Prepared for

ALTIS PROPERTY PARTNERS

Traffic Impact Assessment

Proposed Warehouse Development
Lot 8A - First Estate, Mamre West Precinct

Ref: 0612r01v2
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Info@asongroup.com.au | +61 2 9083 6601 | Suite 1202, Level 12, 220 George Street. Sydney, NSW 2000

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Client: Altis Property Partners c/- Hansen Yuncken

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Revision History

Revision	Date	Details	Author	Approved by
-	05/06/2018	Draft	J. Laidler	T. Lewis
1	10/07/2018	Issue I	T. Lewis	T. Lewis
2	08/08/2018	Issue II	T. Lewis	T. Lewis

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Appendices

1 Introduction

1.1 Overview

Ason Group has been engaged by Hansen Yuncken, acting as Project Managers on behalf of the client Altis Property Partners (Altis), to prepare a Traffic Impact Assessment (TIA) in relation to Lot 8A of the First Estate Precinct at 585-649 Mamre Road, Orchard Hills.

The subject site is Lot 8 (the Site) of the Altis Precinct Master Plan site located at 585-649 Mamre Road, Orchard Hills (the Altis Precinct), known as First Estate. This First Estate Precinct itself comprises the southern portion of a larger precinct referred to as the Mamre West Land Investigation Area (or the Mamre West Precinct). A Location Plan is presented in **Figure 1**, which provides an appreciation of the Mamre West Precinct, and its location within the new Western Sydney Priority Growth Area.

This TIA report addresses the relevant traffic, transport and parking implications of the development, including compliance with relevant State and Local Government controls and Australian Standards. This report also builds on the following Traffic Impact Assessments undertaken by Ason Group relating to the Precinct:

- *Mamre West Land Investigation Area, Planning Proposal Mamre Road, Western Sydney Priority Growth Area*, prepared by Ason Group (ref: 0124r03v3) and dated 23 February 2016 (the Planning Proposal TIA).
- *Stage 1 SSDA, Proposed Warehouse and Logistics Hub; 585-649 Mamre Road, Orchard Hills, Western Sydney Priority Growth Area* (the SSD TIA), prepared by Ason Group (ref: 0124r04v2) and dated 5 April 2016. This report was submitted as a State Significant Development (SSD) application for Stage 1 (Lots 7, 8 and internal roads) of the Altis Precinct, and
- *Proposed Training Academy and Emergency Services Facility – FRNSW; Lot 2, 585-649 Mamre Road, Orchard Hills* (the Lot 2 TIA), prepared by Ason Group (ref: 0287r01v2) and dated 22 September 2016. This report was submitted under Part 5 of the Environmental Planning and Assessment Act 1979.
- *Proposed First Estate Development – Lot 8, 585-649 Mamre Road, Orchard Hills* (Lot 6 Report), prepared by Ason Group (ref:0395r01v2) and dated 17 May 2017.

The history of the site, including the access and future intersection operation is discussed in further detail in the following sections to provide context to this application.

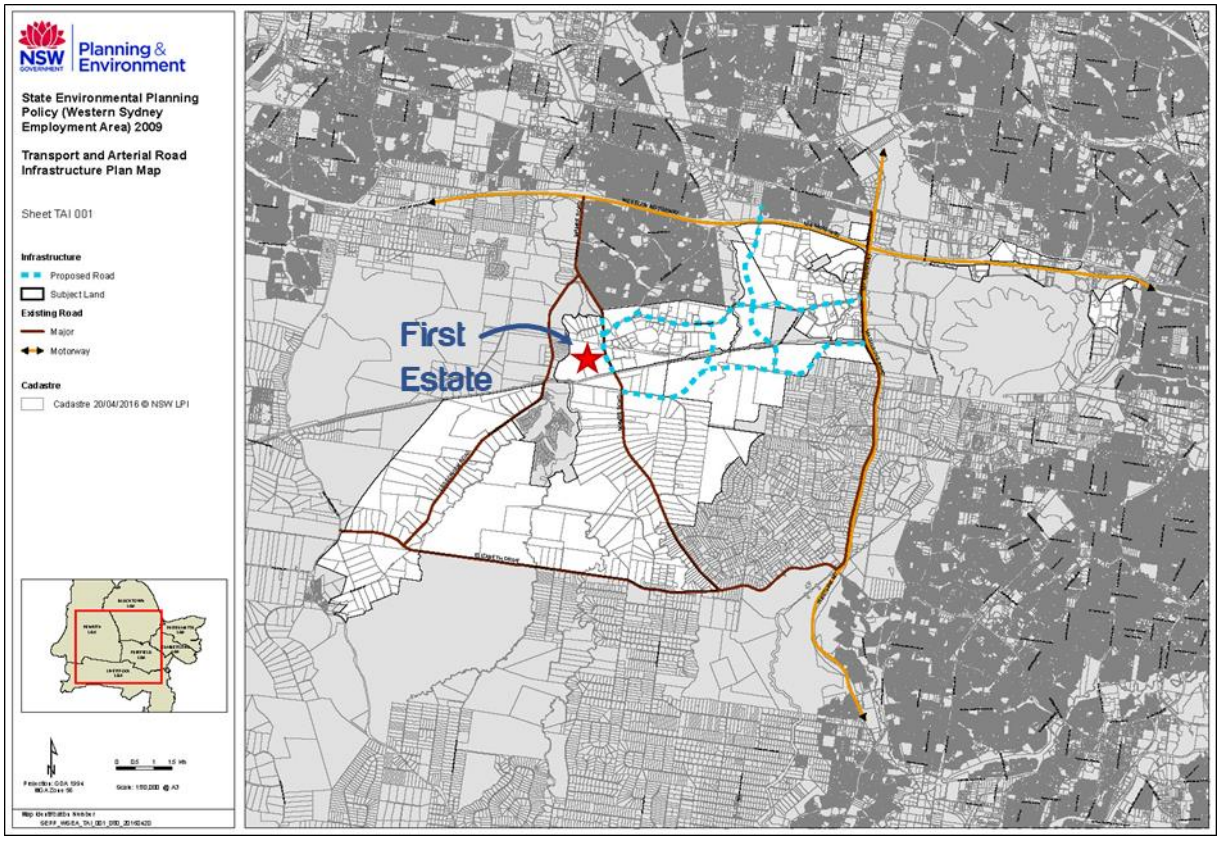


Figure 1: Site Context Plan

1.2 Summary of Proposed Development

1.2.1 Built Form

The development for which approval is now sought is detailed in the EIS and generally seeks approval for the construction of a warehouse and distribution facilities for IMCD (Lot 8A2) and a speculative warehouse. Lot 8A1 (the speculative warehouse) does not have a specific tenant at this time. A summary of the proposed building floor areas and parking provision is provided in **Table 1**.

Table 1: Development Yield Summary

Site	Floor Areas (m^2 GFA)			Parking Spaces
	Warehouse	Ancillary Office	Total	
Lot 8A1	11,980	400	12,380	49
Lot 8A2	5,500	600	6,100	34
Total	17,480	1,000	18,480	83

1.2.2 Site Access Arrangements

Access to the site is proposed via several vehicular crossings to the Estate Roads of varying widths. Commercial vehicle hardstand areas are intended to cater for access by B-doubles. Accordingly, it is expected that all vehicular crossovers to the hardstand will cater for B-double access.

Operationally, it is anticipated that B-doubles will enter Lot 8A2 via the northern access and then traverse southbound to the exit on the southern boundary.

Similarly, the eastern access to the Lot 8A1 hardstand will be designated as an Entry to encourage a one-way movement through the hardstand area and facilitate 'right-hand-down' access to the dock faces.

Length of stay within each respective loading bay will vary and appropriate measures shall be in place to ensure that loading / unloading activities do not obstruct the use of adjoining loading areas. As such, subject to any specific restrictions in place, access to all loading docks shall be maintained.

Car parking areas are designed to be accessed by cars and other light passenger vehicles. However, the Lot 8A1 car park is also to cater for fire truck circulation around the perimeter of the site.

