asongroup

Prepared for

TACTICAL GROUP

Traffic Impact Assessment Report

Proposed Warehouse Development
5 & 9 Culverston Road, Minto

Ref: 0191r01v2
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1 Introduction

1.1 Study Objectives

Ason Group has been commissioned by Tactical Group to prepare a Traffic Impact Assessment (**TIA**) report to support a State Significant Development Application (**SSDA**) for a proposed industrial development (the **Proposal**) at the subject site at 5 & 9 Culverston Road, Minto (the **Site**). The Proposal generally seeks approval for the following:

- 4 warehouses and ancillary office space with a total of 112,000 m^2 of Gross Floor Area (GFA).
- Supporting infrastructure and servicing.
- Construction of 481 car parking spaces with provisions for a further 147 spaces if required.

This TIA report addresses the relevant traffic, transport and parking implications of the Proposal, including compliance with relevant State and Local Government controls and Australian Standards. More importantly, the assessment responds to the Secretary's Environmental Assessment Requirements issued on 10 March 2016 (refer to Section 1.3).

In preparing this TIA report, Ason Group has referenced the following key planning documents that are relevant to development at the Site:

- Campbelltown Development Control Plan 2015 (**CDCP2015**).

This TIA report also references general access, traffic and parking guidelines, including:

- NSW Roads & Maritime Services (RMS – formerly RTA) *Guide to Traffic Generating Developments* (**RMS Guide**).
- RMS Technical Direction TDT 2013/04a, *Guide to Traffic Generating Developments – Updated traffic surveys* (**RMS Guide Update**).
- Australian Standard 2890.1 (2004): *Off-street car parking* (**AS2890.1**).
- Australian Standard 2890.2 (2002): *Off-street commercial vehicle facilities* (**AS2890.2**).
- Australian Standard 2890.6 (2009): *Off-street parking for people with disabilities* (**AS2890.6**).

1.2 Site and Location

The Site – with the street address of 5 & 9 Culverston Road and which is legally known as Lot 400 DP 87571 and Lot 3 DP 817793 – is located approximately 3 kilometres northwest of Campbelltown, 30 kilometres southwest of the Parramatta CBD and 40 kilometres southwest of the Sydney CBD. The overall site comprises a total area of about 29.6 hectares and generally occupies the area to the immediate north of Rose Payten Drive and between Bow Bowling Canal in the west and the Main Southern Railway line in the east. The surrounding developments predominantly comprise of industrial facilities used for the purpose of warehousing, distribution and various extractive industries.

The Site is within the Local Government Area (**LGA**) of Campbelltown Council. A Site and Location Plan is presented in **Figure 1**, which provides an appreciation of the Site and its location. It is noteworthy that Culverston Road is effectively the Site's access road, as the Site comprises all land surrounding the road.

1.3 Secretary's Environmental Assessment Requirements

The SEARs were issued by the NSW Department of Planning & Environment (**DPE**) on 10 March 2016, and outlined the key areas for consideration in any subsequent application. This TIA report addresses the traffic and transport issues raised in the SEARs report, of which, the key components are outlined below:

Traffic and Transport *– including:*

- *a Traffic Impact Assessment detailing all daily and peak traffic and transport movements likely to be generated (vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development, including a description of vehicle access routes and the impacts on nearby intersections;*
- *details of access to the site from the road network including intersection location, design and sight distance;*
- *an assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development;*
- *plans of any road upgrades or new roads required for the development if necessary;*
- *detailed plans of the proposed layout of the internal road network and parking provision on-site in accordance with the relevant Australian Standards; and*
- *details of any likely dangerous goods to be transported on arterial and local roads to/from the site, if any, and the preparation of an incident management strategy.*

