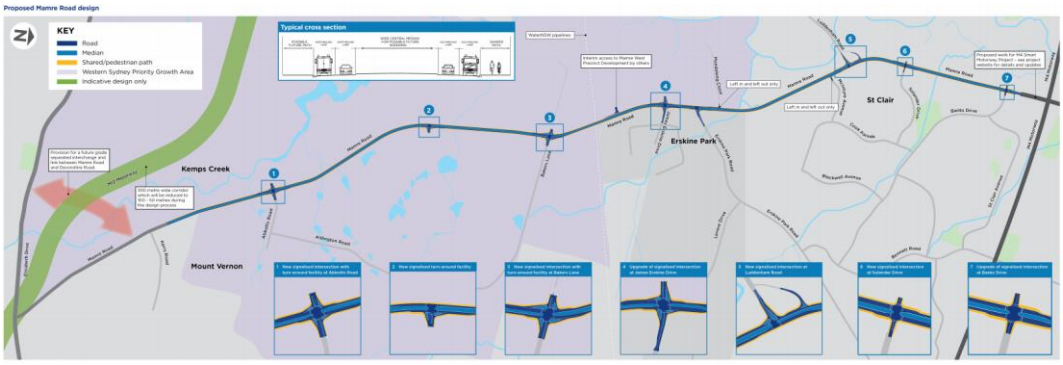

Figure 2: Proposed Mamre Road design
Source – TfNSW, April 2020

2.2.2 Mamre Road Precinct

The Mamre Road Precinct is an area within the Penrith City Council Local Government Area (LGA) that has been rezoned primarily for industrial purposes. This rezoning responds to the demand for industrial land in Western Sydney and helps to facilitates the NSW Government's vision for the Western Parkland City - forming an extension of the Western Sydney Employment Area.

The Mamre Road Precinct Structure Plan (Figure 3) forms the basis for development within the precinct including the major road network, access points and a potential intermodal terminal and associated integrated freight network to connect with the proposed Western Sydney Freight Line.

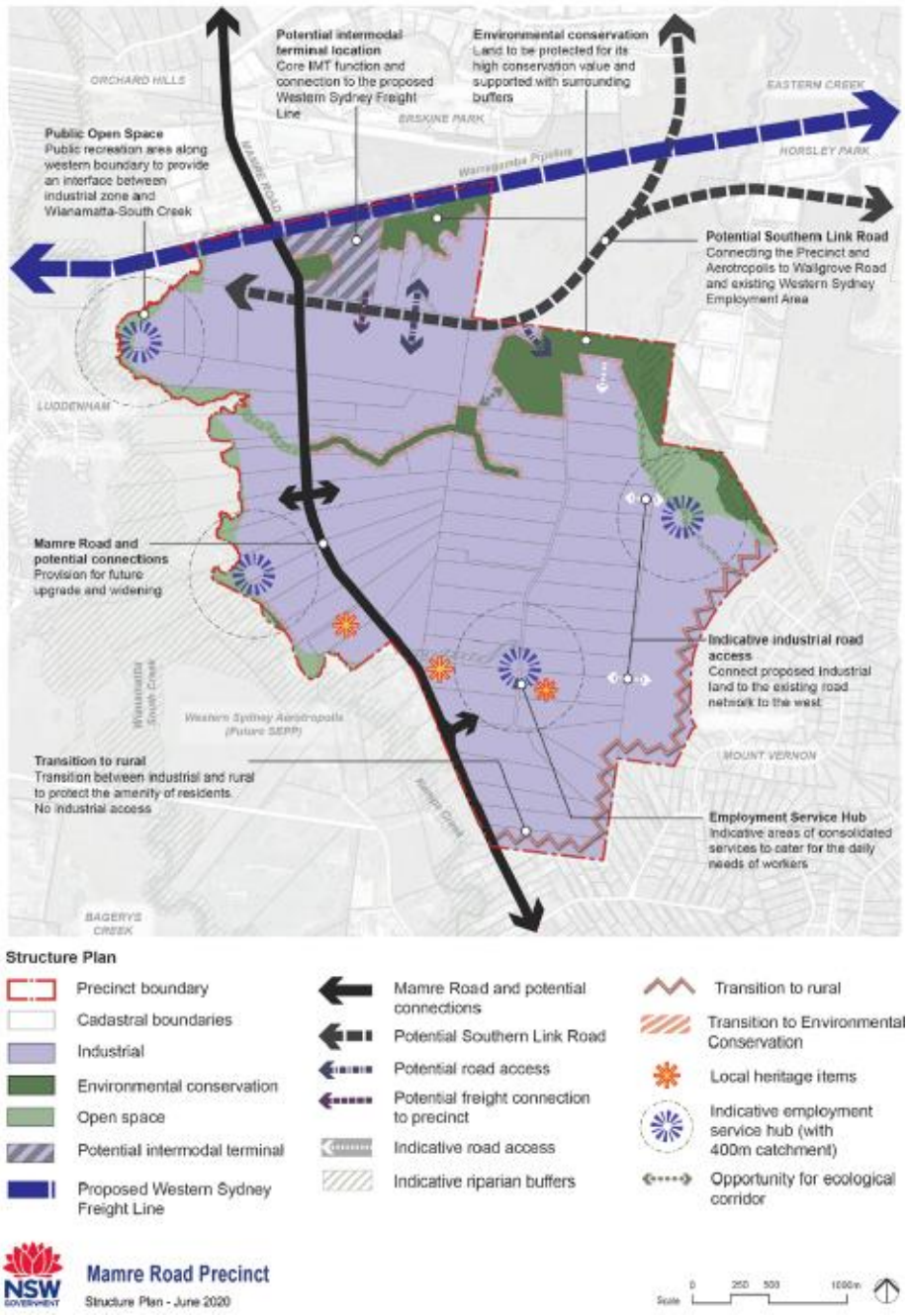

Figure 3: Mamre Road Precinct structure plan
Source – NSW Department of Planning, Industry and Environment, June 2020

The flexible zoning and land use controls will allow for smaller industrial, manufacturing, commercial and clean industrial uses to locate here.

Connectivity to other adjoining employment precincts shall be improved and the Mamre Road Precinct will leverage off access to the M12 and an upgraded Elizabeth Drive. Staging of development will be reliant on improved road access and public transport provision. The uses within the precinct will also benefit from proximity to Western Sydney Airport.

2.2.3 Mamre Road Precinct Draft Development Control Plan

The NSW Department of Planning, Industry and Environment (DPIE) have prepared a Draft Development Control Plan (DCP) for the Mamre Road Precinct

(November 2020). All consent authorities will use this DCP in their assessment of any planning applications for development within the precinct. Key controls relevant to traffic and transport are summarised in Table 2.

Table 2: Mamre Road Precinct Draft DCP key transport controls

Category	Control	
Minimum car parking (warehouses or distribution centres)	1 space per 300m^2 of gross floor area or 1 space per 4 employees, whichever is the greater	
Accessible car parking	Accessible car spaces should be in accordance with the Access to Premises Standards, Building Code of Australia and AS2890.	
Bicycle parking	Bicycle parking in accordance with the suggested bicycle parking provision rates for different land use types in the document 'Planning Guidelines for Walking and Cycling' (NSW Government 2004). Bicycle parking spaces should comply with AS2890.3:1993 Bicycle Parking Facilities.	
End of trip facilities	Applicants should comply with the suggested end of trip facility rates for different land use types in the document 'Planning Guidelines for Walking and Cycling' (NSW Government 2004).	
Minimum design vehicle	**Site area**	**Design vehicle**
	Up to 1,500m^2	Medium Rigid Vehicle (MRV)
	1,500m^2 to 4,000m^2	Heavy Rigid Vehicle (HRV)
	4,000m^2 to 20,000m^2	Articulated Vehicle (AV)
	Greater than 20,000m^2	26m B-double

2.2.4 Kemps Creek Warehouse, Logistics and Industrial Facilities Hub

Frasers Property Australia Pty Ltd and Altis Bulky Retail Pty Ltd (Altis-Frasers) submitted a SSDA for the Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (SSD-9522) that is located within the Mamre South Precinct. The SSDA plan, shown in Figure 4, sought consent for the:

- Demolition of existing structures, Site-wide earthworks, landscaping, stormwater and other infrastructure and an internal road network;
- Construction and operation of eight warehouses comprising 162,355 m^2 of floor space;
- Intersection upgrade works in Mamre Road;
- 744 parking spaces; and
- 21-lot Torrens title subdivision over two stages, being Stage 1 residual lot subdivision (5 lots) and Stage 2 residual and development lot subdivision (17 lots).

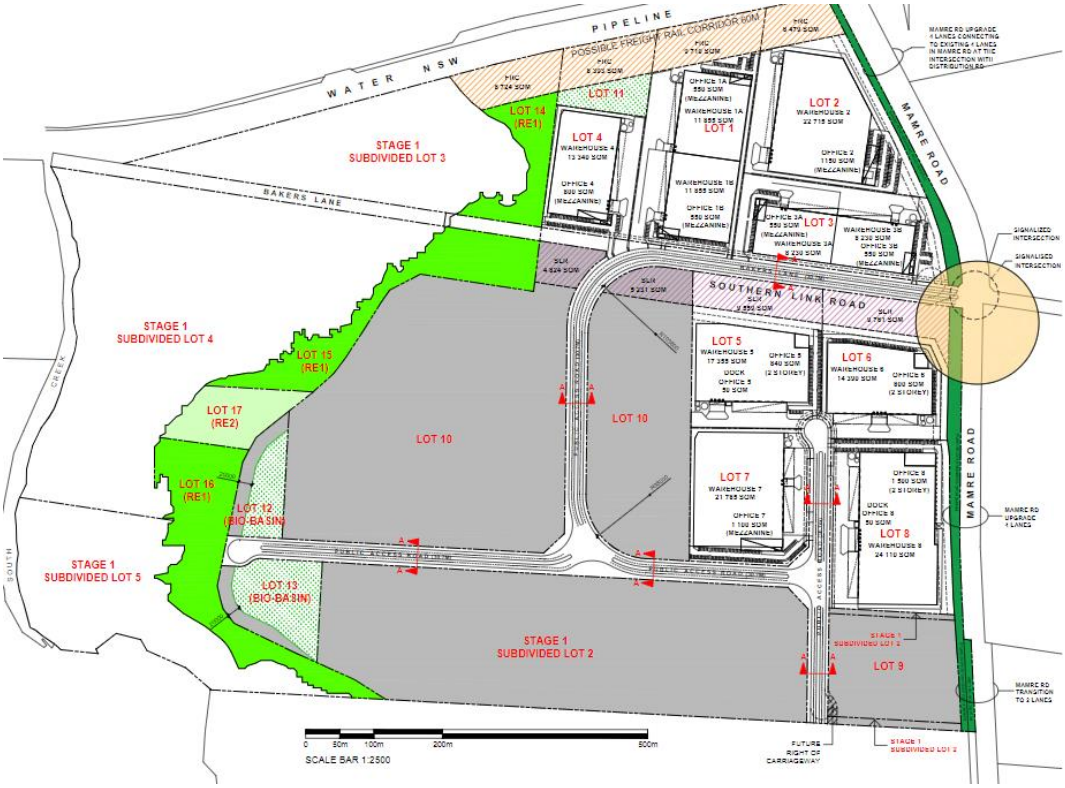

Figure 4: SSDA plan for Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (SSD-9522)[1]
Source – Altis-Frasers, September 2020

SSDA-9522 received development consent from DPIE in December 2020.

Ason Group prepared a Traffic Impact Assessment (TIA) in 2020 in support of SSD-9522. Key findings of the TIA were:

- A number of scenarios were assessed for the Mamre Road / Bakers Lane intersection:
    - Sequence 1A (2020-2025) - All access via an interim upgrade to Mamre Road / Bakers Lane signalised intersection. Sequence 1A is designed to cater the proposed development under this SSDA with a total GFA of 166,225m²;
    - Sequence 1B (2025) – All access from the upgraded Mamre Road / Bakers Lane signalised intersection, with Mamre Road upgrades to 4 lanes (2 in each direction) along the length of the Site; and
    - Sequence 2 (2026) – Via a future Southern Link Road (SLR) / Mamre Road signalised intersection assuming that the SLR connection will terminate as a turning head at the Site.
- These upgrades to the intersection generally improved performance and accommodated the expected traffic adequately.

Conditions of the SSD-9522 Consent, namely Condition B10-B12 and B18, will enable access to the SYD05 Site. B10-B12 address the intersection works at Mamre Road and Bakers Lane (described above) and B18 ensures preparation of

[1] The development of the shaded lots was not assessed as part of SSD-9522

an acceptable concept design demonstrating how the internal road network can provide access to lots 1-4 and link to the future Southern Link Road.

The proposal assessed as part of this report sits within the ‘Stage 1 Subdivided Lot 2’ shown in Figure 4. This Lot was not assessed as part of SSD-9522, and as such, the impacts identified in this traffic and transport assessment will be in addition to impacts associated with SSD-9522.

3 Methodology

This Chapter outlines the methodology used to define the baseline and undertake an assessment of the potential impacts of the proposal in relation to traffic and transport. The study area for the assessment has also been defined.

3.1 Study area

The study area for the traffic and transport assessment of the proposal is outlined on Figure 5. In addition to the Site, this captures the road network that connects the Site to Mamre Road including the intersection with Bakers Lane

Figure 5: Traffic and transport assessment study area

3.2 Method

To address the proposal, SEARS and agency advices the following methodology was developed:

- Review available data and policy documentation to understand the transport requirements of the facility;
- Identify key routes to be used by construction and operational vehicles considering the suitability of existing and proposed roads;
- Identify the different vehicle types expected to be accessing the Site;
- Undertake swept paths for the largest vehicles expected to access and manoeuvre within different parts of the Site, including loading docks;

- Undertake a quantitative traffic generation exercise to estimate vehicle movements in construction and operation. Due to the impacts of COVID-19, valid data collection through traffic surveys was not possible. Instead, traffic counts from the TIA (Ason Group, 2020) that supported the Mamre South Precinct – Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (SSD-9522) were used;
- Undertake a first-principles estimation of required parking supply for vehicles and bicycles, based on staff numbers and Site operations.
- SIDRA modelling of the future arrangement of the Mamre Road / Bakers Lane intersection to understand the impact of traffic generated on the surrounding road network;
- Undertake a road safety assessment of the internal road network and Site accesses, including appropriate sightlines; and
- Produce an outline Framework Construction Traffic Management Plan.

4 Existing environment

This Chapter provides information relevant to the existing traffic and transport environment in the vicinity of the study area.

4.1 Baseline traffic conditions

The Site is located within the Mamre South Precinct (precinct) bordered by Mamre Road to the east, the Sydney Water Warragamba Pipeline to the north, South Creek to the west and rural land to the south. The Site is located to the south of the existing Bakers Lane, which divides the precinct. The Site and surrounding context are illustrated on Figure 1.

Mamre Road is an arterial road connecting the Western Highway (and the M4 Motorway) in the north to Elizabeth Drive in the south. Mamre Road currently has one lane in each direction and is located adjacent to the eastern side of the precinct[2]. Bakers Lane is a local road that intersects Mamre Road and provides access to a number of local land uses to the east of Mamre Road before it joins Aldington Road. Bakers Lane (west) is currently undivided with unsealed shoulders, providing for small volumes of local traffic. The intersection of Mamre Road and Bakers Lane (east) operates under signal control, while Bakers Lane (west) operates as a give-way. There are currently no other roads within the precinct/adjacent to the proposal Site. The Site does not currently generate any regular traffic.

Due to the impacts of COVID-19, valid data collection through traffic counts was not possible. Instead, the traffic counts from the TIA (Ason Group, 2019) prepared for the Mamre South Precinct – Kemps Creek Warehouse, Logistics and Industrial Facilities Hub (see Section 2.2.4 for details) were used. A summary of the traffic counts undertaken in 2018 is provided in Table 3 for locations in the vicinity of the Site.

Table 3: Existing (2018) traffic volumes
Source – Ason Group, May 2019

Road section	Mid-block traffic volume[3]	
	AM peak	PM peak
Mamre Road – north of Bakers Lane	2,215 (49% northbound) (51% southbound)	2,085 (53% northbound) (47% southbound)
Mamre Road – south of Bakers Lane	1,391 (56% northbound) (44% southbound)	1,541 (44% northbound) (56% southbound)
Bakers Lane – east of Mamre Road	1,085 (38% westbound) (62% eastbound)	734 (73% westbound) (27% eastbound)

Mamre Road currently has only one traffic lane in each direction (northbound and southbound). This equates to an approximate capacity of 1,400 vehicles per peak

[2] Mamre Road is planned for upgrade – see Section 2.2.1
[3] Average of five weekday count

hour per direction.[4] This indicates that Mamre Road north of Bakers Lane is already operating near capacity during both the AM and PM peak periods.

Traffic flow distribution on Bakers Lane (east) is dependent on the peak period. The majority of traffic flows are eastbound in the AM and westbound in the PM. This is reflective of the land uses this link provides access to. The traffic volumes on Bakers Lane (east) are comfortably within the capacity of the link.

4.2 Sustainable transport

There are currently limited facilities surrounding the proposed Site that encourage travel by sustainable modes.

Figure 6 shows the existing cycleways surrounding the Site, and their relative level of difficulty. It is also noted that the Mamre Road Upgrade will include a shared/pedestrian path along Mamre Road between Kerrs Road and the M4 Motorway.