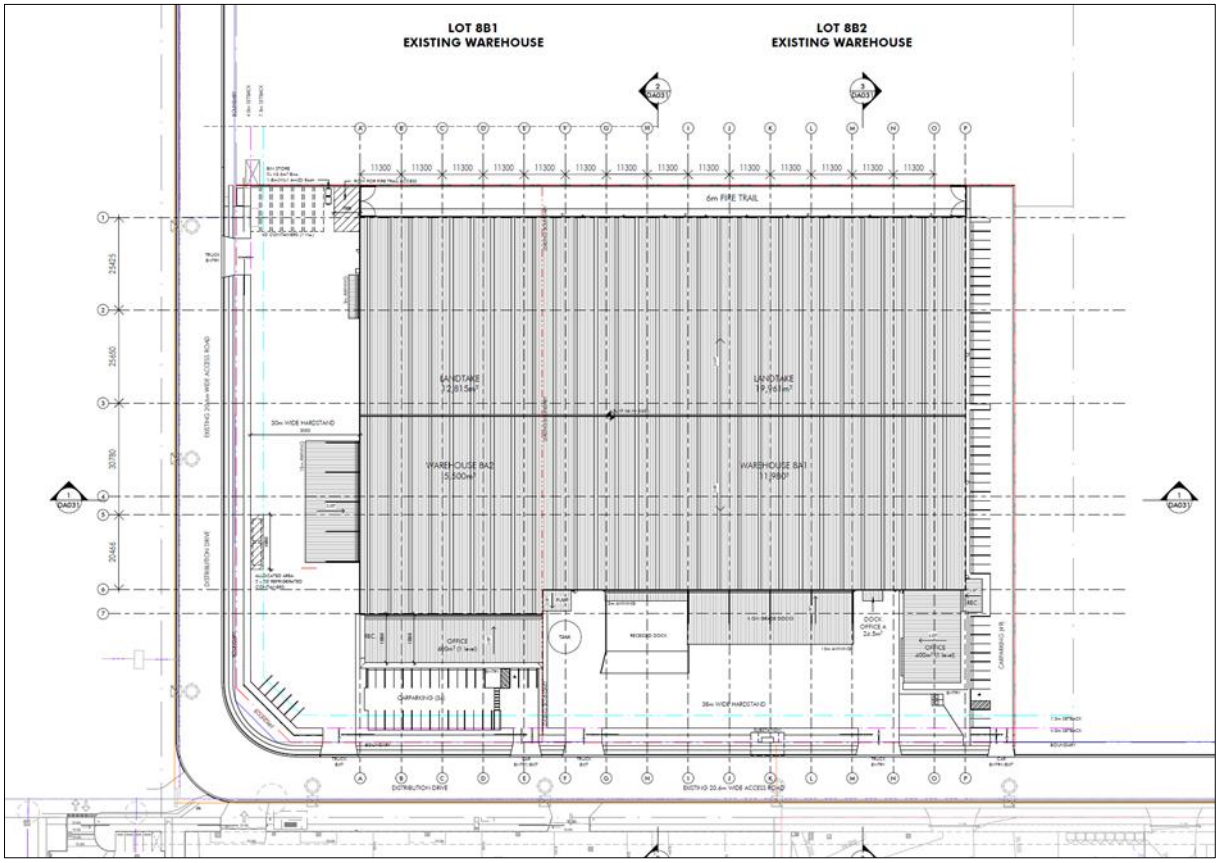


Figure 2: Site Plan

1.3 Report Structure

The remainder of this report is structured as follows:

- Section 2 provides the summary of the planning context associated with the Altis Precinct and the associated interim access arrangements.
- Section 3 describes the site, existing road network and accessibility to alternative transport modes
- Section 4 outlines the relevant parking requirements.
- Section 5 describes the traffic impacts of the proposed development including projected trip generation.
- Section 6 describes the access, internal configuration of the proposed car parking and loading aspects of the development
- Section 7 provides a summary of the key traffic and parking assessment findings.

2 Planning Context

The application has been lodged having regard to the approved Mamre West development (SSDA 7173) and the subsequent MOD Applications considered by the Department of Planning and Environment (DP&E). These previous Concept Plan and subsequent Modification Application approvals set out the development principles including estate infrastructure, overall warehouse / industrial floor space, car parking provision rates and principles regarding future access to the regional road network.

2.1 STG1 Planning Proposal

The Mamre West Land Investigation Area has been the subject of investigations for rezoning. Having regard for the plan at **Figure 2**, the area consists largely of 3 components:

- Stage 1 flood-free area to the south (referred to as STG1 and consists primarily of the Altis Precinct).
- Stage 2 flood-free area to the north (referred to as STG2 and the *Potential Stage 2 Area*).
- The remaining area of the Precinct that is flood prone.

STG1 and STG2 are 47.8 hectares and 39.6 hectares in site area, respectively, and represent the 87.4 hectares of developable (flood-free) area within the investigation area. Based primarily on feedback from residents living within the STG2 area, NSW Department of Planning & Environment (DPE) reduced the Planning Proposal to the STG1 study area, with STG2 to be potentially the subject of a future Planning Proposal. Subsequently, the Planning Proposal was approved and the STG1 area has been rezoned for IN1 use.

It should be noted that the Planning Proposal to DPE was supported by a TIA report titled the *Mamre West Land Investigation Area, Planning Proposal Mamre Road, Western Sydney Priority Growth Area,* prepared by Ason Group in February 2016.

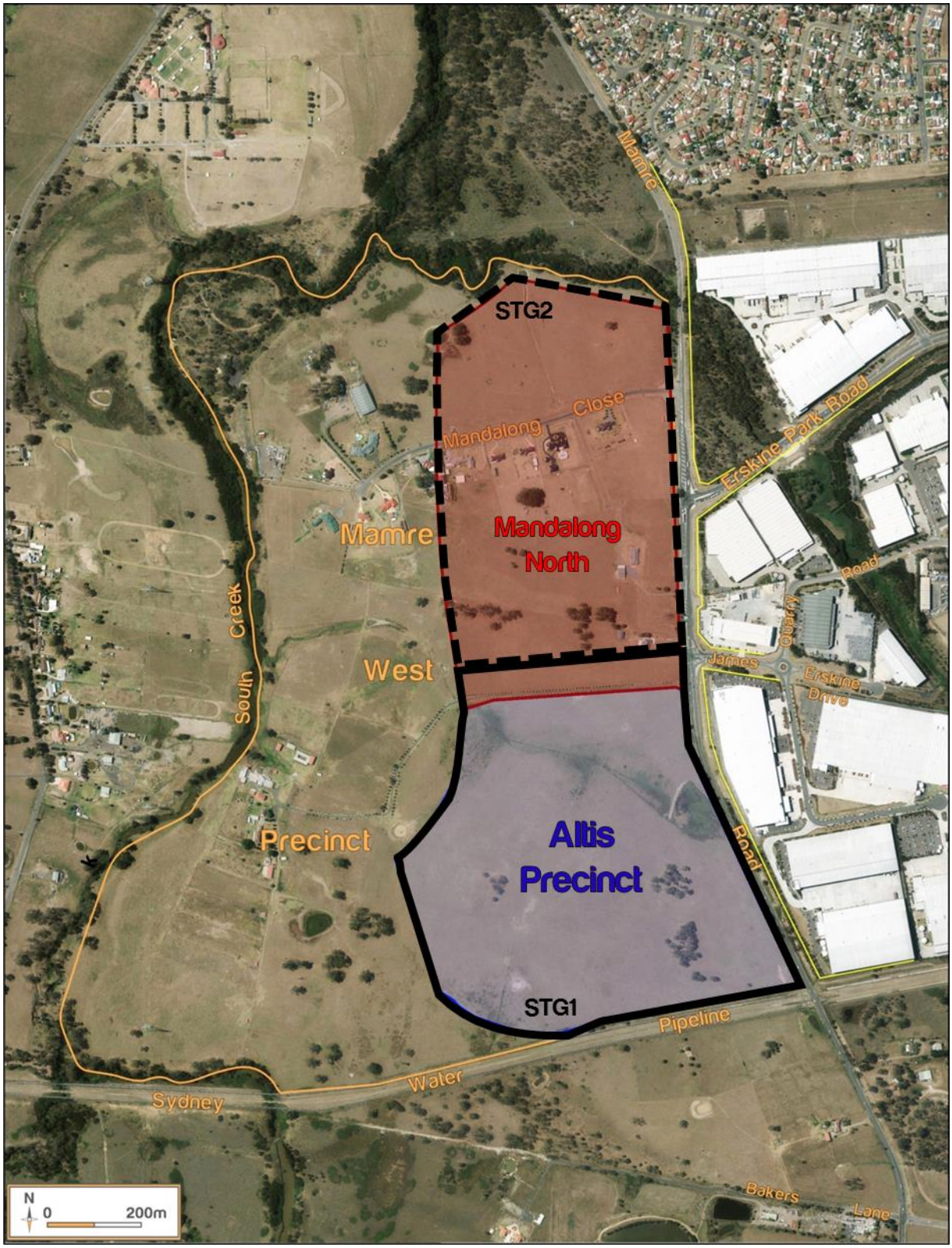


Figure 3: Mamre West Land Investigation Area Plan

2.2 Masterplan Access Strategy

In accordance with the Planning Agreement for the Planning Proposal, the following summarises the key components of the agreed Access Strategy for the STG1 area; it should be noted that the Access Strategy was developed having consideration for the upgrading of Mamre Road by NSW Roads & Maritime Services (RMS) to a Principal Arterial Road:

- Primary Access to be provided via a new western connection to the existing signalised T-intersection of Mamre Road with James Erskine Drive (the Primary Access intersection).
- Secondary Access to the Precinct to be provided via a left-in / left-out priority-controlled intersection with Mamre Road located approximately 500 metres south of the existing intersection with James Erskine Drive (the Secondary Access intersection).
- Internal industrial collector link roads connecting the Altis Precinct to northern STG1 areas and onwards to the Primary Access intersection.

Regarding interim access to the Altis Precinct in advance of the delivery of the Primary Access intersection (which requires the involvement of several third-party landowners) discussions with RMS have been ongoing. The outcome of the most recent discussions is the construction of a (now operational) temporary (interim) signalised intersection in the location of the future Secondary Access intersection. This Planning Agreement includes clauses that will ensure that the interim signalised intersection is removed once RMS upgrades Mamre Road to a principal arterial and the STG1 area is connected to the Primary Access intersection.