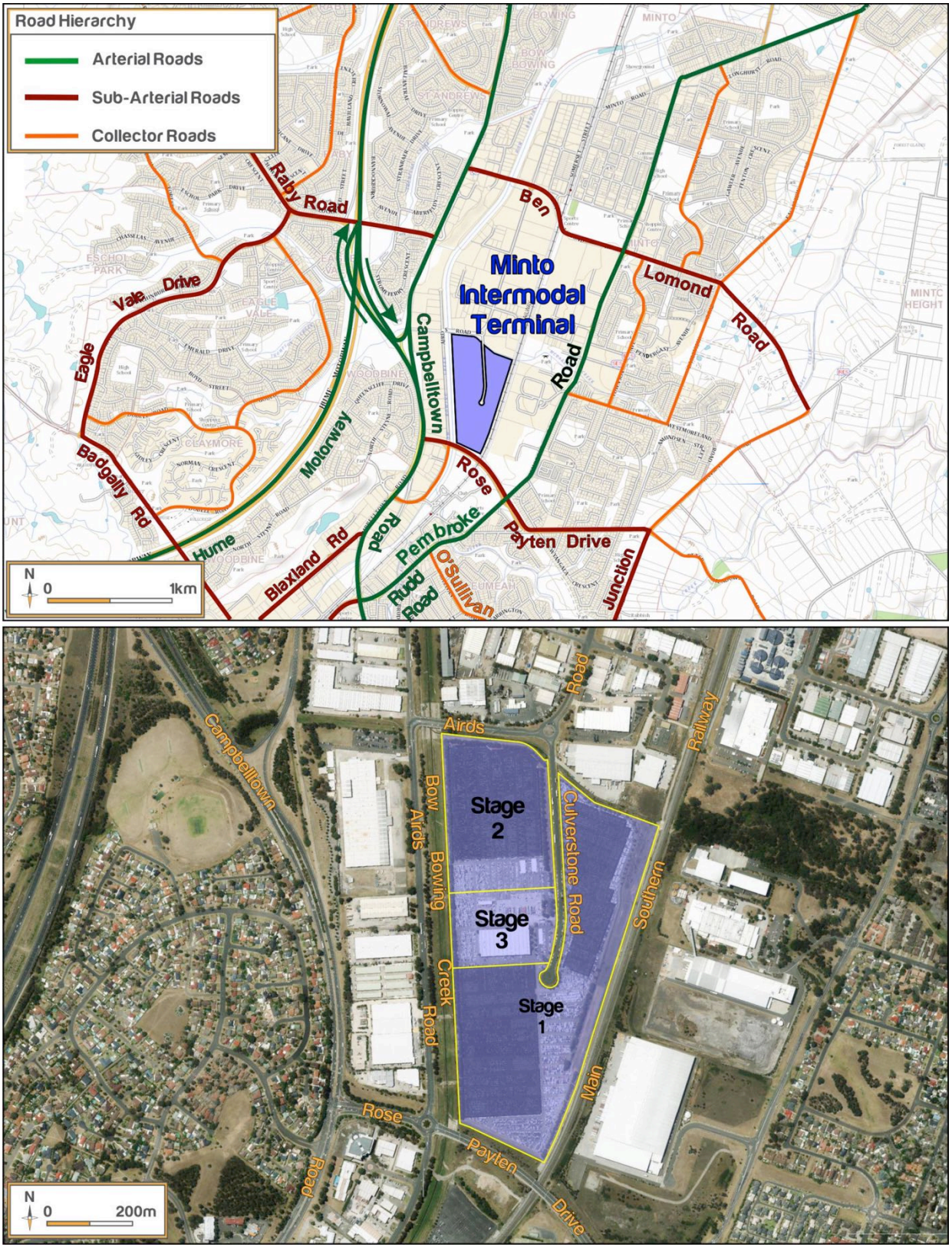


Figure 1: Site & Location Plan

1.4 Consultation

A meeting was held with RMS on 15 March 2016 at which the methodology and scope of works to be covered by this TIA report was discussed, including the extent of the study network. In this regard, Ason Group noted that the RMS input to the SEARs did not nominate the intersections to be assessed; therefore, based on an understanding of the area and having consideration of the intersections that would most likely accommodate future traffic to/from the Site, Ason Group advised that the following 3 intersections had been surveyed for the purpose of network performance testing:

1. Campbelltown Road / Rose Payten Drive – Signalised Intersection.
2. Rose Payten Drive / Airds Road – Roundabout Intersection.
3. Airds Road / Culverston Road – Roundabout Intersection.

RMS generally accepted the scope of work and that the 3 intersections selected were the 3 that would most likely be influenced by the Proposal. However, it was requested that the following intersections also be addressed by the TIA report:

4. Campbelltown Road / Ben Lomond Road – Signalised Intersection.
5. Rose Payten Drive / Pembroke Road – Signalised Intersection.

A meeting was also held with Campbelltown Council on 29 March 2016 to discuss the Proposal and the impending SSDA. At the meeting Council queried how the large area of open storage (associated with Warehouse A) would be used. In response, Council was advised that the exact operations were yet to be determined; however, the storage was to be ancillary to the function of the warehouse and would attract limited (if any) additional staffing. Accordingly, the traffic and parking demands would relate solely to the Warehouse A building.

1.5 Report Structure

The remainder of this report is structured as follows:

- Section 2 provides a summary of the proposed development.
- Section 3 describes the existing road network, accessibility to alternative transport modes and the existing traffic conditions.
- Section 4 describes the traffic impacts of the Proposal including projected trip generation and forecasted network performance.
- Section 5 describes the parking requirements of the Proposal.