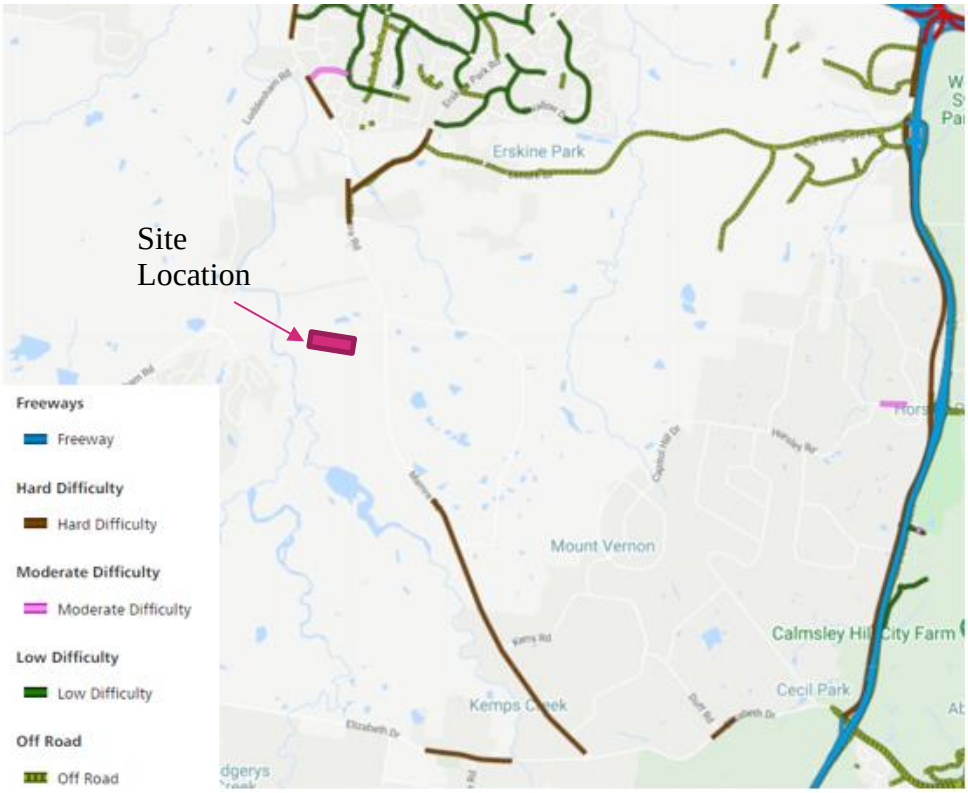

Figure 6: Cycleways surrounding Proposal Site
Source – RMS, January 2021

Opportunities to access the proposal Site by public transport are limited, given the proximity to the nearest stops/stations. The nearest existing and planned bus stops are on Erskine Park Road (approximately 2km walk). Similarly, the nearest rail station to the Site is St Marys (approximately 10km walk). Future plans for public transport will be assessed as the plans for the wider precinct develop.

[4] RMS, Guide to Traffic Generating Developments, Table 4.4, 2002

5 Assessment of potential impacts

This Chapter details the traffic and transport assessment in relation to both construction and operational impacts.

5.1 Traffic generation

Traffic generation of the proposal has been considered in construction and operation to assess the impacts. For the purposes of the assessment the AM peak hour was assumed to be 08:00-09:00 and the PM peak hour 17:00-18:00.

5.1.1 Construction traffic generation

The Framework Construction Traffic Management Plan (CTMP) (Appendix A) outlines the volumes of construction vehicles required at different stages of the proposal and the number of workers likely to be on Site.

Construction Vehicles

It is estimated that there will be a maximum of 75 construction vehicles per day associated with peak construction phase. Assuming these trips would be distributed evenly throughout the working day approximately 10% of these vehicles would access the Site during the peak hours. It is anticipated that there may be up to 16 two-way truck movements (8 trucks inbound and 8 trucks outbound) during peak hours.

It should be noted that all construction vehicles are assumed to exit the Site within the hour they arrive.

Construction Workers

Workers will generate additional traffic to the Site in the form of vans, utes and SRVs. A maximum workforce of approximately 150 personnel could be expected in the peak construction phase. Construction workers generally start earlier and finish earlier than the commuter peak periods and would likely not coincide with the commuter peak periods.

To ensure the assessment is robust, it has been assumed 50% of construction workers would arrive and depart in the AM and PM peak hours. Construction workers would therefore contribute an additional 75 vehicle trips inbound in the AM peak hour and outbound in the PM peak hour.

Overall traffic generation

Table 4 contains the combined construction vehicle and worker traffic generation.

Table 4: Peak construction phase traffic

Type	AM peak (08:00-09:00)		PM peak (17:00-18:00)	
	In	Out	In	Out
Construction vehicle	8	8	8	8
Construction worker	75	-	-	75
Total	**83**	**8**	**8**	**83**

As per the SSD-9522 Consent, prior to the commencement of construction, a Driver Code of Conduct must be prepared, accompanied by induction training to minimise road traffic noise.

5.1.2 Operational traffic

In operation, the proposal will generate traffic due to a range of different users. These can be aggregated into three categories:

- Staff;
- Visitors; and
- Servicing vehicles.

The Driver Code of Conduct and induction training prepared for the construction phase will be updated and implemented for the operational phase.

Staff traffic generation

Seventy-nine staff are expected to be on Site on a typical day. This number is inclusive of:

- Management;
- Security;
- Critical Environment vendor; and
- Janitorial.

As the majority of these staff will work standard hours we have assumed 50% arrive between 08:00-09:00 and depart between 17:00-18:00 with 25% arriving in the shoulder hours either side of these peaks. Given the location of the Site, all staff are expected to drive to the Site.

Visitor traffic generation

A maximum of 40 visitors are expected to access the Site per day. This is expected to occur during periods of heavy maintenance where specialists will be required to access the Site. Given the location, the nature of visitation expected and to ensure the traffic assessment is robust, all visitors are expected to drive to the Site.

A linear profile has been assumed for the arrival distribution of visitors to the Site throughout the nine-hour operational day. All visitors are assumed to exit the Site within the hour they arrive.

Servicing vehicle traffic generation

A maximum of 10 service vehicles are expected to access the Site per day. This is the volume expected during periods of heavy maintenance.

A linear profile has been assumed for the arrival distribution of service vehicles to the Site throughout the nine-hour operational day. All servicing vehicles are assumed to exit the Site within the hour they arrive. All service vehicles have been conservatively assessed as 19m Articulated Vehicles (AVs).

Overall traffic generation

Overall combining the traffic generation described in this section, it is estimated the Site would generate 129 inbound trips and 129 outbound trips daily.

Combining the demand profiles for staff, visitors and servicing traffic generation produces a daily vehicle movement profile for the proposal. This is presented in Figure 7.

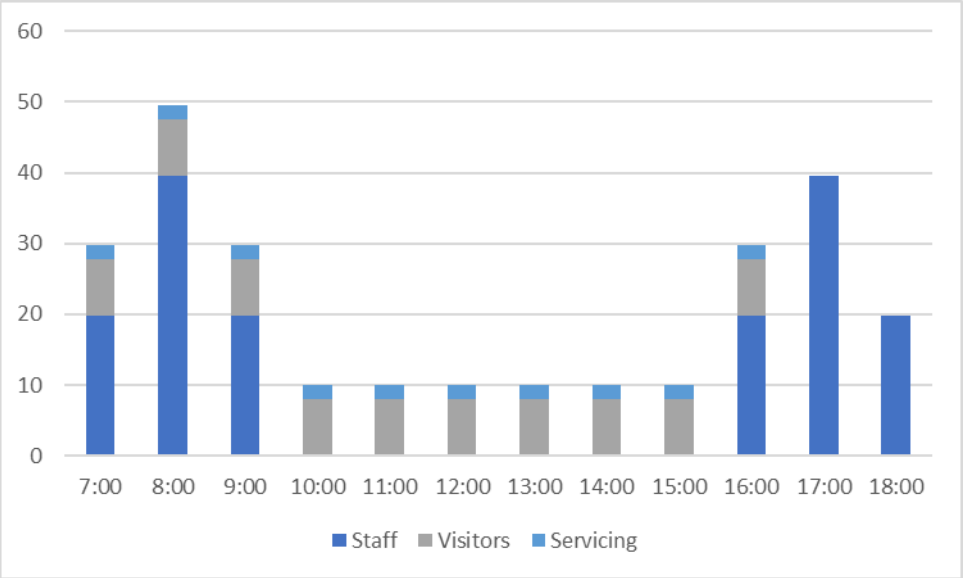

Figure 7: Operational vehicle demand profile (inbound + outbound trips)

This profile indicates that the peak hour is 08:00-09:00 with a combined 50 movements (inbound and outbound). When modelling the impact of operational vehicles on intersections in the vicinity of the proposal Site, the morning (08:00-09:00) and afternoon (17:00-18:00) peak values will be used. These are assumed to align with the peak network hours modelled as part of the TIA (Ason Group, 2019) for the Kemps Creek Warehouse, Logistics and Industrial Facilities Hub.

5.2 Site access

The Site will be accessed via the upgraded Mamre Road and Bakers Lane intersection (west approach) and two new internal public access roads (see Figure 8). The internal public access roads will be designed and constructed as part of SSDA-9522.

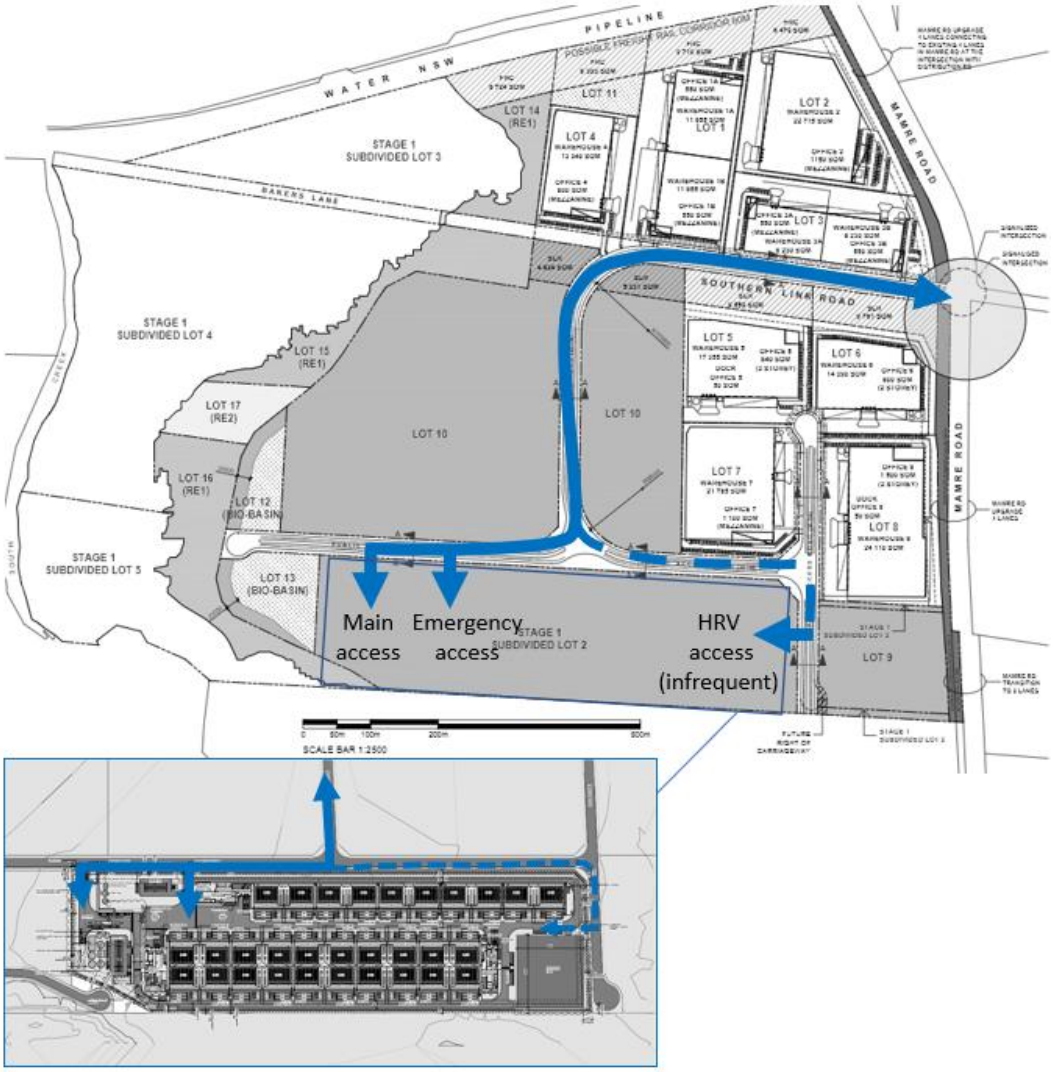

Figure 8: Site access from upgraded Mamre Road / Bakers Lane intersection

A number of access options for the Site on both the northern and eastern frontages were considered. Noting the wider plans for the precinct which could cause the road which borders the eastern boundary of the Site to become a distributor for further development plots. Therefore, the decision was made to locate the main access on the northern boundary road where through traffic volumes are likely to be lower. Access to this will be enabled through condition B10 of the SSD-9522 Consent which dictates the upgrade of the Mamre Road and Bakers Lane intersection.

The main vehicle entry will be located in the north-west corner of the Site. This left in / left out arrangement has been designed to accommodate two-way Articulated Vehicles (AVs) movements. Vehicle swept path analysis of the proposed access has been conducted using expected design vehicles. The Safe Intersection Sight Distance has also been checked considering a speed limit of 50km/h on the access road and a reduced deceleration coefficient to consider truck movements. This is included in Appendix B.

In addition to the main access there are two other accesses to SYD05. One located on the northern boundary east of the main access which will be for emergency vehicles.

The other is located on the eastern boundary of the Site and will be used for specialist maintenance activities. These maintenance activities are expected to occur infrequently (less than once a month), so traffic associated with this access has not been considered as part of the traffic modelling in Section 5.6.

Technical drawings showing the swept paths and sightlines are presented in **Appendix B**.

5.3 Emergency vehicle access

Emergency vehicles will access the Site via a separate access to the east of the main access (see Figure 8). Once entering the Site, sufficient width is provided for emergency vehicles to circulate around the development to gain access to various parts of the Site. In the event of an emergency, servicing vehicles within the Site will be directed to areas where they would not obstruct the circulation loop for any emergency vehicles.

5.4 Site layout

The Site layout is presented in Figure 9. Servicing vehicles will enter the Site via the road adjacent to the northern boundary. All these vehicles will be screened for security reasons at two internal gate locations. A truck trap system is included before the second boom gate to allow for the rejection of vehicles where necessary.

The internal loop road system will facilitate circulation within the Site. This will provide access to the car parks, loading docks and all operational facilities, including the substation yard and generators. All roads within the Site have been designed to accommodate 19m Articulated Vehicles (AVs).

Paved paths will be provided between all car parks and buildings to allow workers and visitors to gain access to the admin blocks and operational facilities within the Site.

Technical drawings showing the swept paths of internal circulation are presented in **Appendix B**.

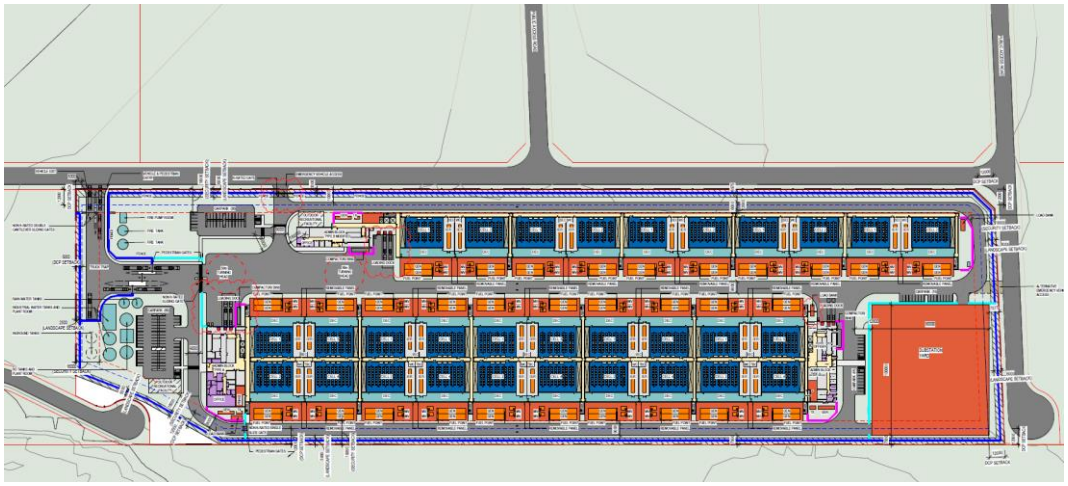

Figure 9: Site layout

5.4.1 Loading docks

The proposal has three loading docks, each with a capacity for two Articulated Vehicles. The Site layout provides sufficient space for these vehicles to safely reverse into designated loading bays from which they can load/unload into the relevant data centre. The locations of the loading docks are shown in Figure 10.