2.3 Future Road Network Considerations

It is worth noting that the Planning Proposal TIA provided a preliminary assessment of the Primary Access intersection – and the other study network intersection of Mamre Road with Erskine Park Road – under 2026 future year (with development) conditions. However, during the pre-lodgement consultation phase for the Planning Proposal, RMS advised that a Mamre Road Upgrade study was being undertaken in response to:

- Growth within the broader WSEA (such as the subject Planning Proposal), and
- Future traffic demands on Mamre Road arising directly and indirectly from the proposed Western Sydney Airport at Badgerys Creek.

The study is ongoing; however, RMS has advised:

- That Mamre Road is earmarked for classification as a Principal Arterial Road and that its main role would be to cater for 'through traffic' – as opposed to provide access to development – and would ideally achieve an 80 km/hr speed environment.
- Whilst upgrades to key Mamre Road intersections are yet to be committed, the Mamre Road upgrade would include (as a minimum) duplication of the existing 2-lane sections of Mamre Road, such as the section adjacent to the Site that has resulted in the proposed dedication of a 20-metre wide strip along the eastern boundary of the Altis Precinct to RMS. That dedication requirement has subsequently reduced to only 10 metres.

Accordingly, the Planning Proposal TIA provided an intersection layout for the Primary Access intersection and upgrades to the existing intersection of Mamre Road with Erskine Park Road that were 'indicative only', recognising that the eventual infrastructure works (in the first instance at least) would be determined by the Mamre Road Upgrade study. It is understood that RMS raises no objections to the approach of relying on the Mamre Road Upgrade study to identify future necessary upgrades.

2.4 First Estate Master Plan

The Precinct Masterplan is shown in **Figure 3** with the corresponding land use assumptions provided in **Table 1**. These yields have been adopted for all previous traffic assessments and form the basis of the interim and future site access and network operation in the vicinity.

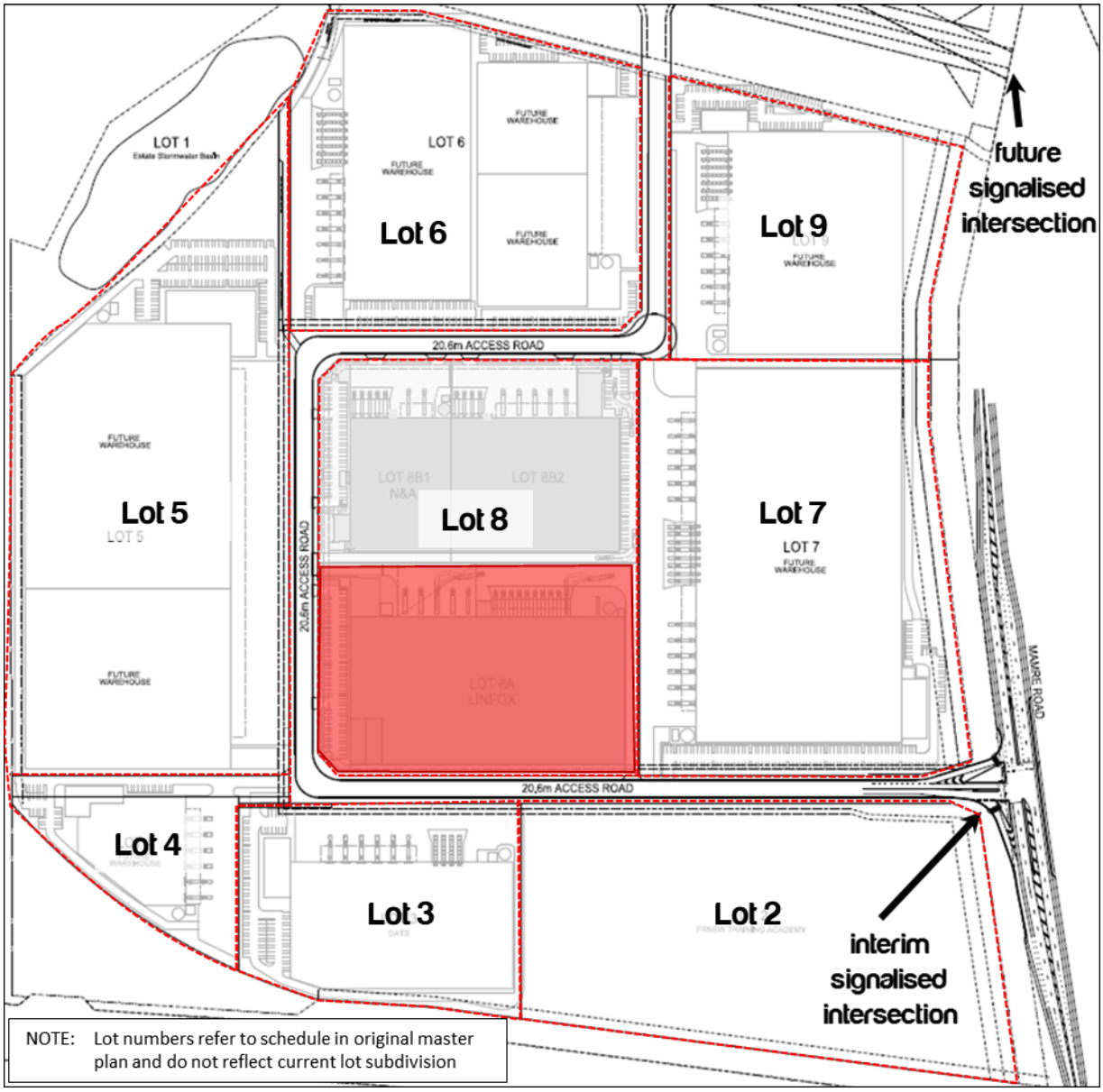


Figure 4: Altis Precinct Master Plan

The RMS *Technical Direction 2013/04a – Guide to Traffic Generating Developments; Updated traffic surveys* (RMS Technical Direction) provides surveys of industrial precincts across Sydney, including specific data for development within the Erskine Park Industrial Area and therefore provides the most appropriate rates for assessment. The RMS Technical Direction provides the following rates in relation to the Erskine Park Industrial Area:

- 0.134 trips per 100m^2 GFA (total building, warehouse and office) during the morning peak hour
- 0.139 trips per 100m^2 GFA during the evening peak hour

This TIA report adopts trip rate assumptions from the RMS Technical Direction as stipulated above, with application of these rates to the adopted Precinct development yields summarised in Table 2.

Table 2: Master Plan Forecast Traffic Generation

Lot	Warehouse Ref:	Total Built Area (m^2)	AM Trips	PM Trips
Lot 1	Bio retention basis	n/a	-	-
Lot 2	FRNSW	-	91	91
Lot 3	Warehouse3	16,000	21	22
Lot 4	Warehouse 4	4,250	6	6
Lot 5	Warehouse 5a	22,200	30	31
	Warehouse 5b	28,600	38	40
Lot 6	Warehouse 6A	6,900	9	10
	Warehouse 6B	8,200	11	11
	Warehouse 6C	20,200	27	28
Lot 7	Warehouse 7	41,500	56	58
Lot 8	Warehouse 8A	11,400	15	16
	Warehouse 8B	9,400	13	13
	Warehouse 8C	22,160	30	31
Lot 9	Warehouse 9	21,200	28	29
Total			**375**	**386**

It is noted that, under this Precinct wide assessment, Lot 8 was assumed to have a potential development floor area of some 42,960m^2 GFA. Accordingly, the approved Precinct-wide modelling adopts a traffic generation of 58 and 60 vehicles per hour during morning and evening peak periods, respectively, for Lot 8.

2.5 Proposed Modifications

Whilst the above relates to the original Concept Plan approval, it is noted that a number of subsequent MOD applications for Mamre West have been approved/proposed, as well as a number of DAs for lots within the Estate. The key elements of Lot 8 and in particular this application is summarised in the table below. This provides a summary of the floor areas and resultant traffic generation

Table 3: Lot 8 Development Components

Lot	Area / Measure	Approved Master Plan	Approved MOD 1	Approved MOD 2
Lot 8 North	GFA (m^2)	22,060	19,744	19,744
	Trip Generation (veh/hr)	30-31	27	27
Lot 8 South	GFA (m^2)	20,900	21,725	21,725
	Trip Generation (veh/hr)	28-29	29-30	29-30

Consistency with the above planned traffic generation for Lot 8 as a result of the Proposal is discussed further in Section 5.1.

2.6 Interim Access

As mentioned, an interim signal intersection between Mamre Road and the proposed industrial access road – designed and constructed in accordance with Austroads and RMS requirements – has been approved (as part of a separate application) to provide access to the Altis Precinct until completion of, and connection to, the Primary Access intersection. Based on preliminary SIDRA modelling, the following summarises key characteristics of the intersection design.

- Southbound on Mamre Road:
  - An auxiliary southbound lane of about 240 metres length, comprising a 100-metre approach lane and a 120-metre departure lane, plus approximately 20 metres through the intersection.
  - A dedicated right-turn bay on the northern approach of 130 metres length.
- Northbound on Mamre Road – An auxiliary northbound lane of about 340 metres length, comprising a 200-metre approach lane and a 120-metre departure lane.
- Site Access Road – 2 approach lanes, a full right-turn lane and a 70 metre left-turn short lane.

This intersection is currently operational.

2.7 Interim Access Intersection Performance

The following analysis assesses the performance of the approved interim signalised intersection using SIDRA modelling. In this regard, SIDRA modelling outputs a range of performance measures, in particular:

- Degree of Saturation (DOS) – The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity. As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is usual to attempt to keep DOS to less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.
- Average Vehicle Delay (AVD) – The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- Level of Service (LOS) – This is a comparative measure that provides an indication of the operating performance, based on AVD.