- Section 6 describes the access, internal configuration of the proposed car parking and servicing facilities of the development.
- Section 7 describes the general principles of a construction traffic management plan for the Site.
- Section 8 provides responses to the issues raised in the SEARs.
- Section 9 provides a conclusion of the key traffic and parking impacts.

2 Overview of Proposed Development

The development for which approval is now sought is detailed in the Environmental Impact Statement report prepared separately by Willowtree Planning Pty Ltd. In summary, the application seeks to demolish the existing buildings located on the Site to allow the construction of 4 industrial warehouses with ancillary offices and an external storage area. The Proposal would be completed as a staged development with the following summarising the development yield of each stage:

- Stage 1 – Warehouse A:
  - 40,000 m^2 of Warehouse Gross Floor Area (**GFA**).
  - 2,000 m^2 of ancillary office GFA.
  - 69,066 m^2 of external storage area.
  - Provision of on-site car parking for 183 parking spaces.
- Stage 2 – Warehouse B:
  - 22,000 m^2 of Warehouse GFA.
  - 1,000 m^2 of ancillary office GFA.
  - Provision of on-site car parking for 98 parking spaces.
- Stage 2 – Warehouse C:
  - 22,000 m^2 of Warehouse GFA.
  - 1,000 m^2 of ancillary office GFA.
  - Provision of on-site car parking for 98 parking spaces.
- Stage 3 – Warehouse D:
  - 23,000 m^2 of Warehouse GFA.
  - 1,000 m^2 of ancillary office GFA.
  - Provision of on-site car parking for 102 parking spaces.
- New driveways and internal access arrangement to service operational vehicles, up to B-double heavy vehicles.

The traffic and parking implications arising from the Proposal are discussed in the following sections. Reference should also be made to the Architectural Plans prepared by Reid Campbell, of which, relevant plans are attached at reduced scale at **Appendix A**.

3 Existing Conditions

3.1 Road Network

With reference to Figure 1, the key local roads influenced by the application include:

- M31 (Hume) Motorway – an RMS Main Road that generally runs in a north-south direction to the west of the Site between Prestons in the north (from the junction with the M7 and M5 Motorways), south towards the State of Victoria and eventually Melbourne.
- Campbelltown Road – an RMS State Road (MR 177) that generally runs in a north-south direction also to the west of the Site between The Hume Highway in the north and Campbelltown in the south. Campbelltown Road carries approximately 30,500 vpd (vehicles per day) in the vicinity of the Site and is subject to 'No Stopping' restrictions along both kerb sides at all times. Campbelltown Road is generally subject to a 60 km/h speed zoning in the vicinity of the Site and provides 2 lanes of traffic in either direction within a divided carriageway of width 22.0 metres.
- Rose Payten Drive – an RMS unclassified regional road that connects the Site via Airds Road to the M31 Motorway via Campbelltown Road.
- Airds Road – a local industrial access road that provides a collector road function and connects the Site to the M31 Motorway via Rose Payten Drive and Campbelltown Road.
- Culverston Road – a local industrial access road that provides direct access to the Site and connects it to Campbelltown Road via Airds Road and Rose Payten Drive.

3.2 Public Transport

The Site's proximity to public transport is shown on **Figure 2**, which demonstrates the locations and distances to bus and railway services surrounding the Site. The *Integrated Public Transport Service Planning Guidelines* states that bus services influence the travel mode choices of areas within 400 metres walk (approximately 5 minutes) of a bus stop. Based on these parameters, Figure 2 demonstrates that the Site is not favourably located with regard to the bus stops on Campbelltown Road and Pembroke Road. Furthermore the *Integrated Public Transport Service Planning Guidelines* states that railway services influence the travel mode choices within 800 metres walk (approximately 10 minutes) of a railway station. Figure 2 shows that the Site is outside the Leumeah railway station influence zone, which makes the Site unfavourably located for railway services.

In summary, the Site has limited access to existing public transport facilities. However, this is not uncommon for the industrial areas that support this type of warehouse development.