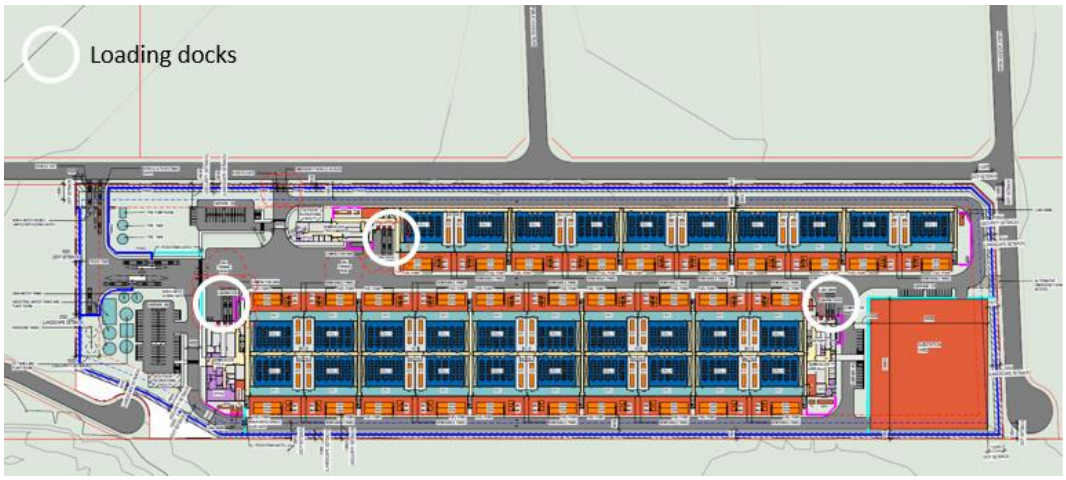

Figure 10: Loading dock locations

Technical drawings showing the swept paths of loading vehicles are presented in **Appendix B**.

5.4.2 Sub station

A sub station is located in the south west corner of the Site. This will have two accesses for maintenance vehicles on its north east and south west corners. Generally, maintenance vehicles are expected to be smaller than AVs so will have no issues accessing the sub station via the internal road network.

5.4.3 Road safety

Safe Intersection Sight Distance drawings have been produced for all access points to the Site to confirm the arrangements are safe. These can be found in Appendix B.

In addition to this appropriate signage and line marking will be implemented that is compliant with Australian Standards. We note that private vehicles and servicing vehicles will share the same circulation routes around the site. This is deemed acceptable due to the low volume of heavy vehicles accessing the site on a normal day (one articulated vehicle).

Safe Intersection Sight Distance drawings have been produced for all access points to the Site to confirm the arrangements are safe. In addition to this appropriate signage and line marking will be implemented that is compliant with Australian Standards.

As outlined in the Site layout presented in Section 5.4 all buildings within the Site are provided with separate car parks to avoid pedestrians walking across the Site. This is to avoid conflicts, particularly in locations where AVs are circulating. Where pedestrians are required to cross vehicle circulation routes appropriate marked, lit and signed crossings will be provided. This arrangement is deemed suitable given the low frequency of heavy vehicles on a normal day (one articulated vehicle).

Where pedestrians are required to cross vehicle circulation routes appropriate marked and signed crossings will be provided.

5.4.4 Vehicle parking

Vehicles parking on the Site has been developed through considering local planning controls and the demands related to the proposal.

Two different methodologies were used to develop the parking requirement for the Site. The first was using the minimum parking rates outlined in the Mamre Road Precinct DCP for a warehouse. This is presented in Table 5.

Table 5: Mamre Road Precinct DCP vehicle parking requirement

Method		Rate	Parking requirement
GFA (m^2)	65,354	1 space per 300m^2 GFA	218

As a comparison, a first principles approach was developed based on the number of staff and visitors expected to be on Site per day. The parking requirement using this method is outlined in Table 6.

Table 6: First principles vehicle parking requirement

User	Parking requirement
Staff	79
Visitor	40
Total	**119**

This methodology provides a parking space for each full-time equivalent (FTE) staff on the Site (79). In addition to this, 40 spaces are provided for visitors which will accommodate the expected maintenance visitors.

The first principles parking requirement approach has been adopted as the appropriate methodology for the Site with 120 parking spaces included within the

Site layout. The locations of the various parking facilities are marked on Figure 11.

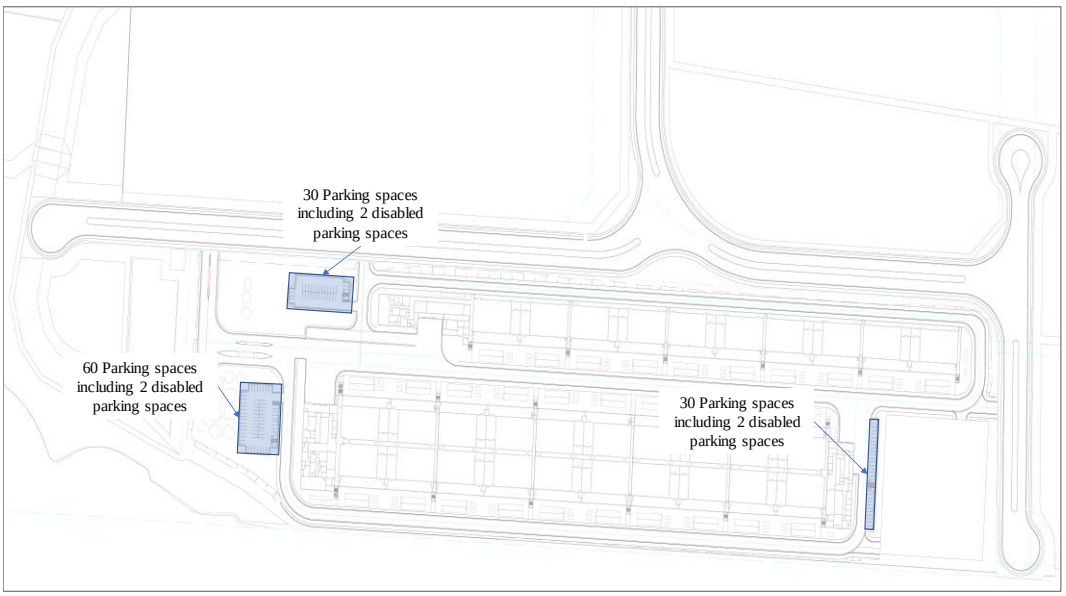

Figure 11: Parking layout

All car parking has been designed in accordance with AS/NZS 2890.1 and AS/NZS 2890.6 where applicable, with the following considered noteworthy:

- Car parking spaces are designed with a width of 2.5 metres, and a minimum aisle width of 5.8 metres.
- Accessible parking spaces will be located adjacent to each building entry and include the 2.4 metre ‘Shared Area’ on one side of the bay.

Two parking spaces will be provided with active provision for electric vehicle charging.

All parking areas are connected to the relevant buildings using footpaths and pedestrian crossings where they are crossing vehicle circulation paths.

5.5 Bicycle parking

To determine the bicycle parking requirement for the proposal, the Planning Guidelines for Walking and Cycling (NSW Government, 2004) have been used. The rates outlined in the document for industrial and warehousing land use types are summarised in Table 7.

Table 7: Bicycle parking requirement

Staff		Visitors		Total bicycle parking requirement
Rate	Parking requirement	Rate	Parking requirement	
3-5% of staff	3 - 4	5-10% of staff	4 - 8	7 - 12

Therefore, 12 secure bike racks will be provided for staff and visitors. The office component of the proposal will include end of trip facilities to complement the cycle parking. The following will be provided:

- 4 lockers;
- 4 showers (2 male, 2 female); and
- 2 changing rooms (1 male, 1 female).

5.6 Network impacts

Vehicles travelling to and from the Site in construction and operation will originate from a variety of locations. This impact assessment has focused on the Mamre Road / Bakers Lane intersection, which will be used by all traffic accessing the proposal. The main access to the Site was not modelled as the road that is adjacent to the northern boundary is a cul de sac which is expected to have minimal through traffic.

5.6.1 Future network cumulative impacts

SSD-9522 (described in Section 2.2.4) relating to the Kemps Creek Warehouse, Logistics and Industrial Facilities Hub, within the Mamre South Precinct, has been consented. The primary access for this development will be via / Mamre Road / Bakers Lane intersection.

Ason Group prepared a Traffic Impact Assessment (TIA) in 2020 in support of SSD-9522 which included various future scenarios for the Mamre Road / Bakers Lane intersection as outlined in in Figure 12, Figure 13 and Figure 14. All these scenarios considered background traffic growth and demands relating to SSD-9522.

All scenarios presented in this report have used the demands from the Ason Group report as a baseline to ensure the cumulative impacts of SSD-9522 were also captured in this assessment.

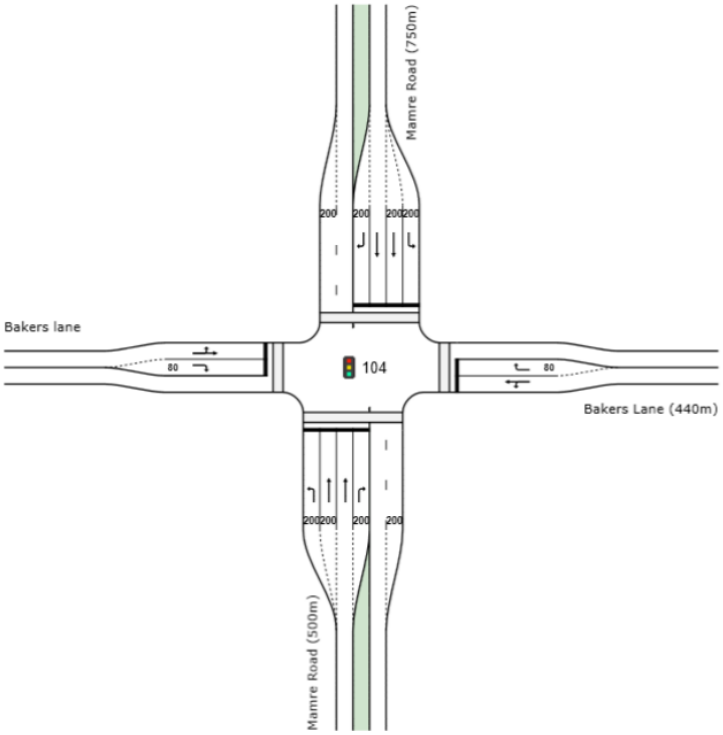

Figure 12: Sequence 1A (2020-2025) Mamre Road / Bakers Lane Signal Layout

Source – Ason Group, 2020

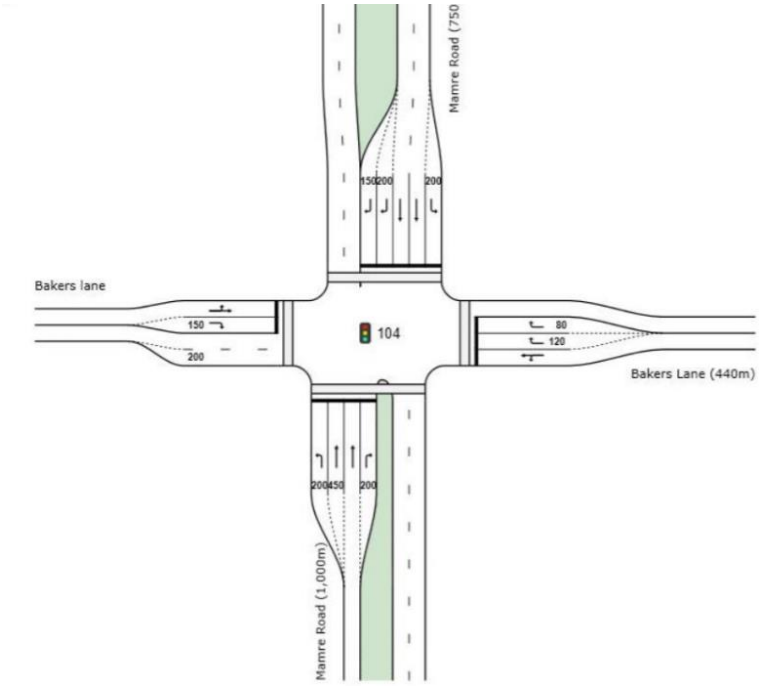

Figure 13: Sequence 1B (2025) Mamre Road / Bakers Lane Signal Layout

Source – Ason Group, 2020

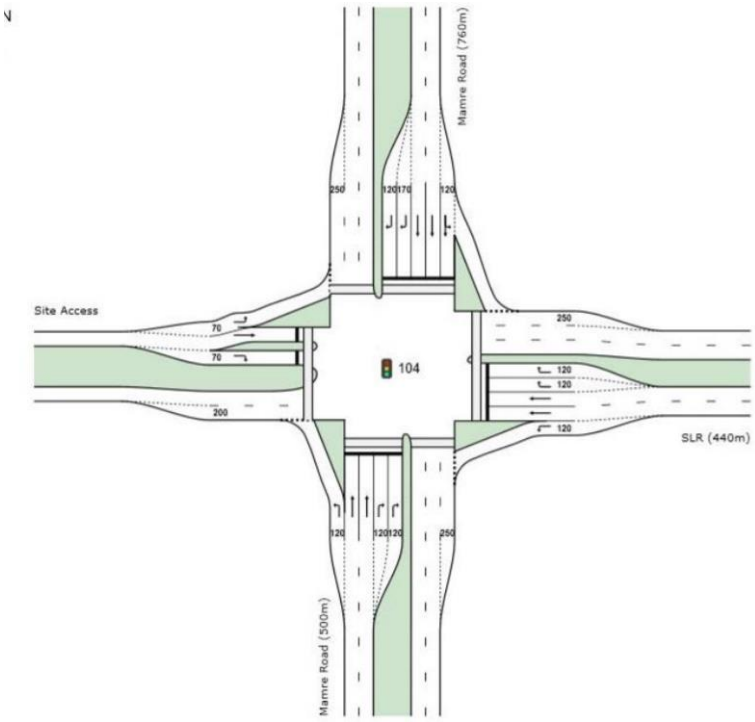

Figure 14: Sequence 2 (2026) Mamre Road / Bakers Lane Signal Layout

Source – Ason Group, 2020

It is expected the construction phase of the project will impact upon Sequence 1A, while operation will impact upon all three iterations.

5.6.2 Distribution assumptions

The following assumptions have been made to distribute the future vehicle trip distribution for both construction and operational traffic:

Directional split - Construction

- Construction vehicle trips: 50%-50% split of trips to be inbound in the AM peak and outbound during the PM peak
- Construction workers: 100% of workers trips to be inbound in the AM peak and outbound during the PM peak

Directional split - Operational

- Staff Trips: 80% of staff trips to be inbound in the AM peak and outbound during the PM peak with the 20% in the opposing direction
- Visitor Trips: 50%-50% split of trips to be inbound in the AM peak and outbound during the PM peak
- Servicing Trips: All servicing vehicles are assumed to enter and exit the Site within the hour they arrive.

Traffic distribution:

The construction and operational traffic has been distributed as per Table 8, and graphically shown in Figure 15 at the Mare Road / Bakers Lane intersection.

Table 8: AM and PM peak traffic distribution for generated trips

Origin/Destination	Peak Periods
North via Mamre Road	50%
South via Mamre Road	50%

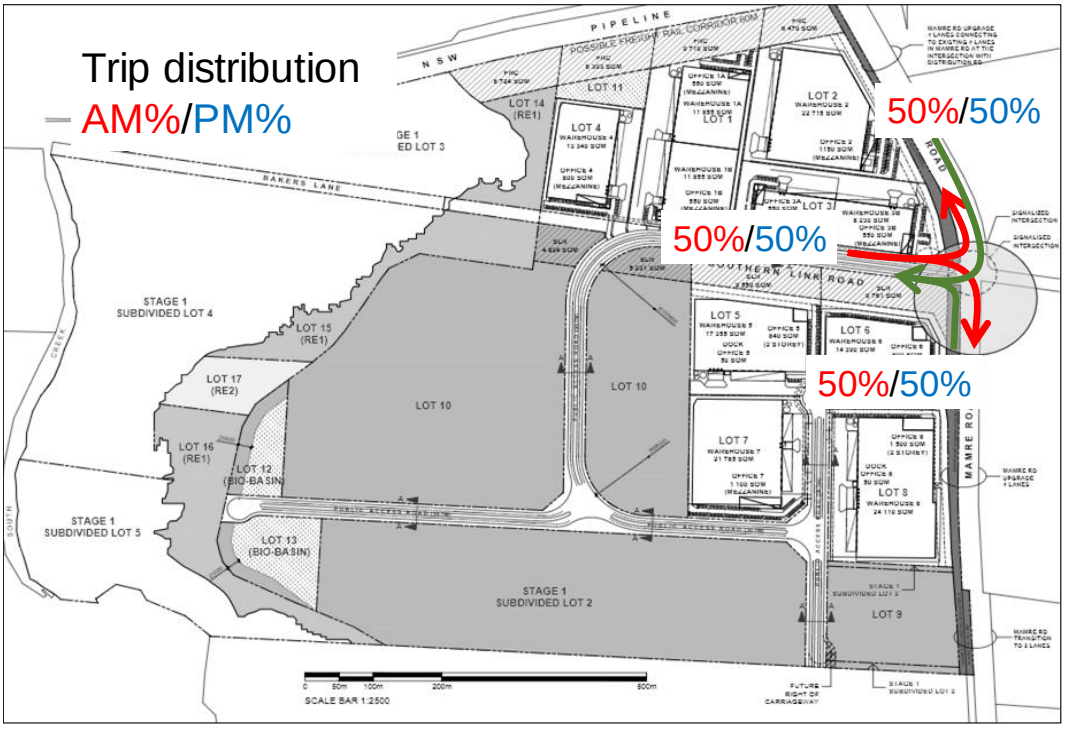

Figure 15: Traffic distribution accessing the proposed Site

5.6.3 Intersection modelling

This section describes the results of SIDRA traffic modelling analysis. The Mamre Road / Bakers Lane intersection has been assessed using RMS approved software SIDRA 8 software for a range of future scenarios.

The main access to the Site was not modelled as the road that is adjacent to the northern boundary is a cul de sac which is expected to have minimal through traffic.

Traffic modelling

The following scenarios have been modelled. These all consider the cumulative impacts captured in the TIA to support the SSD-9522 proposal.