A recommended baseline for assessment as per the RMS Guide is provided in Table 4

Table 4: Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

Results of the SIDRA analysis of the interim intersection under the full development of the Altis Precinct are presented in **Table 3**.

Table 5: Intersection Operation Performance

Scenario	Period	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
2026 Baseline with Altis Precinct Master Plan	AM	0.949	20.9	B
	PM	0.741	14.7	B

The SIDRA results demonstrate that the proposed interim signal intersection is expected to operate with a Level of Service B based on the Altis Precinct development yield outlined in Table 3. These Level of Service indicate acceptable delays and spare capacity.

3 Existing Conditions

3.1 Road Network

With reference to **Figure 5**, the key local roads influenced by the application include:

- Mamre Road – an arterial road servicing traffic between the Great Western Highway and M4 to the north and Elizabeth Drive to the south. In the vicinity of the Precinct, Mamre Road generally provides 2 lanes for two-way traffic, with additional through movement and turning infrastructure at key intersections, specifically at Erskine Park Road and James Erskine Drive. Mamre Road has a posted speed limit of 80km/hr.
- Erskine Park Road – a sub-arterial road servicing traffic between the Great Western Highway and M4 to the north, and Mamre Road to the south-west, as well as linking Lenore Drive (Erskine Park Link Road) to the M7 to the east. Erskine Park Road provides 4 lanes for two-way traffic north-east from the intersection of Mamre Road. Erskine Park Road has a posted speed limit of 70km/hr.
- James Erskine Drive – a local industrial access road, providing access for the Erskine Park Industrial Precinct, which lies to the east of Mamre Road adjacent to the Precinct. James Erskine Drive provides 4 lanes for two-way traffic and provides additional turning infrastructure on the approach to Mamre Road. On-street parking is permitted; however, demand for this parking is low and therefore rarely used.

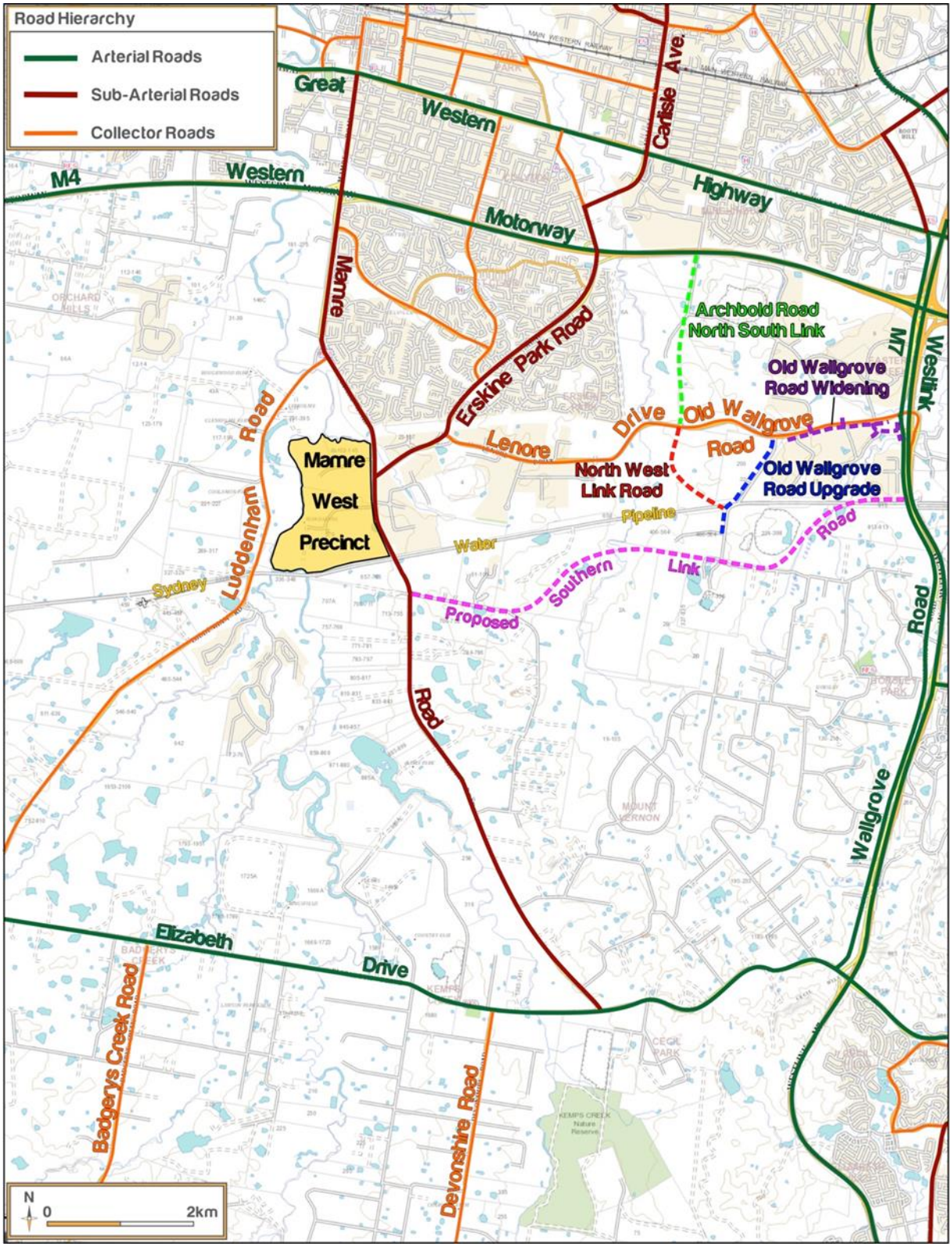


Figure 5: Location Plan & Road Hierarchy

3.2 Public Transport

3.2.1 Bus Services

The existing bus services within the vicinity of the Site are shown **Figure 6**. It is evident that the Site is not directly serviced by frequent public transport operations at this time. Notwithstanding, the opportunities for future connections have been identified and are discussed further below.

3.2.2 Future Bus Service Opportunities

While it is apparent that the Site will be well served by a future road network, it is nonetheless important that people have the opportunity to use public transport, which requires significant improved connectivity to the broader area in the first instance. This could be possible through an extension of the 779 bus route to include stops within the future internal road network of the Site. The mentioned route provides a key connection to the St Mary's railway station and to the broader transport network.

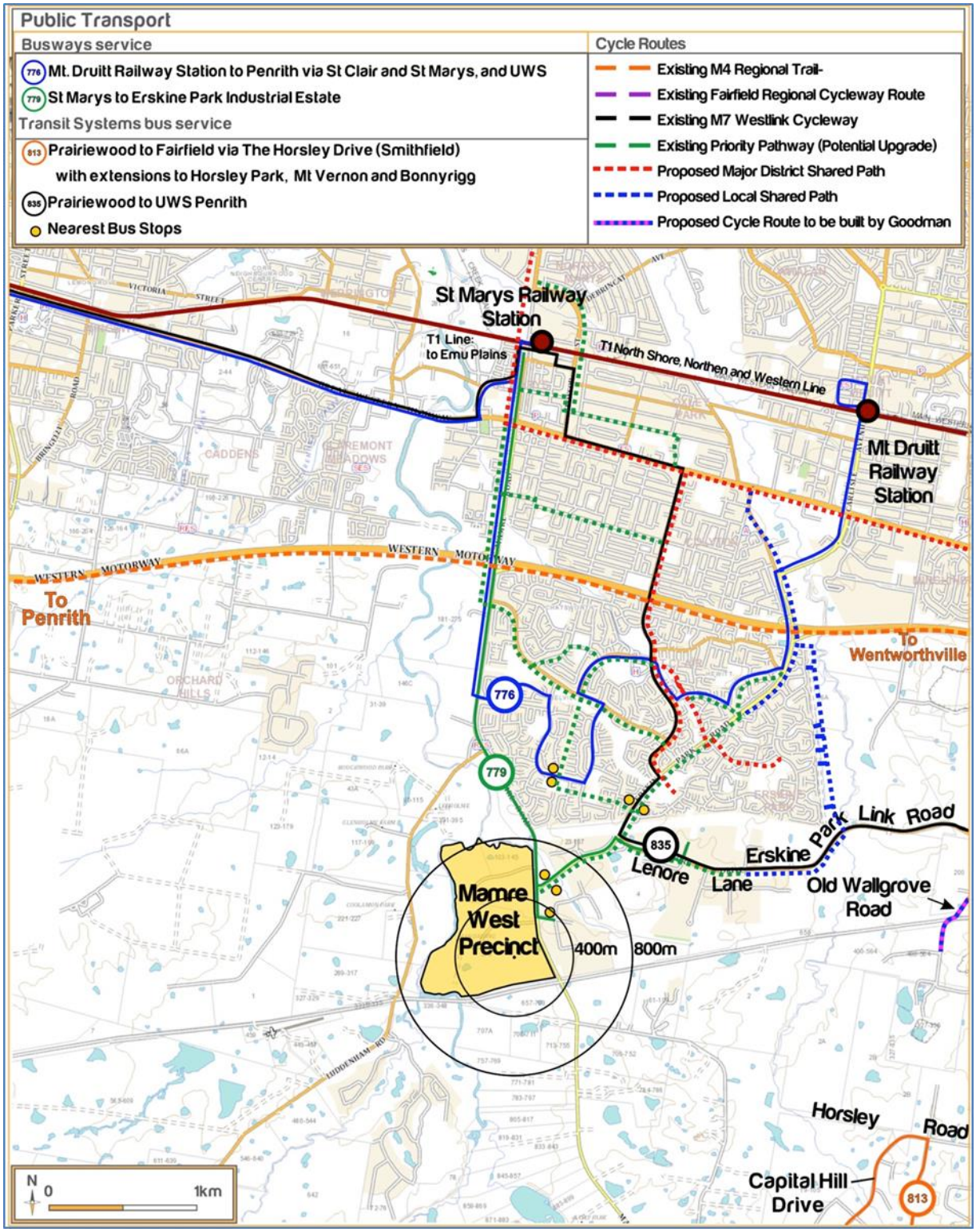


Figure 6: Public Transport Services & Cycling Routes

The planning of bus services in Sydney is governed by the NSW Service Planning Guidelines, which aim to establish Strategic Transport Corridors and a hierarchy of bus route types that:

- link to regional centres (such as Penrith and Mt Druitt).
- pass through patronage generators such as district centres, TAFE colleges, hospitals and universities.
- connect with other transport modes (trains, ferries and other buses).
- are multifunctional (serving journeys to work, education, shopping and recreation).
- are direct and frequent.
- meet the network planning principles.

It is also the case that the establishment of public transport services as early as possible in the development stages of the area is important to achieve a culture of public transport use from the outset. To make public transport a viable choice in the study area, the services should ideally:

- integrate with existing bus services in the area.
- connect to regional centres of Penrith, Mt Druitt and Blacktown.
- in the long term connect to areas such as Leppington in the South West Growth Centre, Prairiewood and the Liverpool to Parramatta T-Way.

3.3 Cycling

There are existing opportunities and infrastructure for cyclists to access the Site via Mamre Road. Bicycle lanes are provided along Erskine Park Road and sections of Mamre Road, in addition to carriageway shoulders that could also be utilised by cyclists. Notwithstanding, there are opportunities to improve cycling infrastructure through the provision of shared paths along Mamre Road fronting the Site that could be connected to paths along Erskine Park Road.

4 Parking Requirements

4.1 Car Parking

4.1.1 Car Parking Requirement

The *Mamre West Land Investigation Area Development Control Plan* (the Precinct DCP), and the Master Plans conditions of consent requires car parking for warehouse developments to be provided at the following rates:

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

Application of these rates to the floor areas proposed is summarised in Table 6.

Table 6: Car Parking Provision and Requirements

Site	Floor Area (m^2 GFA)	DCP Parking Rate	Parking Required[1]	Parking Provided
Lot 8A1 sub-total	**12,380**		**50**	**49**
Warehouse	11,980	1 space / 300 m^2 GFA	40	
Office	400	1 space / 40 m^2 GFA	10	
Lot 8A2 sub-total	**6,100**		**33**	**34**
Warehouse	5,500	1 space / 300 m^2 GFA	18	
Office	600	1 space / 40 m^2 GFA	15	
TOTAL Lot 8A	**18,480**		**83**	**83**

Notes: 1) No. of spaces rounded to nearest whole number

The development includes provision of a total of 83 car spaces which satisfies the requirements of the Precinct DCP rates and outlined within the conditions. Accordingly, the parking proposed will accommodate future demands off-street and is consistent with relevant planning controls.

Accordingly, the proposed car parking provision is acceptable.

4.1.2 Accessible Parking

Council's DCP at Part C10 – Transport, Access and Parking, Table C10.2 – requires accessible parking to be provided in accordance with the *Disability (Access to Premises – Buildings) Standards 2010* from the Building Code of Australia. This Standard requires accessible parking for office (Class 5) and warehouse (Class 7) developments to be provided at a rate of:

- 1 space for every 100 car parking spaces or part thereof (rounded up).

Application of this control to the proposal results in a minimum of a single accessible parking space being required per tenancy. Accordingly, the development provides sufficient accessible parking.

4.2 Bicycle Parking

Council's DCP requires bicycle parking to be provided in accordance with *Planning Guidelines for Walking and Cycling* (NSW Government 2004) which stipulated the following bicycle provision rates:

- 3% - 5% of staff (for staff).
- 5% - 10% of staff (for visitors).

The expected staff numbers for the proposed warehouses are yet to be identified, however reference is to be made to the Lot 8 TIA (0395r01v2) which provides indicative staff numbers based on staff-to-floor ratio derived from within the Lot 8 TIA. Accordingly, the development is nominally required to provide 7 bicycle spaces as summarised in Table 7 below.

Table 7: Minimum Bicycle Parking Requirements

Lot	Peak Staff[1]	No. Bicycle Spaces		
		Staff	Visitors	Total
Lot 8A1	43	2	3	5
Lot 8A2	19	1	1	2
TOTAL	**62**	**3**	**4**	**7**

Notes: Indicative peak staff numbers are based on staff-to-floor ratio derived from the Lot 8 TIA report.

Ample bicycle spaces are provided near each building to satisfy this requirement.

5 Traffic Assessment

5.1 Traffic Generation

As discussed in Section 1.2, the RMS Technical Direction 04a identifies the following traffic generations for the Erskine Park Industrial Area which are considered representative of the proposed development:

- 0.134 trips per 100m^2 GFA (total building, warehouse and office) during the morning peak hour
- 0.139 trips per 100m^2 GFA during the evening peak hour

However, at each modification stage, consideration has also been given to the historic traffic generation assumptions that informed the local and regional infrastructure upgrades. This represents the Master Plan analysis – which adopted Stage 1 Estate peaks hour traffic generation of 375 and 386 vehicle movements in the AM and PM peak, respectively.

Traffic analysis undertaken for each subsequent MOD applications, has demonstrated that the subject Proposal would be reduced or remain unchanged. Accordingly, each application has been deemed supportable on traffic planning grounds on the basis that the committed infrastructure upgrades would remain acceptable, as they were developed in response to a greater volume of peak hour traffic.

The Approved MOD 2 development is expected to generate in the order of 28 and 29 veh/hr during peak periods with approximately 23 in and 6 out in the morning peak with the reverse during the evening peak hour.

Similarly, the application of the above rates to the proposed development yield is summarised in **Table 8** below.

Table 8: Proposed Development Traffic Generation – Lot 8

Lot	Building Floor Area (m^2)	Traffic Generation (veh/hr)		
		AM	PM	Daily
Lot 8A1	12,380	17	17	235
Lot 8A2	6,100	8	8	116
TOTAL	**18,480**	**25**	**25**	**350**[1]

Note: 1) Previous Lot 8 South (Linfox) approval from MOD 1 included 21,725m^2, equating to a daily traffic generation of 411 vehicles per day.

As evident from Table 8, the proposed development is expected to generate in the order of 25 veh/hr during peak periods and 350 vehicle movements per day.

Referring to Table 3, this development traffic generation is less than adopted by the approved Master Plan modelling and subsequent MOD 2 traffic volumes.

On the basis of the above, it is anticipated that the road and intersection upgrades would be more than adequate to cater for the traffic generated by the Proposal. Accordingly, it is considered that no further road upgrades are required to support the proposed development.

5.2 Future Network Performance

The development traffic generation outlined in Section 5.1 above is less than that adopted for 8A (previously Lot 8A and Lot 8B in the original application) as part of the Precinct analysis discussion in Section 2.4. As such, the proposal is generally consistent with the Precinct planning undertaken previously.

Previous modelling as part of the planning for the Altis Precinct concluded that the interim access arrangements to Mamre Road will operate with a Level of Service B during both peak periods. Accordingly, there is sufficient spare capacity within the planned intersection design to accommodate the traffic volumes generated by the proposal.

6 Design Commentary

6.1 Relevant Design Standards

The site access, car park and loading areas (and access thereto) shall be designed to comply with the following relevant Australian Standards:

- AS2890.1 for car parking areas;
- AS2890.2 for commercial vehicle loading areas;
- AS2890.3 for bicycle parking; and
- AS2890.6 for accessible (disabled) parking.

It is expected that any detailed construction drawings in relation to any modified areas of the car park or site access would comply with these Standards.

6.2 Site Access & Internal Design Commentary

The proposed development has generally been designed having regard for the above Standards. Reference should also be made to the swept paths and design commentary included in **Appendix A** for detailed commentary with regard to the design.

Compared to the previous approval, it is noted that the new scheme includes additional driveway crossings to the Estate Road. This is a private road but nonetheless designed as a minor public road. All commercial vehicle crossovers have been assessed using AutoTrack software, with car park accesses designed in accordance with AS2890 as Category 2 driveways (with a width of between 6.0-9.0 metres). Some minor changes to the commercial vehicle crossovers may be required to provide additional splays to minimise vehicles having to cross the road centreline. However, it should be noted that crossing of the centreline is permitted by AS2890 for access by commercial vehicles on a minor public road as is considered applicable in this instance. Nevertheless, this is a detailed matter that can be coordinated as part of subsequent Construction Certificate documentation.

Separate driveways for commercial vehicles (trucks) and passenger vehicles (cars) are provided to minimise the interaction between these user groups, as far as practicable. Respective driveways will experience only moderate traffic volumes and therefore the location of driveways (in proximity to driveways of other neighbouring developments) is not considered to raise any unacceptable impacts.