- Base Case – Sequence 1A including SSD-9522 traffic
- Construction Case – Sequence 1A + SYD05 construction traffic
- Future Case Sequence 1A – Sequence 1A + SYD05 Operational traffic
- Future Case Sequence 1B – Sequence 1B + SYD05 Operational traffic
- Future Case Sequence 2 – Sequence 2 + SYD05 Operational traffic

The intersection performance for each scenario has been assessed using the following metrics:

- Degree of Saturation;
- Average Delay (Seconds per vehicle);
- Level of Service; and
- 95th percentile queue length.

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LoS), is based on the average delay per vehicle. LoS ranges from A = very good to F = unsatisfactory.

Another common measure of intersection performance is the degree of saturation (DoS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DoS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum degree of saturation for an intersection is 0.9.

5.6.4 Construction traffic impact

Based on the overall construction traffic generation from Section 5.1.1 and distribution assumptions from section 5.6.2, the additional traffic volumes for the peak construction phase in AM and PM peak hours are presented in Figure 16 and Figure 17.

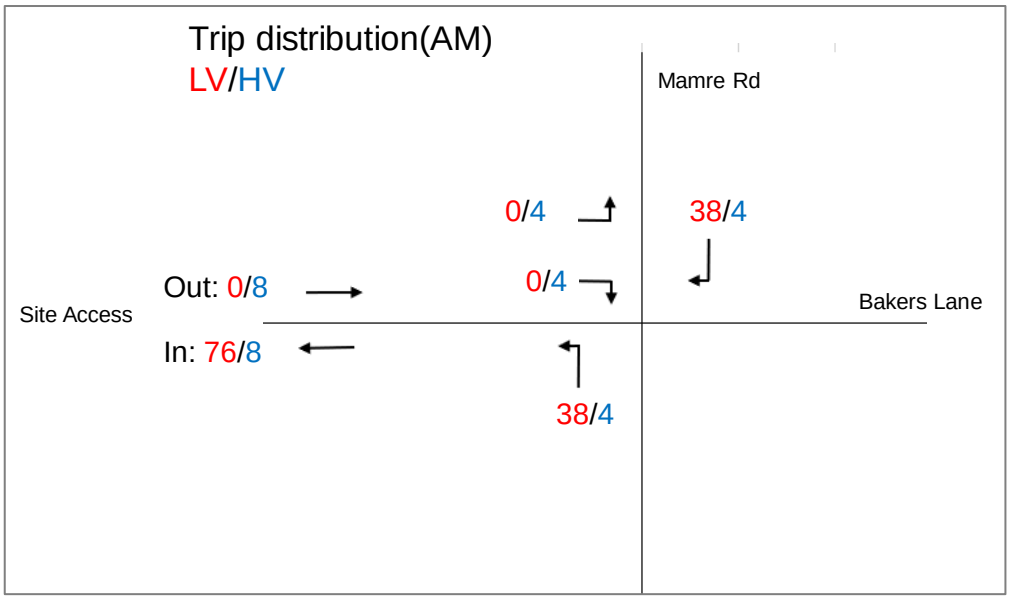

Figure 16: Construction Traffic - AM peak hour net traffic volumes

Values are subject to rounding

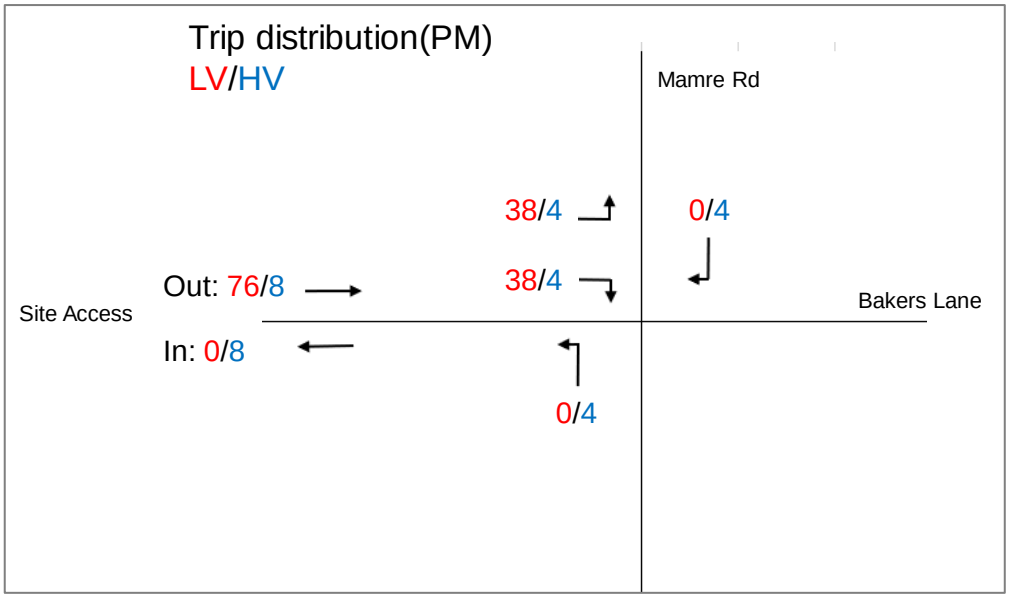

Figure 17: Construction Traffic - PM peak hour net traffic volumes

Values are subject to rounding

Results of the analysis have been summarised in Table 9, with the detailed results attached to this report in Appendix C.

Table 9: SIDRA modelling results – Construction phase

Scenario	AM Peak (08:00-09:00)				PM Peak (17:00-18:00)			
	DoS	Delay (sec)	LoS	Queue (m)	DoS	Delay (sec)	LoS	Queue (m)
Base Case (1A)	0.904	39.5	C	168	0.849	35.0	C	196
Construction Case 1A	0.894	40.8	C	168	0.849	35.5	C	196

The modelling indicates that the intersection would operate at Level of Service C despite the increase in traffic volumes due to construction, representing minimal change to the operation of the intersection.

5.6.5 Operational traffic impact

Based on the overall operational traffic generation from Section 5.1.2 and distribution assumptions from section 5.6.2, the net intersection volumes are shown for the operational stage in both AM and PM peak hours in Figure 18 and Figure 19.

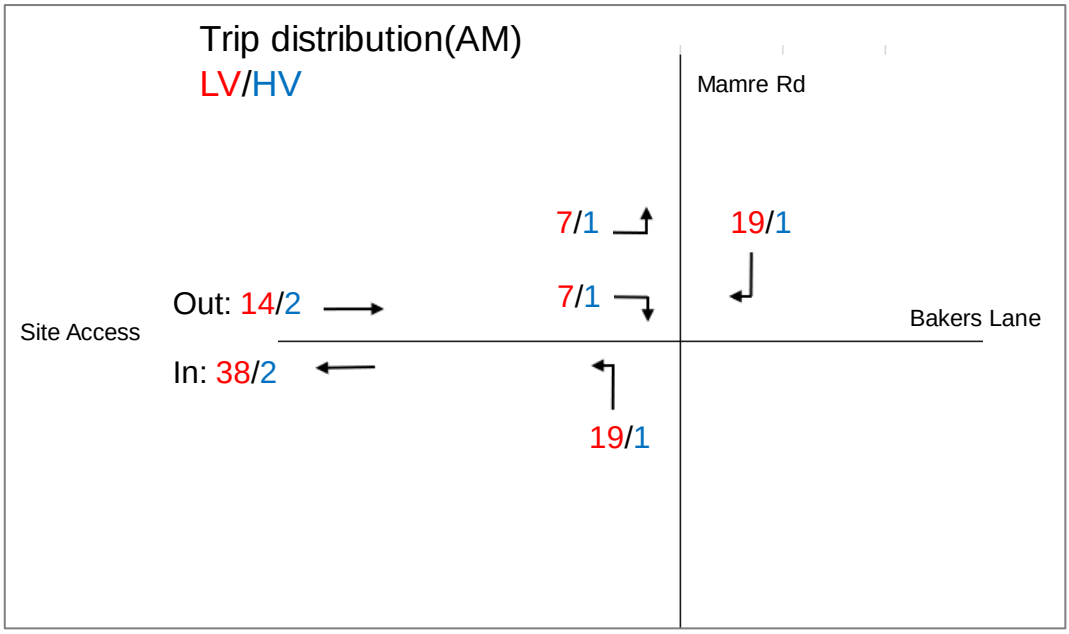

Figure 18: Operational Traffic - AM peak hour net traffic volumes

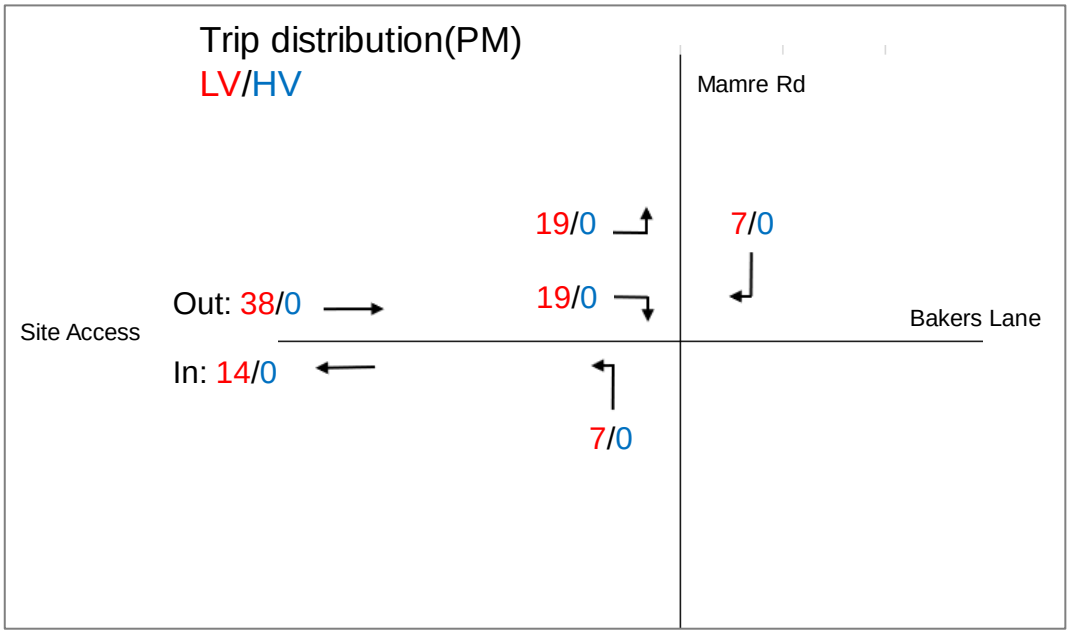

Figure 19: Operational Traffic - PM peak hour net traffic volumes

Results of the analysis have been summarised in Table 10, with the detailed results appended to this report.

Table 10: SIDRA modelling results – Operational phase

Scenario	AM Peak (08:00-09:00)				PM Peak (17:00-18:00)			
	DoS	Delay (sec)	LoS	Queue (m)	DoS	Delay (sec)	LoS	Queue (m)
Future Case (1A)	0.922	38.9	C	168	0.849	35.2	C	196
Future Case (1B)	0.918	35.4	C	156	0.917	26.4	C	209
Future Case (2)	0.826	36.3	C	240	0.660	35.4	C	171

The modelling indicates that the intersection would operate at Level of Service C for all future intersection arrangements despite the increase in traffic volumes related to the operation of SYD05, representing minimal change to the future operation of the intersection.

5.7 Sustainable Travel Initiatives

The traffic assessment considered all visitors using private vehicles to ensure the assessment was robust. In operation a variety of measures will be used to encourage sustainable travel patterns to and from SYD05 including:

- Producing a Green Travel Plan and appointing a coordinator;
- Shared car travel for staff with parking bays prioritised for employees choosing to car share; and
- Adequate cycle parking and end of trip facilities.

6 Environmental management measures

Table 11: Environmental management measures for traffic and transport impacts

Impacts	Mitigation	Responsibility	Timing
Construction traffic impacts to surrounding road network	Construction Traffic Management Plan	Applicant	Submitted with SSDA. Updated once contractors appointed
Operational traffic impacts to the surrounding road network	Cycle parking and end of trip facilities Car share Green Travel Plan	Applicant	Designs for all measures to be developed further post SSDA

7 Summary of residual impacts

This section provides a summary of the construction and operational risks both pre-mitigation and any residual impacts remaining after the implementation of the management measures describe in Section 7. Pre-mitigation and residual impacts are summarised in Table 12.

Table 12: Summary of pre-mitigation and residual impacts

Potential pre-mitigation adverse impact	Relevant management measures	Potential residual impact after implementation of management measures	Comment on how any residual impacts would be managed
Construction			
Increased traffic – particularly heavy vehicle traffic – associated with the construction of the Site on the surrounding road network.	• Traffic control with qualified TfNSW accredited traffic controllers to manage and regulate traffic movements into and out of the Site.	Negligible	N/A

Potential pre-mitigation adverse impact	Relevant management measures	Potential residual impact after implementation of management measures	Comment on how any residual impacts would be managed
	• Minimising disruption to road users by scheduling major delivery activities outside of peak network hours; • Restricting heavy vehicles to use arterial routes and access roads suitable for larger vehicles; • Encouraging workers to carpool to Site; • Containing the manoeuvring of all construction vehicles within the Site extent; and • Coordination with adjacent developments and authorities.		
Operation			
Increased traffic associated with the operation of the Site on the surrounding road network.	In operation a variety of measures will be used to encourage sustainable travel patterns to and from SYD05 including: • Producing a Green Travel Plan and appointing a coordinator; • Shared car travel for staff with parking bays prioritised for employees choosing to car share; and • Adequate cycle parking and end of trip facilities.	Negligible	N/A

8 References

- Ason Group, Traffic Impact Assessment, Warehouse & Logistics Hub 657-703 Mamre Road, Kemps Creek, dated 30 July 2020
- NSW Department of Planning, Industry and Environment| dpie.nsw.gov.au, Mamre Road Precinct, Draft Development Control Plan , November 2020

Appendix A

Framework Construction Traffic Management Plan

Confidential

Kemps Creek Data Centre

Construction Traffic Management Plan

SYD05-06-07_C-R-0004

Rev 1 | 19 March 2021

Job number 277863-00

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Document verification

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Document title		Construction Traffic Management Plan			**File reference**
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			Prepared by	Checked by	Approved by
		Name	Annabel Kerr	Sam Oswald	Chris Fay
		Signature			
Rev 1	19 Mar 2021	Filename	SYD05-06-07_C-R-0004		
		Description	Final issue		
			Prepared by	Checked by	Approved by
		Name	Sophie Zachulski	Sam Oswald	Chris Fay
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
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		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
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Contents

1 Introduction

1.1 Purpose of this report

The purpose of this Construction Traffic Management Plan (CTMP) is to provide guidance and support to manage the impacts relating to the construction of the SYD05 Kemps Creek Data Centre (SYD05). This document responds to the agency advice received by Transport for NSW (TfNSW) on 22nd October 2020. The plan is supplementary to the Traffic and Transport Assessment Report (SYD05-06-07_C-R-0011). This document:

- Describes the planned construction vehicle movements – including time of day and types of vehicles in use;
- Assesses intersection performance impacts for times of peak construction activity;
- Assesses road safety impacts, including the impact of construction vehicle movement on public transport, pedestrian connectivity and cycling; and
- Outlines measures to ameliorate the above impacts.

This is intended as a living document that will be updated as a contractor is appointed to the detailed design and construction phases.

1.2 Proposal overview

1.2.1 Site context

The identified Site address that is the subject of this technical report is legally defined as 757-769 Mamre Road, Kemps Creek. The entire Site comprises a total area of approximately 17.38 hectares (ha) and is subject to the applicable provisions outlined within SEPP (WSEA) 2009. Access to the Site is currently obtained via the proposed Estate Access Roads (SSD 9522), which are accessed from Mamre Road. Access into the Site is made possible via Mamre Road, which is subject to future road widening as part of the Mamre Road Widening Project (Transport for NSW).

The Site is situated approximately 40.26 km west of the Sydney CBD, 22.11 km west of Parramatta and 11.97 km southeast of Penrith. It is within close proximity to transport infrastructure routes (predominantly the bus network), as well as sharing direct links with the wider regional road network, including Mamre Road and both the M4 & M7 Motorways. All of which provide enhanced connectivity to the Subject Site and immediate vicinity, as well as the wider locality.

Additionally, the Subject Site is located within close proximity to active transport links, such as bicycle routes, providing an additional mode of accessible transport available to the Subject Site. In its existing state, the Subject Site comprises an undeveloped land portion; however, is subject to bulk earthworks and

infrastructure works under a concurrent State Significant Development (SSD) Application – SSD 9522.

The Proponent is proposing to construct and operate a Data Centre on the Subject Site. The Site is located within the Penrith Local Government Area (LGA) and is zoned IN1 General Industrial under the provisions of State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP (WSEA) 2009). Development for the purpose of a Data Centre is permissible with consent within the IN1 General Industrial zone pursuant to the provisions outlined with Part 3, Division 3, Clause 27 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP).

The Site and surrounding context are illustrated below in Figure 1.

Agency advices relevant to this report are identified in Table 1.

1.2.2 Description of the proposed development

The Site will form part of the new Kemps Creek Warehouse, Logistics and Industrial Facilities Hub being developed as a joint venture between Frasers Property and Altis Property Partner under the recently approved SSD 9522 as of 21st December 2020.

The Site layout has been developed for three data centres for a total of 144MW capacity (3 x 48MW). Full detailed design is currently underway for two 48MW centres, with the third data centre being designated as a future build. Throughout this report, the three data centres are referred to as SYD05, SYD06 and SYD07.