Reference should also be made to the swept paths included in Appendix A demonstrating access and egress to respective loading docks. Subject to the restrictions noted, access to all loading shall be maintained at all times.

It is also noted that the Estate Roads are currently private access roads and already subject to reduced speed limits. To ensure appropriate speeds (35km/hr or less) through the bend in the Estate Road on approach to the southern vehicle access to the hardstand, it is recommended that additional advisory speed signage, similar to the below, be provided on-street in advance of the bend.

7 Conclusions

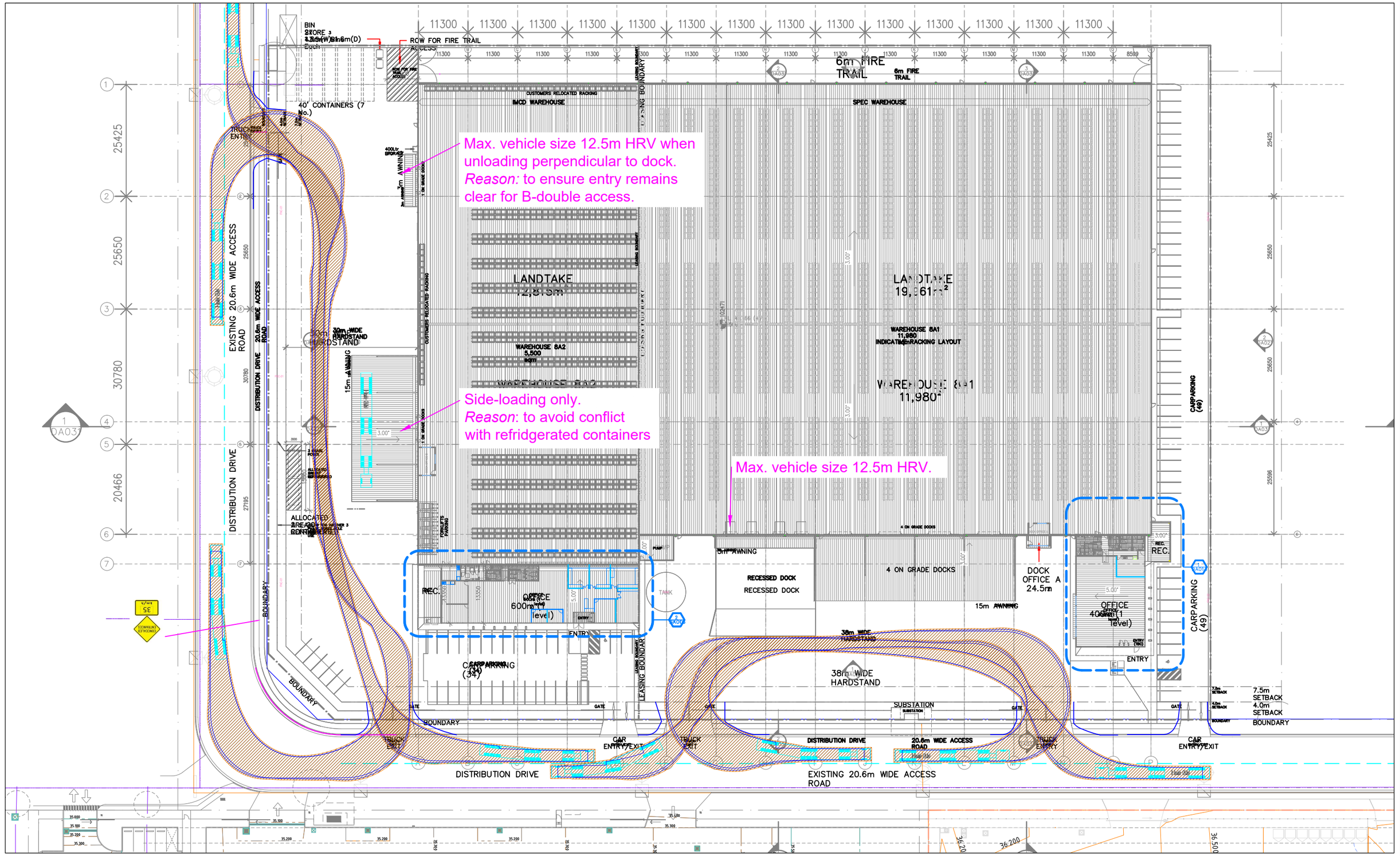
The key findings of this Traffic Impact Assessment are:

- Ason Group has been engaged by Hansen Yuncken, acting as Project Managers on behalf of Altis Property Partners, to prepare a TIA report relating to a relation to the development of Lots 8A of First Estate, Mamre West. The Site is located within the recently rezoned Altis Precinct area.
- Primary access the Altis Precinct is to be provided via a new western connection to the existing signalised T-intersection of Mamre Road with James Erskine Drive and secondary access is to be provided via a left-in / left-out priority-controlled intersection with Mamre Road located approximately 500 metres south of the James Erskine Drive intersection.
- In advance of the delivery of the Primary Access intersection at James Erskine Drive, a temporary (interim) signalised intersection is provided in the location of the future Secondary Access intersection to service the Altis Precinct.
- Previous SIDRA modelling demonstrates that the proposed interim signalised intersection is expected to operate with a Level of Service B during both the morning and evening peak periods. Therefore, the interim signalised intersection to Mamre Road will adequately accommodate the forecast traffic generated by the full Altis Precinct Master Plan area, including that associated with the subject site (Lot 8A).
- The proposed development is generally consistent with that assessed under the Master Plan. In this regard, Lot 8A (comprising both 8A1 and 8A2) will generate less than that adopted (and approved) previously in relation to the Master Plan. Collectively, the future peak hourly traffic volumes associated with Lot 8A1 and 8A2 will be:
  - AM & PM peak 25 vehicles per hour
  - Daily 350 vehicles per day
- A total of 83 car parking spaces are proposed for Lot 8A, comprising:
  - Lot 8A1 49 spaces (50 required)
  - Lot 8A2 34 spaces (33 required)
- These overall provisions are generally in accordance with Council's site-specific Mamre West DCP and therefore deemed acceptable.
- The internal configuration of the Site – including light and heavy vehicular access, car parking and servicing areas – have generally been designed in accordance with Council's DCP and the relevant Australian Standards (AS2890 series) and can be conditioned accordingly.

In summary, the Proposal is supportable on traffic planning grounds and will not result in any adverse impacts on the surrounding road network or the availability of on-street parking.

Appendix A

Swept Paths



Notes:

This drawing is provided for information purposes only and should not be used for construction.