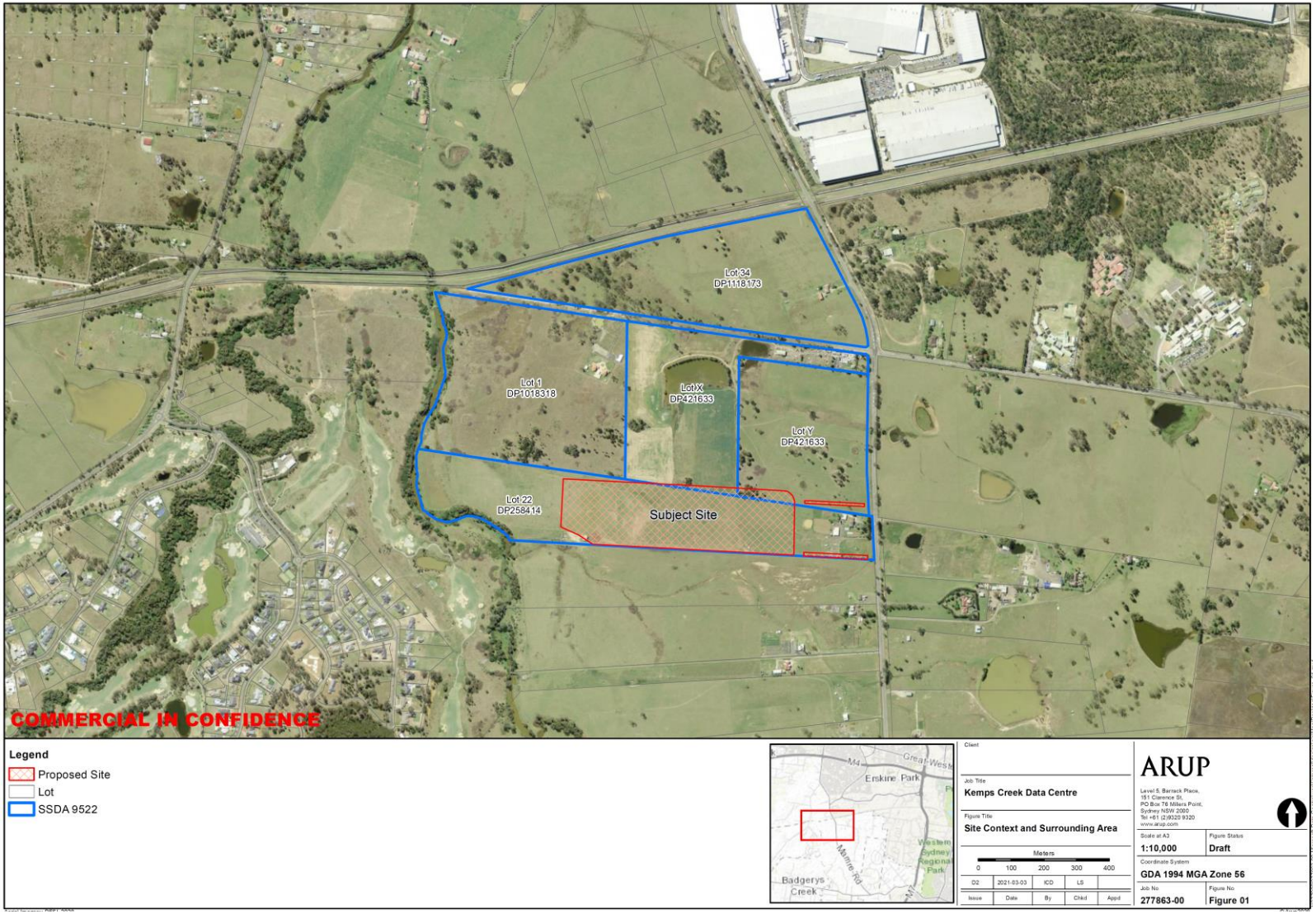


Figure 1: Proposal overview

Table 1: Agency advice requirements for the CTMP

Agency comments	
Draft Construction Traffic Management Plan for consideration, including: - Planned construction vehicle movements by time of day, hourly, including the type of vehicle used for the main construction tasks - Intersection performance impacts for times of peak construction activity - Road safety assessment including the impact of truck movements on public transport, pedestrian connectivity and cycling	Sections 2.3 and 3.2 Section 3.4 (also refer to SY05-05-07_Y-R-0011) Sections 3.1, 4 and 5

1.3 Construction traffic management principles

The development of this document has been underpinned by the following construction traffic management principles:

- Ensure safety of pedestrians, cyclists, construction workers, road users and the local community;
- Minimise the overall impacts to road users;
- Ensure minimal disruptions to public transport operations, including schedules, stop location and routes;
- Maintain access for existing road users, including the local community, public transport operators, pedestrians and cyclists;
- Ensure disruption to residents and local businesses are minimised including appropriate consultation;
- Minimise disruption to existing road furniture and kerbside provisions including existing bus stops, cycleways and on-street parking; and
- Comply with all relevant legislation and other requirements specified by relevant authorities.

2 Description of proposed works

This section outlines the staging of the planned construction works and associated vehicle movements.

2.1 Construction programme

Construction of SYD05 will be undertaken in three main stages. These are outlined in Table 2.

Table 2: Construction staging

Stage	Description	Indicative timeline
Stage 1	• Site preparation works (entire site) • Construction of first data centre (SYD05) • Fit-out of data centre (SYD05)	Construction expected to commence 2022 (Day One),
Stage 2	• Construction of second data centre (SYD06) building • Construction of associated car parking and other site works • Fit-out works within data centre (SYD06)	Expected completion within 7 years post-Day One
Stage 3	• Construction of second data centre (SYD07) building • Construction of associated car parking and other site works • Fit-out works within data centre (SYD07)	Expected completion over 7 years post-Day One

The peak construction period is likely to occur within Stage 1 where civils works for the entire site will be combined with the construction of SYD05.

2.2 Hours of Operation

During each stage, the typical construction operating hours are proposed to be:

- Monday to Friday: 7:00am to 7:00pm
- Saturday: 7:00am to 5:00pm
- Sundays and public holidays: None.

It should be noted that the Minister for Planning and Public Spaces made the Environmental Planning and Assessment (COVID-19 Development – Construction Work Days) Order 2020 on 31 March 2020. This allows construction works to occur on weekends and public holidays to ensure workers can practice social distancing without loss of productivity or jobs. The construction program will be revised as COVID-19 protocols continue to adapt and evolve.

2.3 Vehicles types expected

A mix of vehicles would be needed to build and service the construction works, including vehicles to:

- Deliver materials/equipment to and from the site
- Convey materials/equipment across the site
- Remove waste
- Carry out construction works
- Convey workers to and from the site, supplementing public transport and active transport access alternatives.

This Construction Traffic Management Plan considers both light and heavy vehicles associated with construction stages.

Light vehicles

The construction workforce is expected to travel to and from the Site via private vehicle – cars, utes, SRVs and potentially motorcycles. The expected distribution of worker arrivals and departures is discussed in Section 3. Given the proposed hours of work, the workforce is likely to arrive and leave site on the fringes of peak periods on the surrounding network reducing impacts.

As the Site is located a two kilometres walk from the nearest bus stop on James Erskine Drive (route 779), or five kilometres from Elizabeth Drive/Mamre Road (route 801), it is expected that only a very small proportion would travel by public transport. However, reductions in trip numbers may also be realised by encouraging workers to carpool.

Section 3 assesses the potential distribution of worker trips on the surrounding road network.

Heavy vehicles

Heavy vehicles include trucks, plant and other heavy vehicles for special deliveries such as bulky construction materials, heavy plant and other equipment. A list of plant expected to operate within the site during different types of works is provided below:

- Backhoe
- Compactor
- Concrete Pump
- Concrete Truck
- Crane (20t)
- Crane (tower)
- Excavator tracked – 35t
- Excavator mounted hammer
- Front end loader
- Grader
- Roller (vibratory)
- Roller (smooth)
- Pavement layer
- Piling (impact)
- Scraper
- Truck (15t)

- Truck (water cart)
- Vehicle (light commercial)

Deliveries of large plant to Site will be scheduled outside of peaks to minimise impacts and coordinate the National Heavy Vehicle Regulator (NHVR) where loads are oversized. In addition to the plant on Site construction deliveries using heavy vehicle will occur throughout operational hours.

The distribution and impact of heavy vehicle traffic on the surrounding road network is discussed further in Section 3.

3 Construction traffic management measures

3.1 Truck routes and controls

Heavy vehicle movements will be undertaken on designated transport haulage routes and arterial roads. Access to the Site will be via Mamre Road and the Mamre Road/Bakers Lane intersection. Note that Transport for NSW are planning to upgrade this intersection to a signalised intersection. Further details can be found in Section 2.2.4 of the Traffic and Transport Report (SYD05-06-07_C-R-0011).

As part of SSD-9522 a road network is being provided for the Mamre South Precinct that has been designed to accommodate large vehicles given the industrial nature of the precinct.

The main access route is shown below in Figure 2.

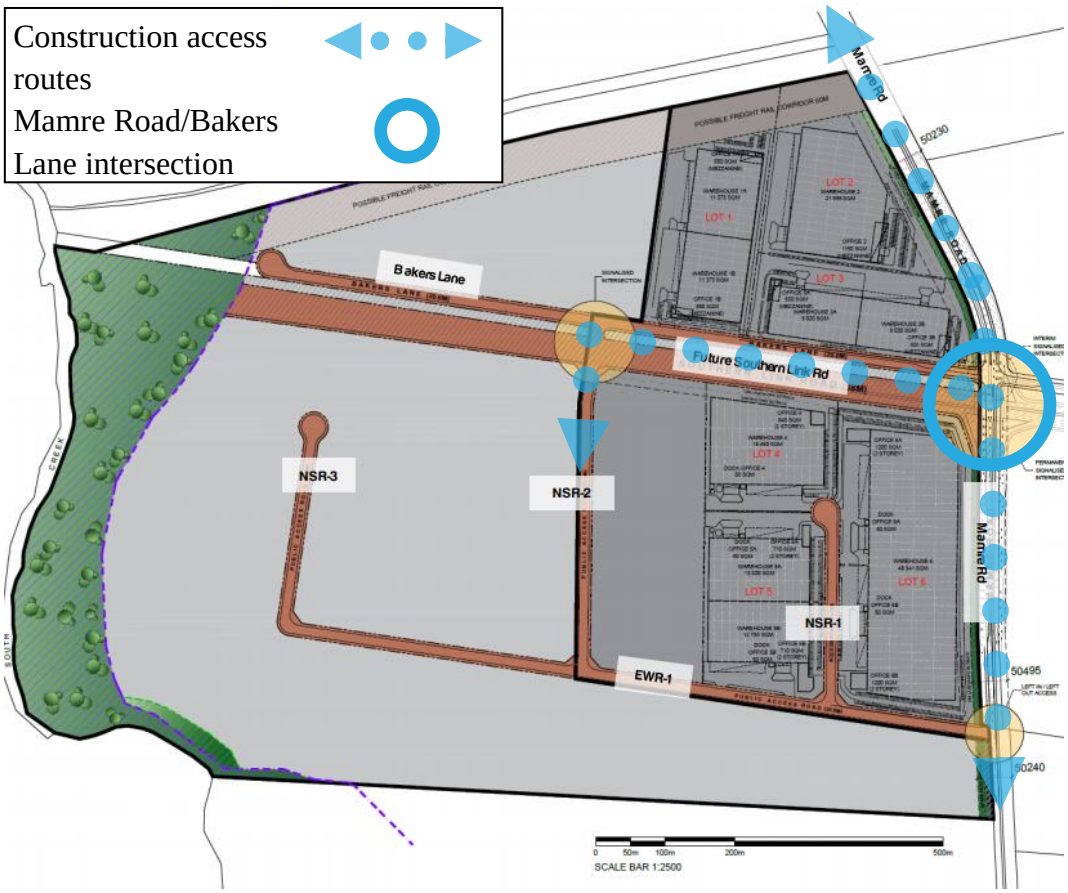


Figure 2: Construction vehicle access routes

Source: Modified map of the SSDA Plan, *SSDA Traffic Impact Assessment for Mamre South Precinct; 657 – 703 Mamre Road, Kemps Creek*

As plans for the construction phase develop swept paths will be undertaken for key movements. The key aim will be for all manoeuvring of construction vehicles to occur within the Site to minimise impacts the surrounding network.

3.2 Construction traffic

The estimated construction volumes associated with peak construction phase for heavy and light vehicles are outlined in this section. They align with the volume presented in Section 5.1.1 of the Traffic and Transport Report (SYD05-06-07_C-R-0011).

3.2.1 Construction vehicles

It is estimated that there will be a maximum of 75 construction vehicles per day associated with peak construction phase. Assuming these trips would be distributed evenly throughout the working day approximately 10% of these vehicles would access the Site during the peak hours. It is anticipated that there may be up to 16 two-way truck movements (8 trucks inbound and 8 trucks outbound) during peak hours.

It should be noted that all construction vehicles are assumed to enter and exit the Site within the hour they arrive.

3.2.2 Construction workers

Workers will generate additional traffic to the Site in the form of vans, utes and SRVs. A maximum workforce of approximately 150 personnel could be expected in the peak construction phase. Construction workers generally start earlier and finish earlier than the commuter peak periods and would likely not coincide with the commuter peak periods.

To ensure the assessment is robust, it has been assumed 50% of construction workers would arrive and depart in the AM and PM peak hours. Construction workers would therefore contribute an additional 75 vehicle trips inbound in the AM peak hour and outbound in the PM peak hour.

3.2.3 Overall traffic generation

Table 3 contains the combined construction vehicle and worker traffic generation.

Table 3: Peak construction phase traffic

Type	AM peak (08:00-09:00)		PM peak (17:00-18:00)	
	In	Out	In	Out
Construction vehicle	8	8	8	8
Construction worker	75	-	-	75
Total	**83**	**8**	**8**	**83**

3.3 Effects on existing and future developments

SYD05 is a greenfield site within the Mamre South Precinct. A small part of the site was previously used for light industrial uses but with minimal permanent

building footprint. SSDA 9522 for the Mamre South Precinct includes redevelopment of this property.

Alongside SYD05, the Mamre South Precinct through SSD-9522 has consent for:

- Demolition of existing structures, site-wide earthworks, landscaping, stormwater and other infrastructure and an internal road network;
- Construction and operation of eight warehouses comprising 162,355 m2 of floor space;
- Intersection upgrade works in Mamre Road;
- 744 parking spaces; and
- 21-lot Torrens title subdivision over two stages, being Stage 1 residual lot subdivision (5 lots) and Stage 2 residual and development lot subdivision (17 lots).

We note that the preliminary CTMP for SSD-9522 did not define the number of construction vehicle movements associated with the peak construction phase.

Given SYD05 will be constructed ahead of many uses within the precinct the construction phase is not expected to have a detrimental impact on the surrounding development.

3.4 Network impacts

Construction traffic generation is discussed in Section 5.1.1 of the Traffic and Transport Report (SYD05-06-07_C-R-0011). This report estimates the additional traffic volumes associated with the peak construction phase in the AM and PM peak hours, comprising:

- 76 light vehicle movements in during the AM peak and out during the PM peak;
- 8 heavy vehicle movements in and out during both the AM and PM peaks; and
- Vehicle movements were assumed to be split 50/50 travelling north/south on Mamre Road.

Results of the SIDRA modelling for the peak construction phase indicated that the intersection at Mamre Road/Bakers Lane continued to operate at LOS C in both the AM and PM peak periods, with minimal change in expected queue lengths.

Note that all intersection modelling assumes that this intersection is upgraded from a priority intersection to a signalised intersection prior to construction commencing.

Detailed results can be found in Appendix C of the Traffic and Transport Report (SYD05-06-07_C-R-0011).

4 Details of provisions made for emergency vehicles, heavy vehicles, and cyclists

No special provisions have been identified on the surrounding road network or proposed for emergency vehicles and cyclists.

Construction works and vehicle storage will be mainly confined to the site. Construction activity from any potential works zone is not expected to affect heavy vehicles travelling on surrounding roads not associated with this site.

The construction and delivery vehicles proposed for adjacent sites are permitted to continue and will be managed by construction personnel if necessary.

5 Measures to ameliorate impacts

The measures proposed to ameliorate the impacts of the construction work are:

- Traffic control with qualified TfNSW accredited traffic controllers to manage and regulate traffic movements into and out of the Site.
- Minimising disruption to road users by scheduling major delivery activities outside of peak network hours;
- Restricting heavy vehicles to use arterial routes and access roads suitable for larger vehicles;
- Encouraging workers to carpool to Site;
- Containing the manoeuvring of all construction vehicles within the Site extent; and
- Coordination with adjacent developments and authorities.

Additionally, drivers wishing to access the site for any reason will need to report to the traffic controllers and receive instructions and guidance. Scheduling will be the main management method in ensuring minimal multi-vehicle arrivals. No queuing or marshalling of trucks is permitted within the public roads. A radio set-up will manage multiple vehicle arrivals advising when the site is clear for the next arriving vehicles.

Traffic control plans for the management of the site will be developed and submitted as required. Surrounding traffic will not be impacted by entry or exit of construction vehicles. Any temporary road closures would be obtained through the normal approvals process with Sydney Coordination Office (SCO) and Penrith City Council.

5.1 Vehicle movements

Mitigation measures would be adopted during the construction phase to ensure traffic movements have minimal impact on surrounding land uses and the community in general, and would include the following:

- All truck loads will be covered during transportation off-site for sensitive loads;
- Establishment and enforcement of appropriate on-site vehicle speed limits (20km/h), which would be reviewed depending on weather conditions or safety requirements;
- Neighbouring properties would be notified of construction works and timing;
- Materials would be delivered, and spoil removed during approved construction hours;
- Avoid idling trucks alongside sensitive receivers; and
- Deliveries would be planned to ensure a consistent and minimal number of trucks arriving at site at any one time.

The contractor will ensure sufficient traffic control is in place to assist in large heavy vehicle movements adjacent to the Site and when this affects regular and safe traffic movements. This will not be an ongoing and full-time measure, but rather a measure that will be assessed and if deemed necessary implemented due to the particular activities happening on a particular day.

5.2 Driver code of conduct

To manage driver conduct, the following measures are to be implemented:

- All deliveries are to be pre booked.
- All deliveries are to check in at the site office.
- Drivers are to give way to pedestrians; and
- All loads have traceability point of load and unload.

No queuing or marshalling of trucks is permitted on a public road. TfNSW accredited traffic controllers will be used to manage construction traffic on the public street(s) to manage trucks entering or leaving the site.

At all times, vehicles must wait until a suitable gap in traffic allows them to enter or exit the site. The Roads Act does not give any special treatment to trucks leaving a construction site – the vehicles already on the road have right-of-way. Vehicles entering, exiting, and driving around the site will be required to give way to pedestrians.

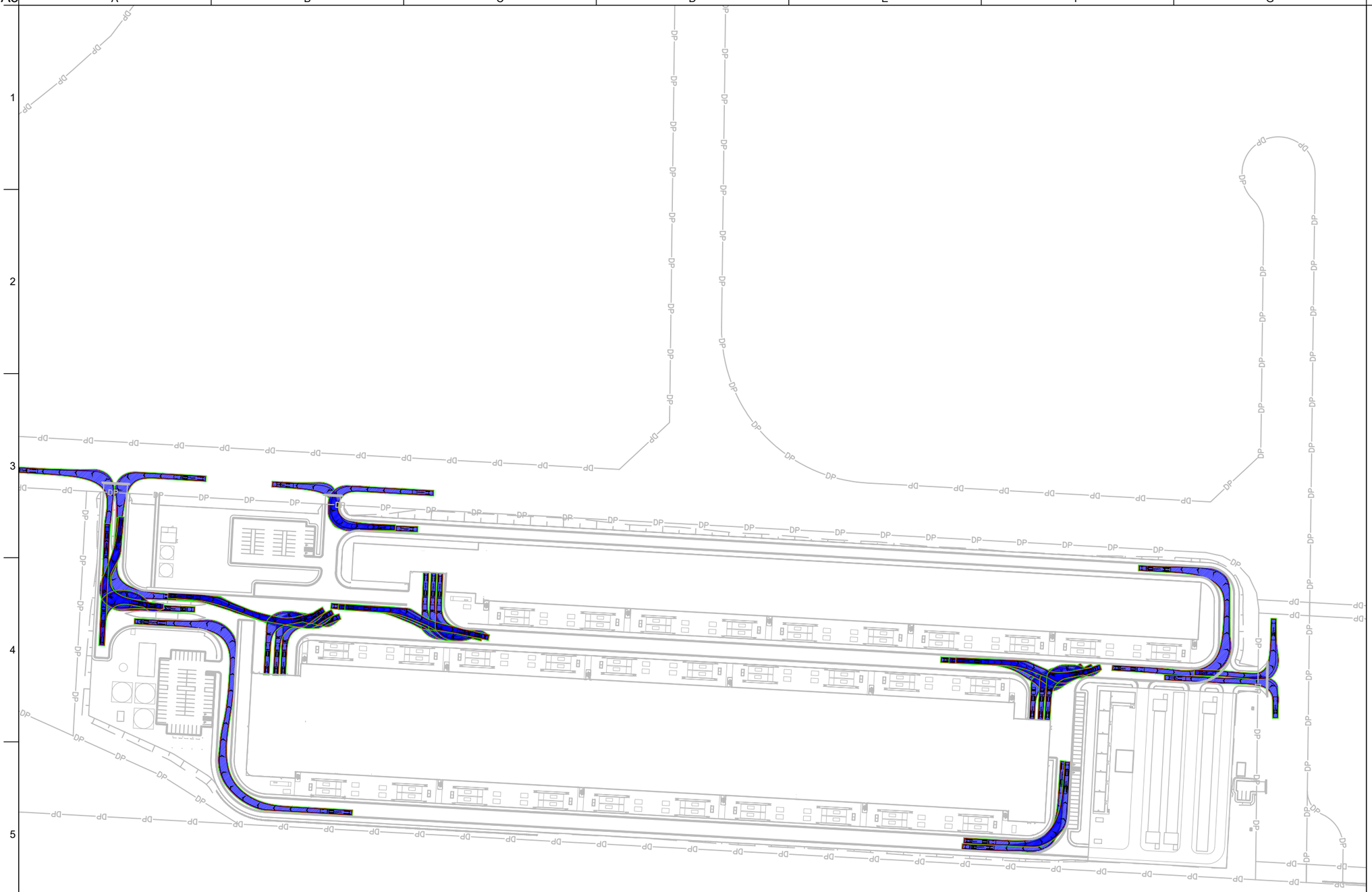
Appendix B

Technical Drawings

A3

A | B | C | D | E | F | G

1 | 2 | 3 | 4 | 5 | 6



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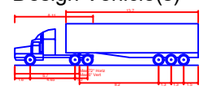
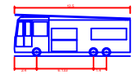
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



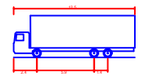
Single Articulated (19 m)

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.560m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m



HRV Fire Aerial Appliance

Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.500m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m



HRV - Heavy Rigid Vehicle

Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

Note(s)

1. All paths have been conducted at 15km/h in forward gear and 2.5km/h in reverse

Issue	Date	By	Chkd	Appd
E	27/04/21	SZ	SO	SO

For Information

ARUP

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Sydney, NSW, 2000
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Client

Confidential

Job Title

SYD05 Data Centre

Drawing Title

Site-wide
Swept path analysis

Scale at A3 1:2,500

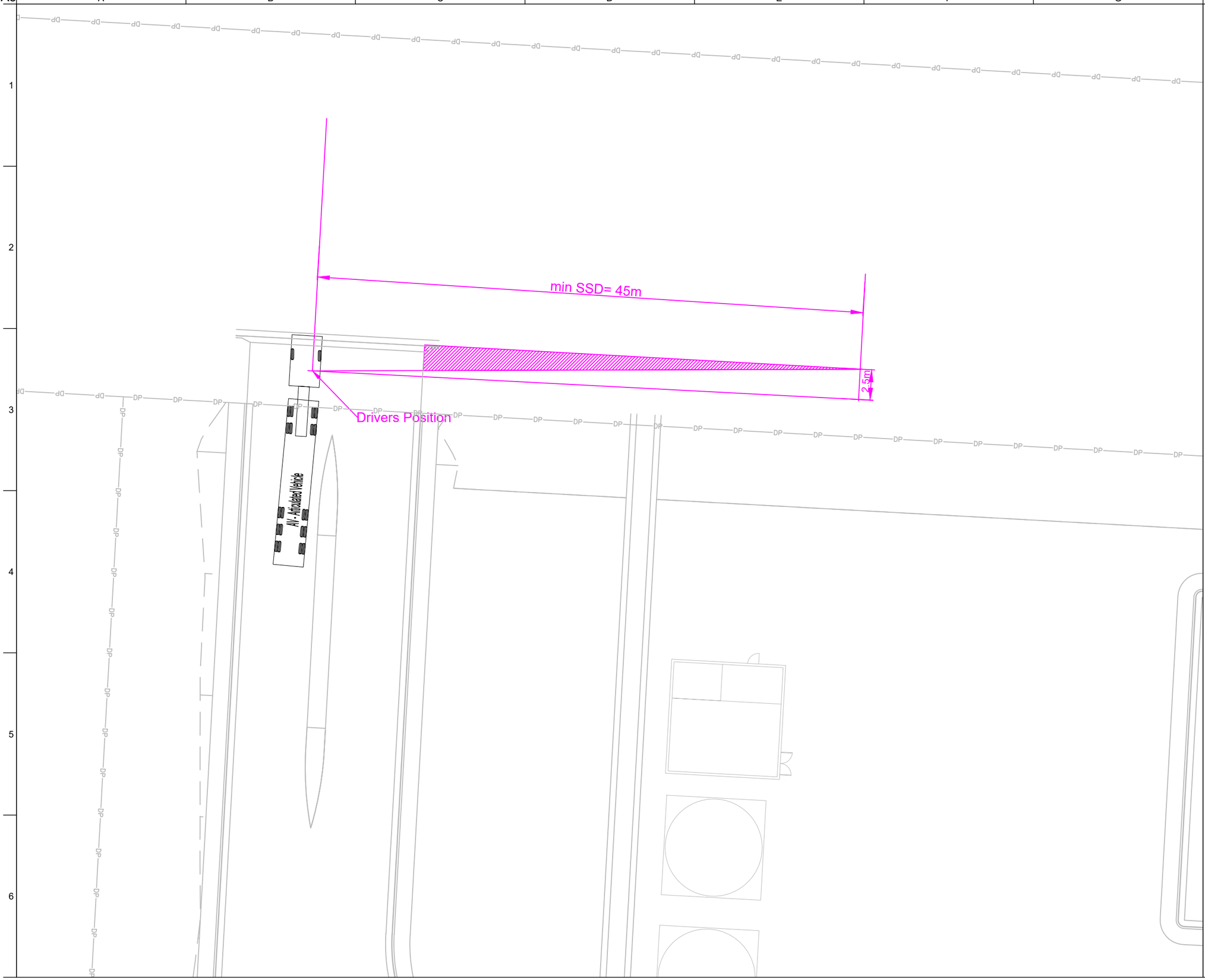
Discipline Transport

Drawing Status

For Information

Job No	Drawing No	Issue
277863-00	**SKT001**	**E**

Do not scale



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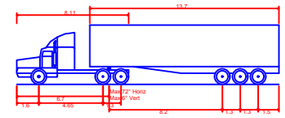
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



Single Articulated (19 m)	
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m

Note(s)

1. No permanent Site Obstruction in the hatched area
2. Parking on the side of the frontage road (in front of the hatched area) may need to be restricted so that the sight distance required to an approaching vehicle is not obstructed

Issue	Date	By	Chkd	Appd
E	27/04/21	SZ	SO	SO
For Information				

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Client
Confidential

Job Title
SYD05 Data Centre

Drawing Title
Main Entrance- Northwest
Sight Distance Checks

Scale at A3 1:300

Discipline Transport

Drawing Status
For Information

Job No	Drawing No	Issue
277863-00	**SKT002**	**E**

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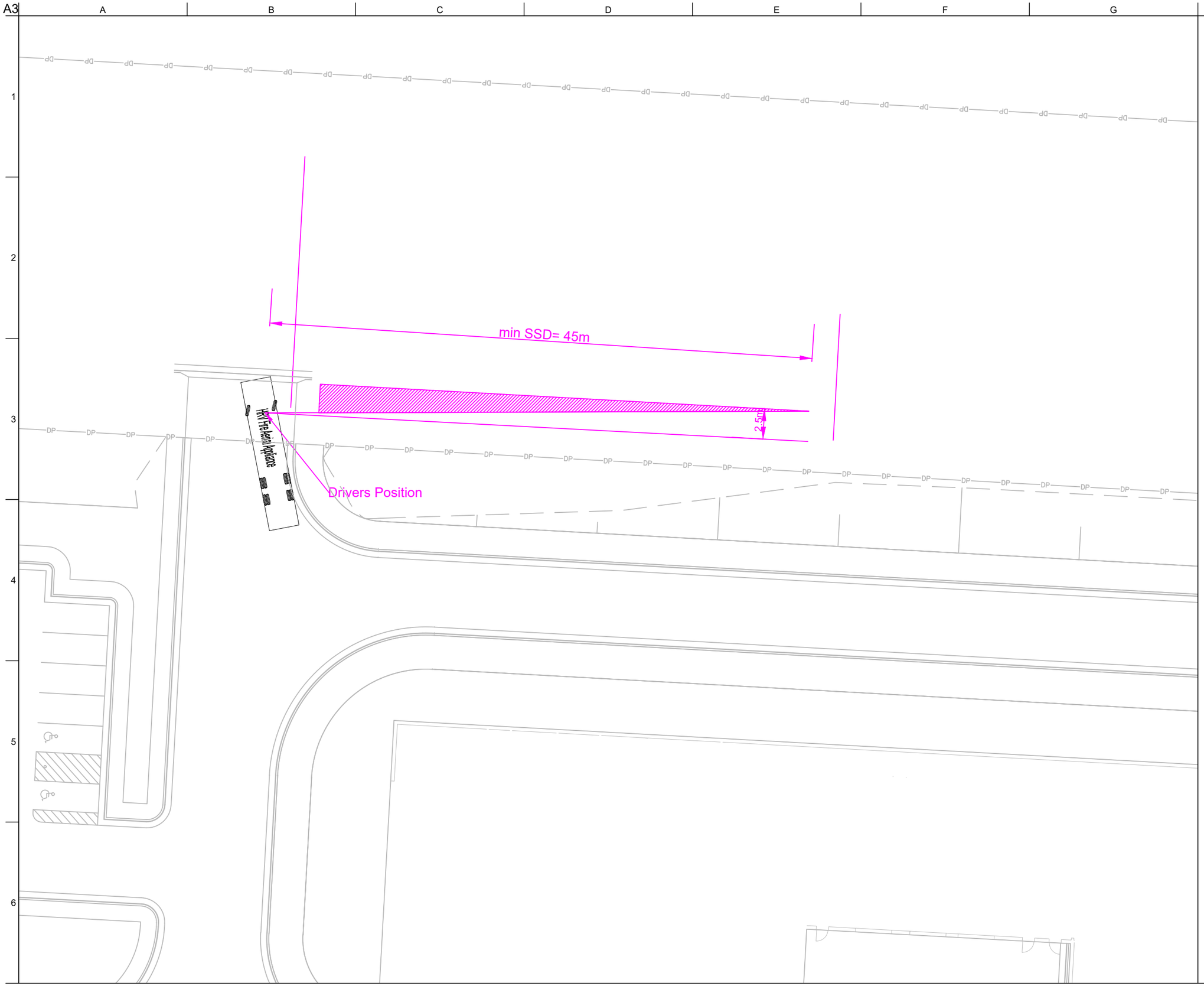

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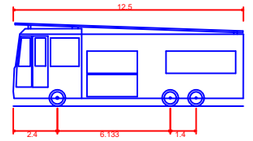
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



HRV Fire Aerial Appliance	
Overall Length	12.500m
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Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m

Note(s)

1. No permanent Site Obstruction in the hatched area
2. Parking on the side of the frontage road (in front of the hatched area) may need to be restricted so that the sight distance required to an approaching vehicle is not obstructed

Issue	Date	By	Chkd	Appd
E	27/04/21	SZ	SO	SO
For Information				

ARUP

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Client
Confidential

Job Title
SYD05 Data Centre

Drawing Title
Fire trucks entry/exit Location
Sight Distance Checks

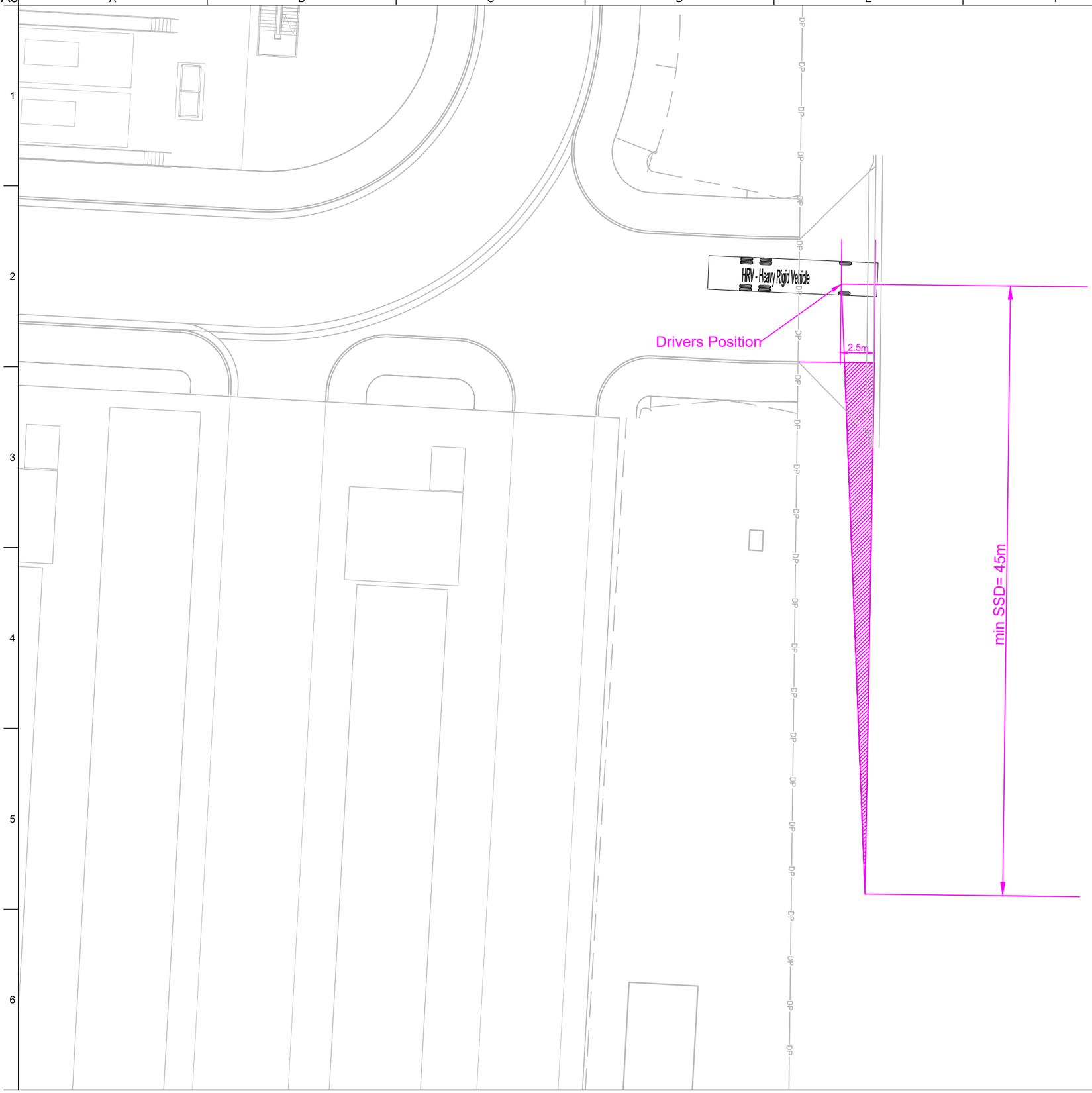
Scale at A3 1:300

Discipline Transport

Drawing Status
For Information

Job No	Drawing No	Issue
277863-00	**SKT003**	**E**

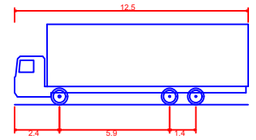
Do not scale



Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



HRV - Heavy Rigid Vehicle	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

Note(s)