Document Info:
Drawn by: Shihui Hu
File name: 0612d02 Lot 8 Design Review.dwg

Client:
Altis

Project:
0612d01
Lot 8A - First Estate, Mamre West

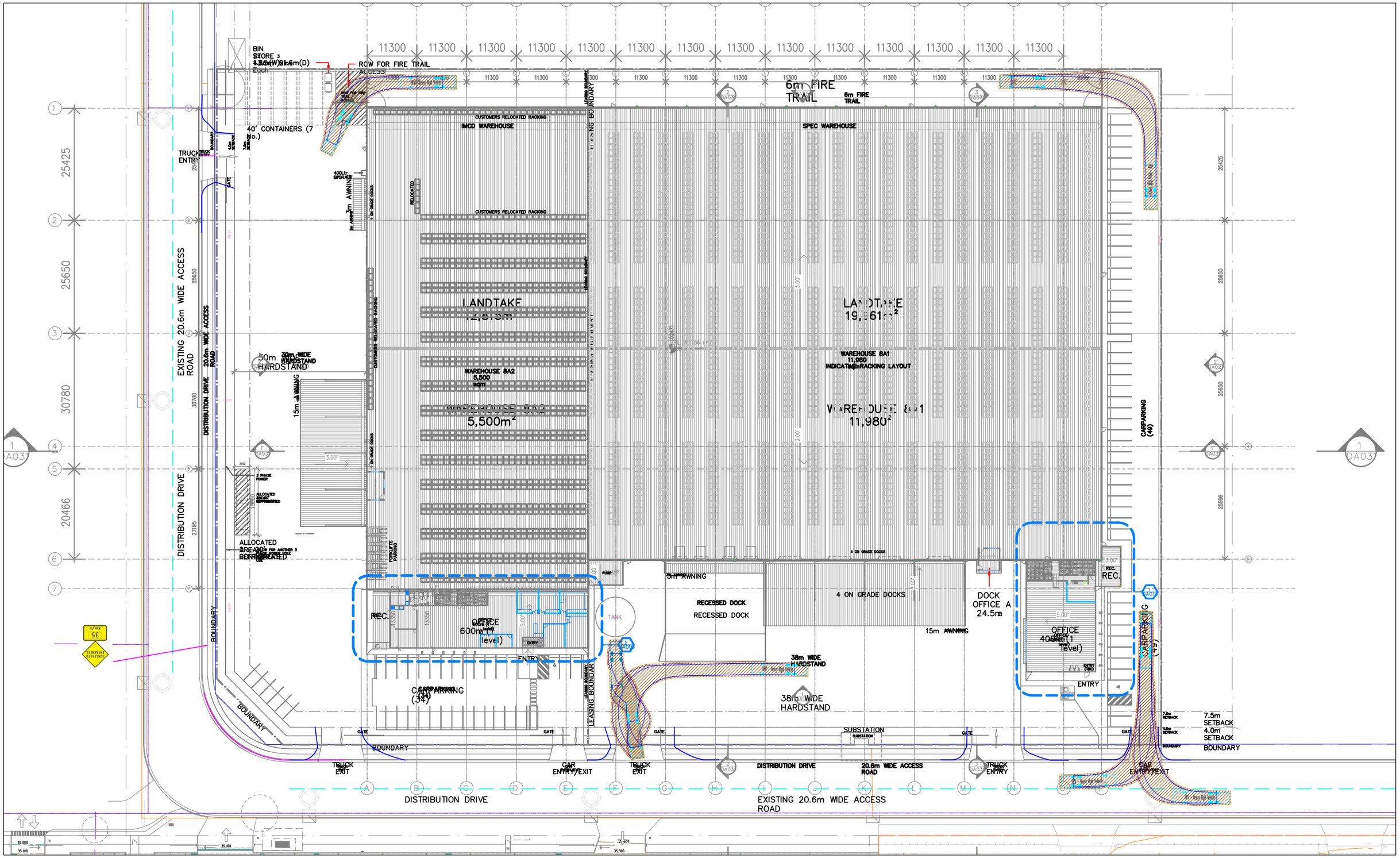
Drawing Title:
B-Double Swept Paths

Date:
10-Jul-18

Scale @ A3:
[scale]

Drawing Number:
AG.01

asongroup
Suite 1202, Level 12, 220 George Street
Sydney NSW 2000
info@asongroup.com.au



Notes:

This drawing is provided for information purposes only and should not be used for construction.

Document Info:

Drawn by: Shihui Hu

File name: 0612d02 Lot 8 Design Review.dwg

Client:

Altis

Project:

0612d01

Lot 8A - First Estate, Mamre West

Drawing Title:

Fire Truck (HRV) Circulation

Date:

10-Jul-18

Scale @ A3:

[scale]

Drawing Number:

AG.02

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Sydney NSW 2000

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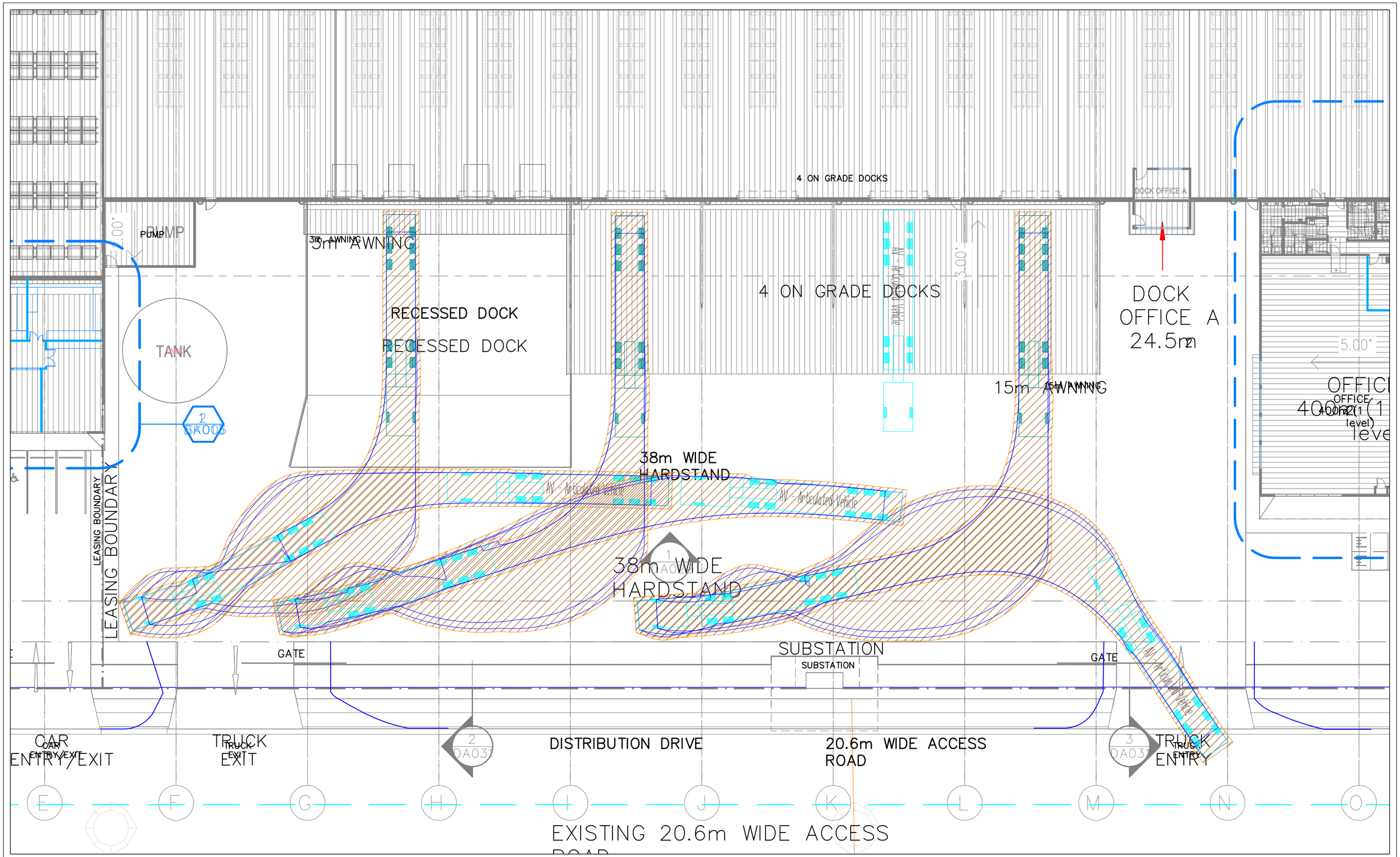

Notes:

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Document Info:
Drawn by: Shihui Hu
File name: 0612d02 Lot 8 Design Review.dwg

Client:
Altis

Project:
0612d01
Lot 8A - First Estate, Mamre West

Drawing Title:
Articulated Vehicles Swept Paths
Enter Loading Bay

Date:
10-Jul-18

Scale @ A3:
[scale]

Drawing Number:
AG.03

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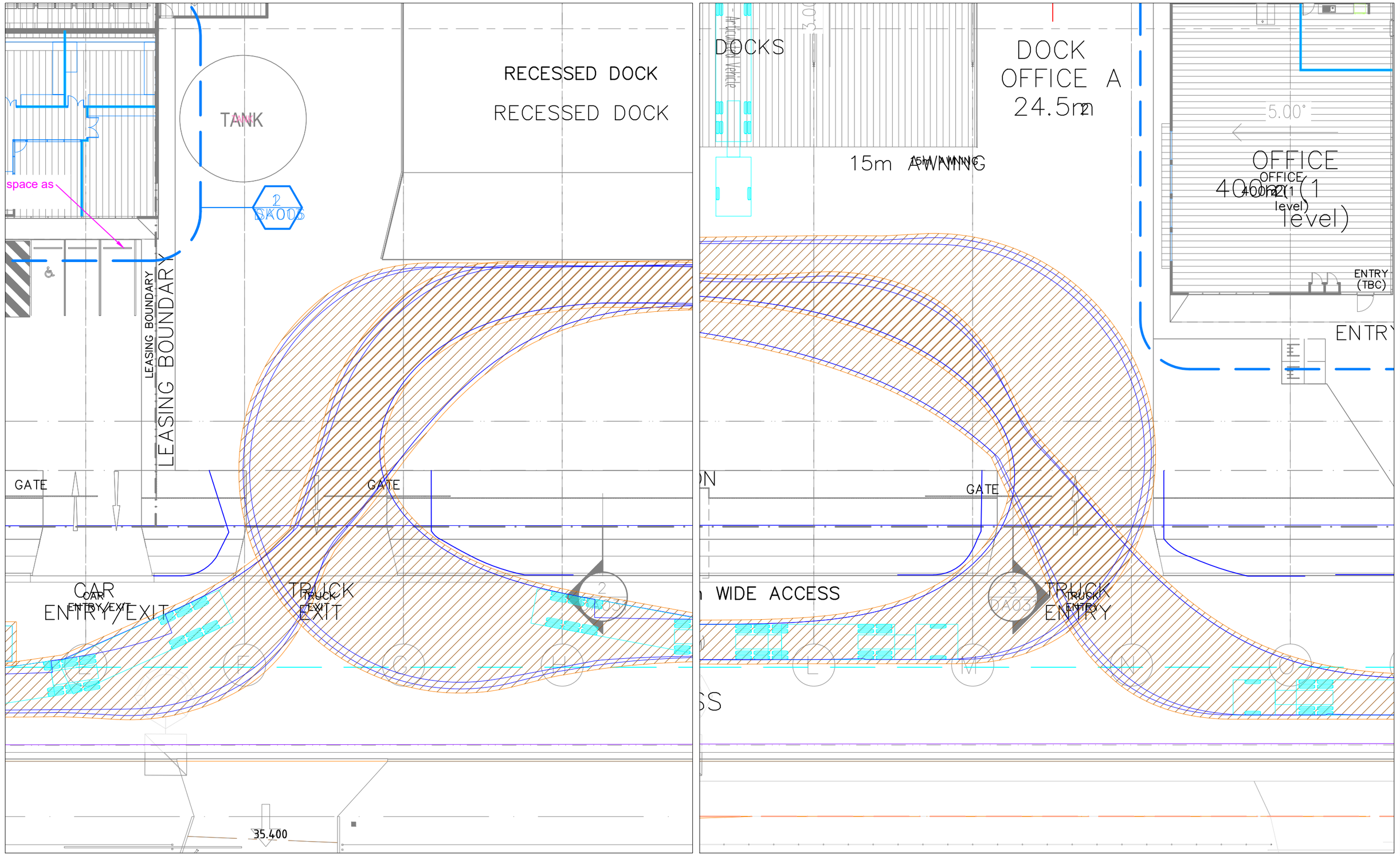

Notes:
This drawing is provided for information purposes only and should not be used for construction.