1. No permanent Site Obstruction in the hatched area
2. Parking on the side of the frontage road (in front of the hatched area) may need to be restricted so that the sight distance required to an approaching vehicle is not obstructed

Issue	Date	By	Chkd	Appd
E	27/04/21	SZ	SO	SO

For Information

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Client
Confidential

Job Title
SYD05 Data Centre

Drawing Title
HRV trucks entry/exit Location
Eastern Access
Sight Distance Checks

Scale at A3 1:300

Discipline Transport

Drawing Status
For Information

Job No	Drawing No	Issue
277863-00	**SKT004**	**E**

Do not scale

Appendix C

Sidra Outputs

MOVEMENT SUMMARY

Site: 104 [[Scen.0] 2025 Mamre Road x Bakers Lane (Seq 1A)_AM]

Mamre Road x Bakers Lane
2025 Future + Dev
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	113	30.8	0.125	15.5	LOS B	2.4	21.2	0.47	0.69	0.47	46.0
2	T1	847	12.2	0.711	30.7	LOS C	17.0	131.7	0.87	0.76	0.88	51.9
3	R2	80	0.0	0.172	38.7	LOS C	2.8	19.4	0.74	0.74	0.74	38.2
Approach		1040	13.3	0.711	29.7	LOS C	17.0	131.7	0.82	0.75	0.82	50.2
East: Bakers Lane (440m)												
4	L2	43	0.0	0.084	32.5	LOS C	1.5	10.8	0.75	0.71	0.75	40.3
5	T1	1	0.0	0.084	26.9	LOS B	1.5	10.8	0.75	0.71	0.75	38.4
6	R2	392	0.3	0.850	46.0	LOS D	19.0	133.6	1.00	0.95	1.24	39.5
Approach		436	0.2	0.850	44.6	LOS D	19.0	133.6	0.97	0.93	1.19	39.5
North: Mamre Road (750m)												
7	L2	627	0.2	0.705	28.9	LOS C	24.0	168.0	0.85	0.86	0.85	47.5
8	T1	681	18.4	0.889	53.6	LOS D	19.3	156.7	1.00	1.03	1.33	41.2
9	R2	194	29.9	0.904	67.2	LOS E	11.4	100.5	1.00	1.02	1.49	31.2
Approach		1502	12.3	0.904	45.0	LOS D	24.0	168.0	0.94	0.96	1.15	41.7
West: Bakers lane												
10	L2	81	31.2	0.247	40.4	LOS C	3.3	29.5	0.86	0.76	0.86	38.2
11	T1	1	0.0	0.247	34.5	LOS C	3.3	29.5	0.86	0.76	0.86	35.4
12	R2	48	30.4	0.110	30.0	LOS C	1.6	14.2	0.78	0.72	0.78	39.2
Approach		131	30.6	0.247	36.5	LOS C	3.3	29.5	0.83	0.74	0.83	38.5
All Vehicles		3108	11.7	0.904	39.5	LOS C	24.0	168.0	0.90	0.88	1.03	43.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	36.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	27.4	LOS C	0.1	0.1	0.74	0.74
All Pedestrians		211	38.0	LOS D			0.87	0.87

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

MOVEMENT SUMMARY

Site: 104 [[Scen.0] 2025 Mamre Road x Bakers Lane (Seq 1A)_PM]

Mamre Road x Bakers Lane
2025 Future + Dev
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	36	29.4	0.035	11.7	LOS A	0.6	5.1	0.35	0.64	0.35	48.3
2	T1	783	12.4	0.678	31.1	LOS C	15.5	120.4	0.86	0.75	0.86	51.7
3	R2	26	0.0	0.236	58.4	LOS E	1.3	9.0	0.97	0.71	0.97	31.4
Approach		845	12.7	0.678	31.1	LOS C	15.5	120.4	0.84	0.74	0.84	50.8
East: Bakers Lane (440m)												
4	L2	52	0.0	0.199	45.8	LOS D	2.3	16.0	0.90	0.74	0.90	34.8
5	T1	1	0.0	0.199	40.3	LOS C	2.3	16.0	0.90	0.74	0.90	33.4
6	R2	513	0.4	0.718	29.4	LOS C	19.6	137.4	0.92	0.85	0.92	46.4
Approach		565	0.4	0.718	31.0	LOS C	19.6	137.4	0.91	0.84	0.91	45.3
North: Mamre Road (750m)												
7	L2	180	1.2	0.146	13.3	LOS A	3.1	22.2	0.39	0.71	0.39	57.2
8	T1	977	12.9	0.849	41.7	LOS C	25.2	196.2	1.00	0.98	1.16	46.2
9	R2	61	32.8	0.676	61.5	LOS E	3.3	29.2	1.00	0.83	1.19	32.4
Approach		1218	12.2	0.849	38.5	LOS C	25.2	196.2	0.91	0.93	1.05	46.4
West: Bakers lane												
10	L2	140	30.8	0.643	51.0	LOS D	6.9	60.8	0.99	0.83	1.04	35.1
11	T1	2	0.0	0.643	45.1	LOS D	6.9	60.8	0.99	0.83	1.04	31.9
12	R2	83	30.4	0.147	24.3	LOS B	2.4	21.3	0.71	0.72	0.71	41.7
Approach		225	30.4	0.643	41.0	LOS C	6.9	60.8	0.88	0.79	0.92	37.0
All Vehicles		2854	11.4	0.849	35.0	LOS C	25.2	196.2	0.89	0.85	0.95	46.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		211	36.2	LOS D			0.85	0.85

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

MOVEMENT SUMMARY

Site: 104 [[Scen.0] 2025 Mamre Road x Bakers Lane (Seq 1A)_AM + CON]

Mamre Road x Bakers Lane
2025 Future + Dev
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	157	24.8	0.178	17.3	LOS B	3.7	31.4	0.52	0.71	0.52	45.2
2	T1	847	12.2	0.782	36.4	LOS C	19.0	147.1	0.93	0.85	0.99	48.7
3	R2	80	0.0	0.172	38.7	LOS C	2.8	19.4	0.74	0.74	0.74	38.2
Approach		1084	13.1	0.782	33.8	LOS C	19.0	147.1	0.86	0.82	0.91	47.5
East: Bakers Lane (440m)												
4	L2	43	0.0	0.084	32.5	LOS C	1.5	10.8	0.75	0.71	0.75	40.3
5	T1	1	0.0	0.084	26.9	LOS B	1.5	10.8	0.75	0.71	0.75	38.4
6	R2	392	0.3	0.849	45.9	LOS D	19.0	133.3	1.00	0.95	1.23	39.5
Approach		436	0.2	0.849	44.5	LOS D	19.0	133.3	0.97	0.93	1.18	39.6
North: Mamre Road (750m)												
7	L2	627	0.2	0.705	28.9	LOS C	24.0	168.0	0.85	0.86	0.85	47.5
8	T1	681	18.4	0.889	53.6	LOS D	19.3	156.7	1.00	1.03	1.33	41.2
9	R2	238	26.1	0.894	63.9	LOS E	13.8	118.3	1.00	1.01	1.42	31.9
Approach		1546	12.2	0.894	45.1	LOS D	24.0	168.0	0.94	0.96	1.15	41.5
West: Bakers lane												
10	L2	81	36.4	0.227	37.8	LOS C	3.2	29.3	0.83	0.75	0.83	39.0
11	T1	1	0.0	0.227	31.9	LOS C	3.2	29.3	0.83	0.75	0.83	36.4
12	R2	48	39.1	0.115	30.2	LOS C	1.6	15.1	0.78	0.72	0.78	38.9
Approach		131	37.1	0.227	34.9	LOS C	3.2	29.3	0.81	0.74	0.81	38.9
All Vehicles		3197	11.9	0.894	40.8	LOS C	24.0	168.0	0.91	0.90	1.06	42.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	36.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	29.7	LOS C	0.1	0.1	0.77	0.77
All Pedestrians		211	38.6	LOS D			0.88	0.88

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

MOVEMENT SUMMARY

Site: 104 [[Scen.0] 2025 Mamre Road x Bakers Lane (Seq 1A)_PM +CON]

Mamre Road x Bakers Lane
2025 Future + Dev
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	40	36.8	0.041	11.9	LOS A	0.6	6.0	0.36	0.64	0.36	48.0
2	T1	783	12.4	0.678	31.1	LOS C	15.5	120.4	0.86	0.75	0.86	51.7
3	R2	26	0.0	0.236	58.4	LOS E	1.3	9.0	0.97	0.71	0.97	31.4
Approach		849	13.1	0.678	31.0	LOS C	15.5	120.4	0.84	0.74	0.84	50.8
East: Bakers Lane (440m)												
4	L2	52	0.0	0.199	45.8	LOS D	2.3	16.0	0.90	0.74	0.90	34.8
5	T1	1	0.0	0.199	40.3	LOS C	2.3	16.0	0.90	0.74	0.90	33.4
6	R2	513	0.4	0.719	29.4	LOS C	19.6	137.4	0.92	0.85	0.92	46.4
Approach		565	0.4	0.719	31.0	LOS C	19.6	137.4	0.91	0.84	0.91	45.3
North: Mamre Road (750m)												
7	L2	180	1.2	0.146	13.3	LOS A	3.1	22.2	0.39	0.71	0.39	57.2
8	T1	977	12.9	0.849	41.7	LOS C	25.2	196.2	1.00	0.98	1.16	46.2
9	R2	65	37.1	0.741	62.8	LOS E	3.5	32.7	1.00	0.87	1.28	32.1
Approach		1222	12.5	0.849	38.6	LOS C	25.2	196.2	0.91	0.93	1.06	46.3
West: Bakers lane												
10	L2	184	25.7	0.812	57.0	LOS E	9.9	84.8	1.00	0.93	1.26	33.6
11	T1	2	0.0	0.812	51.2	LOS D	9.9	84.8	1.00	0.93	1.26	30.2
12	R2	127	23.1	0.217	24.7	LOS B	3.8	31.9	0.73	0.74	0.73	41.7
Approach		314	24.5	0.812	43.9	LOS D	9.9	84.8	0.89	0.86	1.04	36.0
All Vehicles		2951	11.6	0.849	35.5	LOS C	25.2	196.2	0.89	0.85	0.97	46.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		211	36.2	LOS D			0.85	0.85

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

MOVEMENT SUMMARY

Site: 104 [[Scen.0] 2025 Mamre Road x Bakers Lane (Seq 1A)_AM + OP]

Mamre Road x Bakers Lane
2025 Future + Dev
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	134	26.8	0.148	16.1	LOS B	3.0	25.5	0.49	0.70	0.49	45.8
2	T1	847	12.2	0.733	32.5	LOS C	17.7	136.5	0.89	0.79	0.91	50.9
3	R2	80	0.0	0.172	38.7	LOS C	2.8	19.4	0.74	0.74	0.74	38.2
Approach		1061	13.1	0.733	30.9	LOS C	17.7	136.5	0.83	0.77	0.85	49.4
East: Bakers Lane (440m)												
4	L2	43	0.0	0.084	32.5	LOS C	1.5	10.8	0.75	0.71	0.75	40.3
5	T1	1	0.0	0.084	26.9	LOS B	1.5	10.8	0.75	0.71	0.75	38.4
6	R2	392	0.3	0.713	35.8	LOS C	16.3	114.1	0.96	0.85	0.97	43.5
Approach		436	0.2	0.713	35.4	LOS C	16.3	114.1	0.94	0.84	0.95	43.2
North: Mamre Road (750m)												
7	L2	627	0.2	0.705	28.9	LOS C	24.0	168.0	0.85	0.86	0.85	47.5
8	T1	681	18.4	0.889	53.6	LOS D	19.3	156.7	1.00	1.03	1.33	41.2
9	R2	215	27.5	0.922	69.9	LOS E	13.1	113.0	1.00	1.05	1.53	30.6
Approach		1523	12.2	0.922	45.7	LOS D	24.0	168.0	0.94	0.96	1.16	41.3
West: Bakers lane												
10	L2	89	29.4	0.258	39.7	LOS C	3.6	31.9	0.85	0.76	0.85	38.5
11	T1	1	0.0	0.258	33.8	LOS C	3.6	31.9	0.85	0.76	0.85	35.6
12	R2	57	27.8	0.128	30.1	LOS C	1.9	16.4	0.78	0.72	0.78	39.2
Approach		147	28.6	0.258	35.9	LOS C	3.6	31.9	0.82	0.75	0.82	38.7
All Vehicles		3167	11.6	0.922	38.9	LOS C	24.0	168.0	0.90	0.87	1.01	43.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	36.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		211	38.2	LOS D			0.87	0.87

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

MOVEMENT SUMMARY

Site: 104 [[Scen.0] 2025 Mamre Road x Bakers Lane (Seq 1A)_PM + OP]

Mamre Road x Bakers Lane
2025 Future + Dev
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	43	24.4	0.041	11.7	LOS A	0.7	5.9	0.36	0.64	0.36	48.5
2	T1	783	12.4	0.678	31.1	LOS C	15.5	120.4	0.86	0.75	0.86	51.7
3	R2	26	0.0	0.236	58.4	LOS E	1.3	9.0	0.97	0.71	0.97	31.4
Approach		853	12.6	0.678	31.0	LOS C	15.5	120.4	0.84	0.74	0.84	50.8
East: Bakers Lane (440m)												
4	L2	52	0.0	0.199	45.8	LOS D	2.3	16.0	0.90	0.74	0.90	34.8
5	T1	1	0.0	0.199	40.3	LOS C	2.3	16.0	0.90	0.74	0.90	33.4
6	R2	513	0.4	0.719	29.4	LOS C	19.6	137.4	0.92	0.85	0.92	46.4
Approach		565	0.4	0.719	31.0	LOS C	19.6	137.4	0.91	0.84	0.91	45.3
North: Mamre Road (750m)												
7	L2	180	1.2	0.146	13.3	LOS A	3.1	22.2	0.39	0.71	0.39	57.2
8	T1	977	12.9	0.849	41.7	LOS C	25.2	196.2	1.00	0.98	1.16	46.2
9	R2	68	29.2	0.742	62.5	LOS E	3.7	32.4	1.00	0.86	1.28	32.2
Approach		1225	12.1	0.849	38.7	LOS C	25.2	196.2	0.91	0.93	1.06	46.3
West: Bakers lane												
10	L2	160	27.0	0.715	52.7	LOS D	8.1	69.8	1.00	0.87	1.12	34.7
11	T1	2	0.0	0.715	46.8	LOS D	8.1	69.8	1.00	0.87	1.12	31.4
12	R2	103	24.5	0.177	24.4	LOS B	3.0	25.7	0.72	0.73	0.72	41.8
Approach		265	25.8	0.715	41.6	LOS C	8.1	69.8	0.89	0.82	0.96	36.8
All Vehicles		2908	11.2	0.849	35.2	LOS C	25.2	196.2	0.89	0.85	0.96	46.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	28.2	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		211	36.2	LOS D			0.85	0.85

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

MOVEMENT SUMMARY

Site: 104 [[Scen.1.1] 2025 Mamre Road x Bakers Lan_PM + OP]

Config: 2025 Sequence 1B
Traffic: 2018 Survey + 2025 Growth + MWP1 + MP2 + SL (v3)
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 85 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (1,000m)												
1	L2	101	29.2	0.102	12.3	LOS A	1.6	14.1	0.41	0.67	0.41	51.4
2	T1	821	13.3	0.664	24.7	LOS B	13.5	105.1	0.83	0.72	0.83	61.0
3	R2	28	0.0	0.184	48.5	LOS D	1.1	7.9	0.94	0.71	0.94	43.1
Approach		951	14.6	0.664	24.1	LOS B	13.5	105.1	0.79	0.72	0.79	59.3
East: Bakers Lane (440m)												
4	L2	55	5.8	0.145	34.6	LOS C	1.9	13.9	0.84	0.73	0.84	47.3
5	T1	1	0.0	0.145	29.0	LOS C	1.9	13.9	0.84	0.73	0.84	37.5
6	R2	546	5.2	0.917	59.2	LOS E	14.1	103.2	1.00	1.08	1.52	35.3
Approach		602	5.2	0.917	56.9	LOS E	14.1	103.2	0.98	1.05	1.46	36.3
North: Mamre Road (750m)												
7	L2	192	9.9	0.190	16.1	LOS B	3.7	28.4	0.50	0.73	0.50	54.7
8	T1	1089	14.8	0.888	40.9	LOS C	26.4	208.5	1.00	1.05	1.28	52.8
9	R2	167	30.2	0.658	51.2	LOS D	3.7	32.9	1.00	0.83	1.15	35.1
Approach		1448	15.9	0.888	38.8	LOS C	26.4	208.5	0.93	0.98	1.16	50.7
West: Bakers lane												
10	L2	389	29.5	0.902	53.9	LOS D	20.2	176.9	1.00	1.03	1.40	34.3
11	T1	2	0.0	0.902	48.0	LOS D	20.2	176.9	1.00	1.03	1.40	31.0
12	R2	237	28.4	0.679	40.5	LOS C	9.5	82.8	0.97	0.85	1.03	40.9
Approach		628	29.0	0.902	48.8	LOS D	20.2	176.9	0.99	0.97	1.26	36.8
All Vehicles		3629	16.1	0.917	39.7	LOS C	26.4	208.5	0.92	0.92	1.13	47.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	36.8	LOS D			0.93	0.93