Document Info:
Drawn by: Shihui Hu
File name: 0612d02 Lot 8 Design Review.dwg

Client:
Altis

Project:
0612d01
Lot 8A - First Estate, Mamre West

Drawing Title:
B-double Circulation

Date:
10-Jul-18

Scale @ A3:
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Drawing Number:
AG.04

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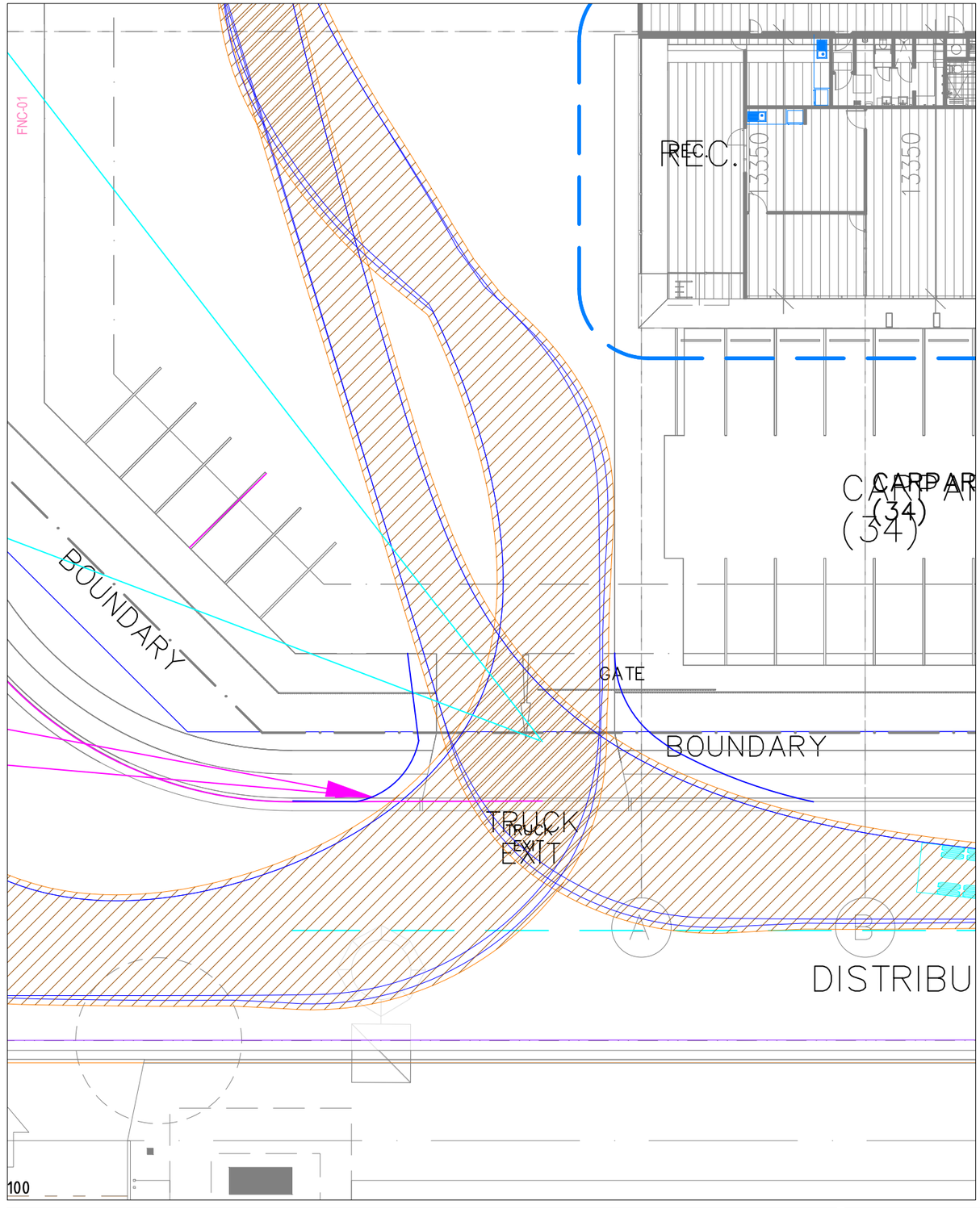
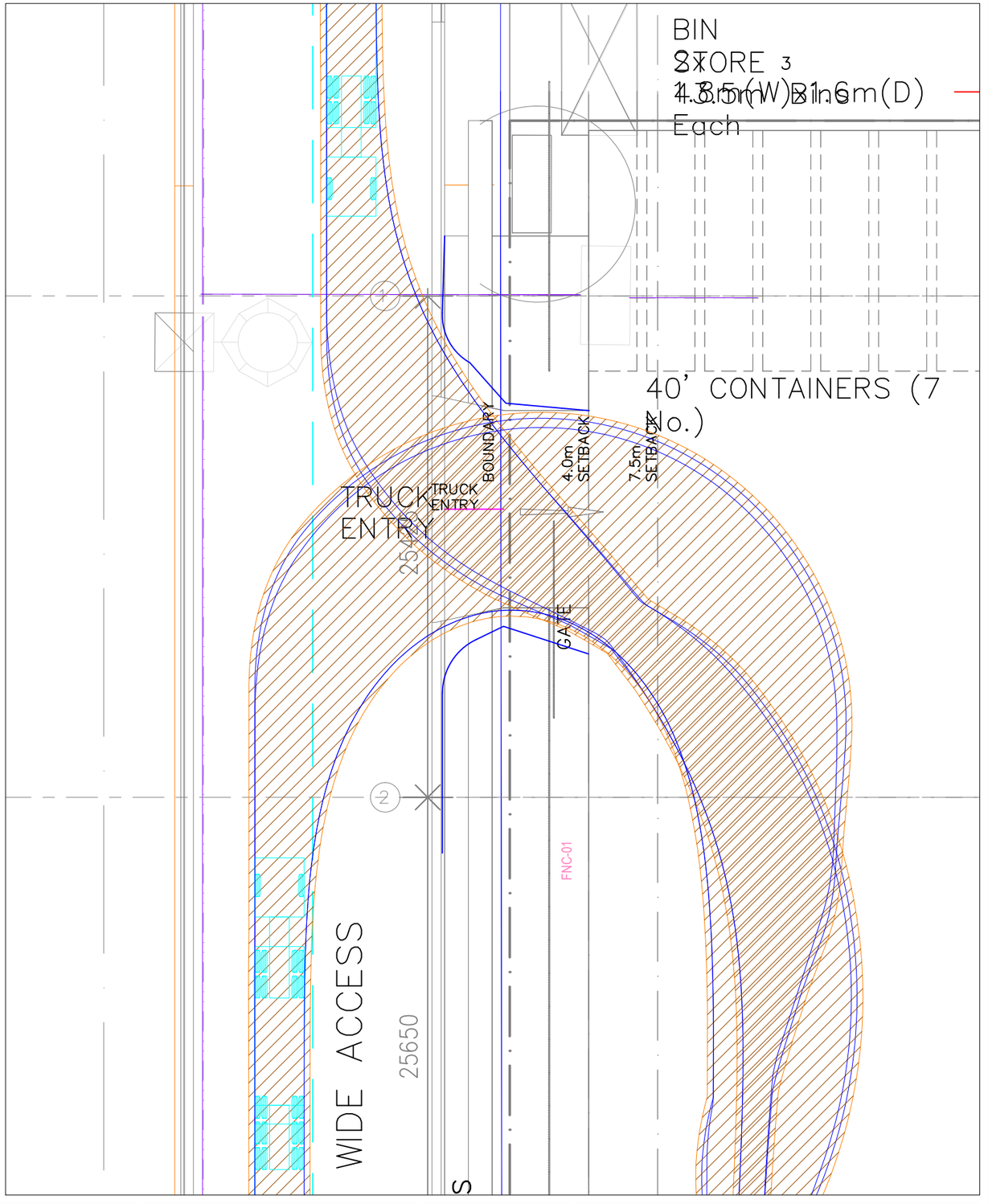
Sydney NSW 2000
info@asongroup.com.au





Notes:

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Document Info:
Drawn by: Shihui Hu
File name: 0612d02 Lot 8 Design Review.dwg

Client:
Altis

Project:
0612d01
Lot 8A - First Estate, Mamre West

Drawing Title:
B-double Circulation

Date:
10-Jul-18

Scale @ A3:
[scale]

Drawing Number:
AG.05

asongroup
Suite 1202, Level 12, 220 George Street
Sydney NSW 2000
info@asongroup.com.au