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

MOVEMENT SUMMARY

Site: 104 [[Scen.1.1] 2025 Mamre Road x Bakers Lane_AM]

Config: 2025 Sequence 1B
Traffic: 2018 Survey + 2025 Growth + MWP1 + MP2 + SL (v3)
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 80 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (1,000m)												
1	L2	296	31.3	0.396	20.0	LOS B	7.4	65.5	0.68	0.77	0.68	47.9
2	T1	958	14.4	0.851	33.2	LOS C	19.3	151.9	0.97	0.94	1.14	56.4
3	R2	85	2.5	0.247	37.8	LOS C	2.7	19.6	0.84	0.75	0.84	47.1
Approach		1339	17.4	0.851	30.6	LOS C	19.3	151.9	0.89	0.89	1.02	53.9
East: Bakers Lane (440m)												
4	L2	46	2.3	0.091	27.4	LOS B	1.3	9.5	0.75	0.71	0.75	50.8
5	T1	1	0.0	0.091	21.8	LOS B	1.3	9.5	0.75	0.71	0.75	40.7
6	R2	418	4.3	0.918	58.0	LOS E	10.2	73.9	1.00	1.10	1.61	35.7
Approach		465	4.1	0.918	54.8	LOS D	10.2	73.9	0.97	1.06	1.52	37.0
North: Mamre Road (750m)												
7	L2	669	3.3	0.749	25.5	LOS B	21.6	155.6	0.87	0.87	0.89	49.1
8	T1	718	19.2	0.656	26.1	LOS B	12.4	100.7	0.92	0.79	0.92	60.2
9	R2	505	31.0	0.877	51.7	LOS D	11.8	104.4	1.00	1.02	1.43	34.9
Approach		1893	16.7	0.877	32.7	LOS C	21.6	155.6	0.92	0.88	1.04	48.6
West: Bakers lane												
10	L2	216	31.2	0.461	29.5	LOS C	6.9	61.0	0.84	0.80	0.84	42.0
11	T1	1	0.0	0.461	23.6	LOS B	6.9	61.0	0.84	0.80	0.84	39.8
12	R2	127	31.4	0.665	45.4	LOS D	5.2	46.0	1.00	0.85	1.12	39.5
Approach		344	31.2	0.665	35.4	LOS C	6.9	61.0	0.90	0.82	0.94	40.9
All Vehicles		4041	16.7	0.918	34.8	LOS C	21.6	155.6	0.92	0.90	1.08	48.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	34.3	LOS D			0.93	0.93

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

MOVEMENT SUMMARY

Site: 104 [[Scen.1.1] 2025 Mamre Road x Bakers Lan_PM]

Config: 2025 Sequence 1B
Traffic: 2018 Survey + 2025 Growth + MWP1 + MP2 + SL (v3)
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 85 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (1,000m)												
1	L2	94	31.5	0.094	11.9	LOS A	1.4	12.8	0.40	0.67	0.40	51.5
2	T1	821	13.3	0.664	24.7	LOS B	13.5	105.1	0.83	0.72	0.83	61.0
3	R2	28	0.0	0.215	50.0	LOS D	1.2	8.1	0.96	0.71	0.96	42.5
Approach		943	14.7	0.664	24.2	LOS B	13.5	105.1	0.79	0.72	0.79	59.4
East: Bakers Lane (440m)												
4	L2	55	5.8	0.153	35.5	LOS C	1.9	14.1	0.85	0.73	0.85	46.9
5	T1	1	0.0	0.153	29.9	LOS C	1.9	14.1	0.85	0.73	0.85	37.1
6	R2	546	5.2	0.917	59.2	LOS E	14.1	103.2	1.00	1.08	1.52	35.3
Approach		602	5.2	0.917	57.0	LOS E	14.1	103.2	0.99	1.05	1.46	36.3
North: Mamre Road (750m)												
7	L2	192	9.9	0.190	16.1	LOS B	3.7	28.4	0.50	0.73	0.50	54.7
8	T1	1089	14.8	0.888	40.9	LOS C	26.4	208.5	1.00	1.05	1.28	52.8
9	R2	160	31.6	0.740	53.8	LOS D	3.7	32.8	1.00	0.88	1.28	34.4
Approach		1441	16.0	0.888	39.0	LOS C	26.4	208.5	0.93	0.99	1.18	50.7
West: Bakers lane												
10	L2	369	31.1	0.863	47.8	LOS D	17.7	156.8	1.00	0.99	1.29	35.9
11	T1	2	0.0	0.863	41.9	LOS C	17.7	156.8	1.00	0.99	1.29	32.8
12	R2	217	31.1	0.600	38.1	LOS C	8.3	73.4	0.94	0.82	0.94	41.6
Approach		588	30.9	0.863	44.2	LOS D	17.7	156.8	0.98	0.92	1.16	38.1
All Vehicles		3575	16.3	0.917	39.0	LOS C	26.4	208.5	0.91	0.92	1.12	47.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	36.8	LOS D			0.93	0.93

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

MOVEMENT SUMMARY

Site: 104 [[Scen.1.1] 2025 Mamre Road x Bakers Lane_AM + OP]

Config: 2025 Sequence 1B
Traffic: 2018 Survey + 2025 Growth + MWP1 + MP2 + SL (v3)
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 80 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (1,000m)												
1	L2	317	29.6	0.419	20.2	LOS B	8.0	70.4	0.69	0.77	0.69	47.8
2	T1	958	14.4	0.851	33.2	LOS C	19.3	151.9	0.97	0.94	1.14	56.4
3	R2	85	2.5	0.247	37.8	LOS C	2.7	19.6	0.84	0.75	0.84	47.1
Approach		1360	17.2	0.851	30.5	LOS C	19.3	151.9	0.89	0.89	1.01	53.8
East: Bakers Lane (440m)												
4	L2	46	2.3	0.091	27.4	LOS B	1.3	9.5	0.75	0.71	0.75	50.8
5	T1	1	0.0	0.091	21.8	LOS B	1.3	9.5	0.75	0.71	0.75	40.7
6	R2	418	4.3	0.918	58.0	LOS E	10.2	73.9	1.00	1.10	1.61	35.7
Approach		465	4.1	0.918	54.8	LOS D	10.2	73.9	0.97	1.06	1.52	37.0
North: Mamre Road (750m)												
7	L2	669	3.3	0.749	25.5	LOS B	21.6	155.6	0.87	0.87	0.89	49.1
8	T1	718	19.2	0.656	26.1	LOS B	12.4	100.7	0.92	0.79	0.92	60.2
9	R2	526	30.0	0.908	56.2	LOS D	13.0	114.1	1.00	1.06	1.53	33.8
Approach		1914	16.6	0.908	34.2	LOS C	21.6	155.6	0.92	0.89	1.08	47.9
West: Bakers lane												
10	L2	224	30.5	0.477	29.7	LOS C	7.2	63.5	0.85	0.80	0.85	42.0
11	T1	1	0.0	0.477	23.8	LOS B	7.2	63.5	0.85	0.80	0.85	39.7
12	R2	136	30.2	0.704	46.1	LOS D	5.6	49.4	1.00	0.87	1.16	39.3
Approach		361	30.3	0.704	35.8	LOS C	7.2	63.5	0.90	0.83	0.97	40.8
All Vehicles		4100	16.6	0.918	35.4	LOS C	21.6	155.6	0.92	0.91	1.10	47.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		211	34.3	LOS D			0.93	0.93

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

MOVEMENT SUMMARY

Site: 104 [[Scen.2] 2026 Sequence 2 Southern Link Road_AM + OP]

Config: Southern Link Road
Traffic: 2018 Survey + 2026 Growth + MWP1,2 + MP2 + SL
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	317	29.6	0.286	10.0	LOS A	5.2	45.4	0.36	0.66	0.36	51.1
2	T1	1060	15.7	0.822	40.3	LOS C	30.2	239.8	0.96	0.91	1.03	47.1
3	R2	86	2.4	0.113	48.9	LOS D	2.1	14.7	0.85	0.73	0.85	36.6
Approach		1463	17.9	0.822	34.2	LOS C	30.2	239.8	0.82	0.84	0.88	47.1
East: SLR (440m)												
4	L2	46	2.3	0.048	15.8	LOS B	1.0	7.1	0.43	0.68	0.43	55.8
5	T1	1	0.0	0.002	50.9	LOS D	0.0	0.2	0.91	0.52	0.91	37.4
6	R2	421	4.3	0.701	60.4	LOS E	12.1	87.7	1.00	0.85	1.05	37.1
Approach		468	4.0	0.701	55.9	LOS D	12.1	87.7	0.94	0.83	0.99	38.1
North: Mamre Road (760m)												
7	L2	676	3.3	0.558	11.2	LOS A	10.2	73.6	0.49	0.74	0.49	63.7
8	T1	759	19.7	0.558	30.5	LOS C	16.7	136.6	0.83	0.74	0.83	52.1
9	R2	526	30.0	0.826	62.5	LOS E	16.4	144.2	1.00	0.93	1.19	33.0
Approach		1961	16.8	0.826	32.4	LOS C	16.7	144.2	0.76	0.79	0.81	47.4
West: Site Access												
10	L2	224	30.5	0.293	21.0	LOS B	7.0	61.5	0.61	0.73	0.61	46.6
11	T1	1	0.0	0.011	59.8	LOS E	0.1	0.4	0.97	0.57	0.97	30.0
12	R2	136	30.2	0.820	70.7	LOS F	8.7	76.7	1.00	0.93	1.28	28.1
Approach		361	30.3	0.820	39.8	LOS C	8.7	76.7	0.76	0.80	0.86	38.3
All Vehicles		4254	16.9	0.826	36.3	LOS C	30.2	239.8	0.80	0.81	0.86	45.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P11	South Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P12	South Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P31	North Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P32	North Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		316	54.3	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 104 [[Scen.2] 2026 Sequence 2 Southern Link Road_PM + OP]

Config: Southern Link Road
Traffic: 2018 Survey + 2026 Growth + MWP1,2 + MP2 + SL
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	101	29.2	0.078	7.0	LOS A	0.6	5.7	0.17	0.59	0.17	53.5
2	T1	865	14.0	0.660	34.1	LOS C	21.1	165.6	0.90	0.79	0.90	50.2
3	R2	28	0.0	0.153	69.6	LOS E	0.8	5.9	0.99	0.69	0.99	30.1
Approach		995	15.1	0.660	32.4	LOS C	21.1	165.6	0.82	0.76	0.82	49.8
East: SLR (440m)												
4	L2	56	5.7	0.063	12.0	LOS A	0.9	6.5	0.34	0.67	0.34	59.0
5	T1	1	0.0	0.002	50.9	LOS D	0.0	0.2	0.91	0.52	0.91	37.4
6	R2	552	5.2	0.513	44.9	LOS D	13.4	97.8	0.88	0.82	0.88	42.6
Approach		608	5.2	0.513	41.9	LOS C	13.4	97.8	0.83	0.81	0.83	43.5
North: Mamre Road (760m)												
7	L2	193	9.8	0.645	39.1	LOS C	20.9	163.0	0.85	0.85	1.21	46.9
8	T1	1198	16.0	0.645	31.3	LOS C	21.5	171.1	0.86	0.79	0.95	51.3
9	R2	167	30.2	0.657	68.0	LOS E	5.1	45.1	1.00	0.82	1.10	31.7
Approach		1558	16.8	0.657	36.3	LOS C	21.5	171.1	0.88	0.80	1.00	47.6
West: Site Access												
10	L2	389	29.5	0.524	20.0	LOS B	12.9	113.5	0.67	0.77	0.67	47.3
11	T1	2	0.0	0.022	60.3	LOS E	0.1	0.8	0.97	0.59	0.97	34.1
12	R2	237	28.4	0.635	50.7	LOS D	12.6	109.9	0.95	0.83	0.95	33.2
Approach		628	29.0	0.635	31.7	LOS C	12.9	113.5	0.78	0.79	0.78	41.5
All Vehicles		3789	16.5	0.660	35.4	LOS C	21.5	171.1	0.84	0.79	0.89	46.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P11	South Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P12	South Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P31	North Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P32	North Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		316	54.3	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 104 [[Scen.2] 2026 Sequence 2 Southern Link Road_AM]

Config: Southern Link Road
Traffic: 2018 Survey + 2026 Growth + MWP1,2 + MP2 + SL
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	296	31.3	0.268	9.6	LOS A	4.6	40.6	0.34	0.65	0.34	50.6
2	T1	1060	15.7	0.821	40.2	LOS C	30.2	239.6	0.96	0.91	1.03	47.1
3	R2	86	2.4	0.113	48.9	LOS D	2.1	14.7	0.85	0.73	0.85	36.6
Approach		1442	18.1	0.821	34.4	LOS C	30.2	239.6	0.83	0.84	0.88	47.0
East: SLR (440m)												
4	L2	46	2.3	0.048	15.4	LOS B	1.0	7.0	0.43	0.68	0.43	56.1
5	T1	1	0.0	0.002	50.9	LOS D	0.0	0.2	0.91	0.52	0.91	37.4
6	R2	421	4.3	0.701	60.4	LOS E	12.1	87.7	1.00	0.85	1.05	37.1
Approach		468	4.0	0.701	55.9	LOS D	12.1	87.7	0.94	0.83	0.98	38.1
North: Mamre Road (760m)												
7	L2	676	3.3	0.558	11.2	LOS A	10.1	73.5	0.49	0.74	0.49	63.7
8	T1	759	19.7	0.558	30.5	LOS C	16.7	136.6	0.83	0.74	0.83	52.1
9	R2	505	31.0	0.797	60.3	LOS E	15.3	135.8	1.00	0.91	1.15	33.3
Approach		1940	16.9	0.797	31.5	LOS C	16.7	136.6	0.76	0.78	0.79	47.8
West: Site Access												
10	L2	216	31.2	0.283	20.8	LOS B	6.6	58.9	0.60	0.72	0.60	46.3
11	T1	1	0.0	0.011	59.8	LOS E	0.1	0.4	0.97	0.57	0.97	30.0
12	R2	127	31.4	0.775	68.3	LOS E	8.0	70.8	1.00	0.90	1.21	28.4
Approach		344	31.2	0.775	38.5	LOS C	8.0	70.8	0.75	0.79	0.83	38.4
All Vehicles		4195	17.1	0.821	35.8	LOS C	30.2	239.6	0.80	0.81	0.85	45.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P11	South Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P12	South Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P31	North Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P32	North Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		316	54.3	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 104 [[Scen.2] 2026 Sequence 2 Southern Link Road_PM]

Config: Southern Link Road
Traffic: 2018 Survey + 2026 Growth + MWP1,2 + MP2 + SL
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mamre Road (500m)												
1	L2	94	31.5	0.073	6.8	LOS A	0.6	5.3	0.17	0.58	0.17	52.5
2	T1	865	14.0	0.631	32.3	LOS C	20.5	161.0	0.87	0.77	0.87	51.2
3	R2	28	0.0	0.153	69.6	LOS E	0.8	5.9	0.99	0.69	0.99	30.1
Approach		987	15.2	0.631	30.9	LOS C	20.5	161.0	0.81	0.75	0.81	50.6
East: SLR (440m)												
4	L2	56	5.7	0.063	11.7	LOS A	0.9	6.3	0.33	0.67	0.33	59.3
5	T1	1	0.0	0.002	50.9	LOS D	0.0	0.2	0.91	0.52	0.91	37.4
6	R2	552	5.2	0.543	46.8	LOS D	13.7	100.4	0.90	0.83	0.90	41.8
Approach		608	5.2	0.543	43.6	LOS D	13.7	100.4	0.85	0.81	0.85	42.8
North: Mamre Road (760m)												
7	L2	193	9.8	0.620	37.1	LOS C	20.2	157.4	0.82	0.83	1.17	47.9
8	T1	1198	16.0	0.620	29.5	LOS C	20.9	166.3	0.84	0.77	0.92	52.4
9	R2	160	31.6	0.633	67.6	LOS E	4.9	43.3	1.00	0.81	1.08	31.6
Approach		1551	16.8	0.633	34.4	LOS C	20.9	166.3	0.85	0.78	0.97	48.5
West: Site Access												
10	L2	369	31.1	0.492	19.4	LOS B	11.8	105.0	0.65	0.76	0.65	47.0
11	T1	2	0.0	0.022	60.3	LOS E	0.1	0.8	0.97	0.59	0.97	34.1
12	R2	217	31.1	0.634	52.1	LOS D	11.7	103.7	0.96	0.83	0.96	32.3
Approach		588	30.9	0.634	31.6	LOS C	11.8	105.0	0.77	0.79	0.77	41.0
All Vehicles		3735	16.7	0.634	34.5	LOS C	20.9	166.3	0.83	0.78	0.88	46.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P11	South Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P12	South Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P31	North Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95
P32	North Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		316	54.3	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.