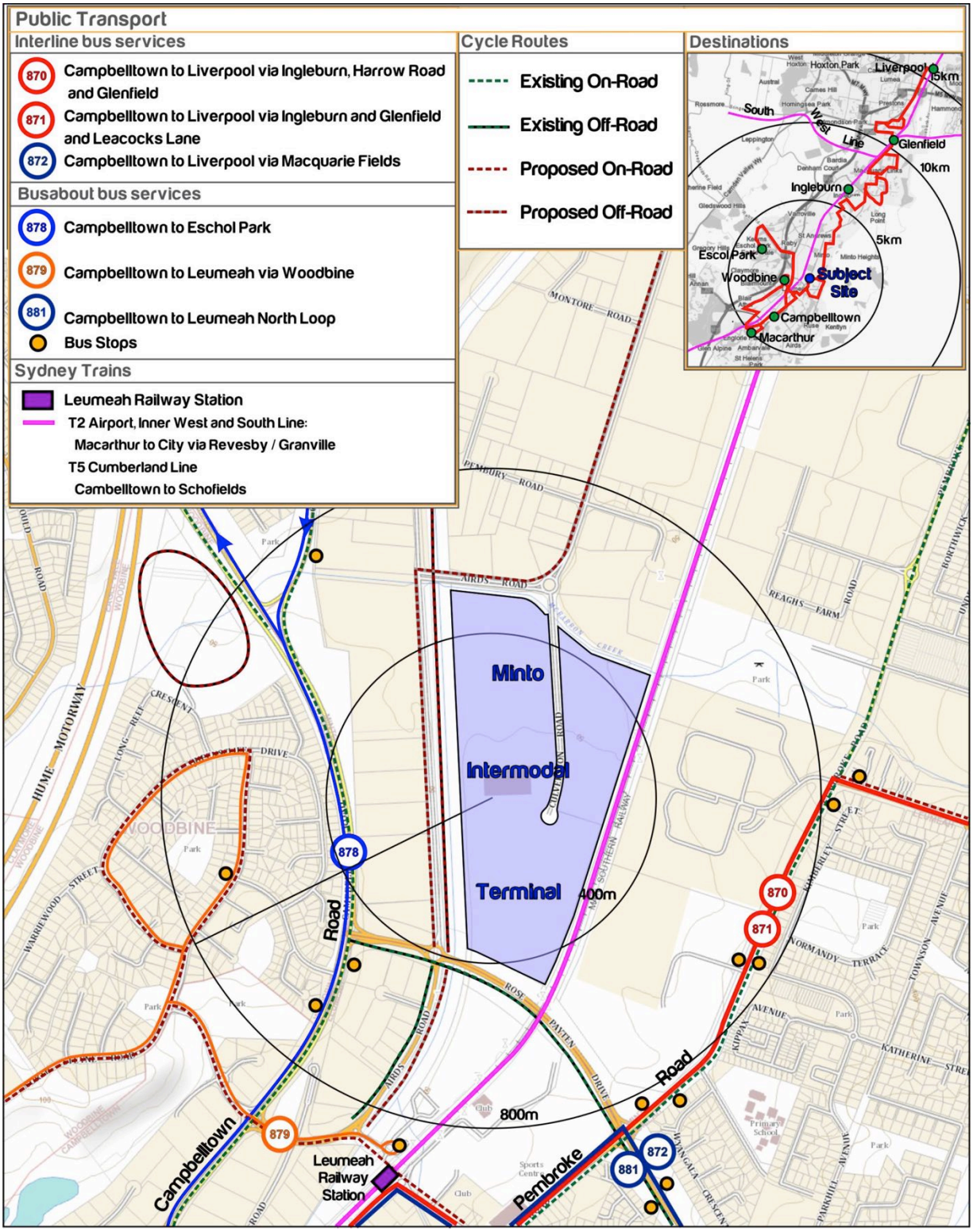


Figure 2: Public Transport Services & Cycleways

3.3 Cycle Paths

The cycle network surrounding the Site is also shown on Figure 2. In this regard, the Campbelltown on-road bicycle lane runs to the west of the Site. The bicycle lane connects to the Hume Motorway, which runs through Leumeah, St. Andrews, Varroville and Glenfield. In addition, other cycleways and shared paths connect to Pembroke Road. These provide the Site with reasonable dedicated bicycle access to locations such as Campbelltown and Ingleburn.

3.4 Existing Traffic Conditions

3.4.1 Study Network Traffic Volumes

As mentioned, traffic surveys were conducted of the following intersections:

1. Campbelltown Road / Rose Payten Drive – Signalised Intersection.
2. Rose Payten Drive / Airds Road – Roundabout Intersection.
3. Airds Road / Culverston Road – Roundabout Intersection.

The traffic survey data indicated the following:

- The morning peak hour period was between 7.30 – 8.30AM.
- The evening peak hour period was between 4.15 – 5.15PM.

The existing traffic volumes on the study road network – derived from the traffic surveys – are presented in **Figure 3**.

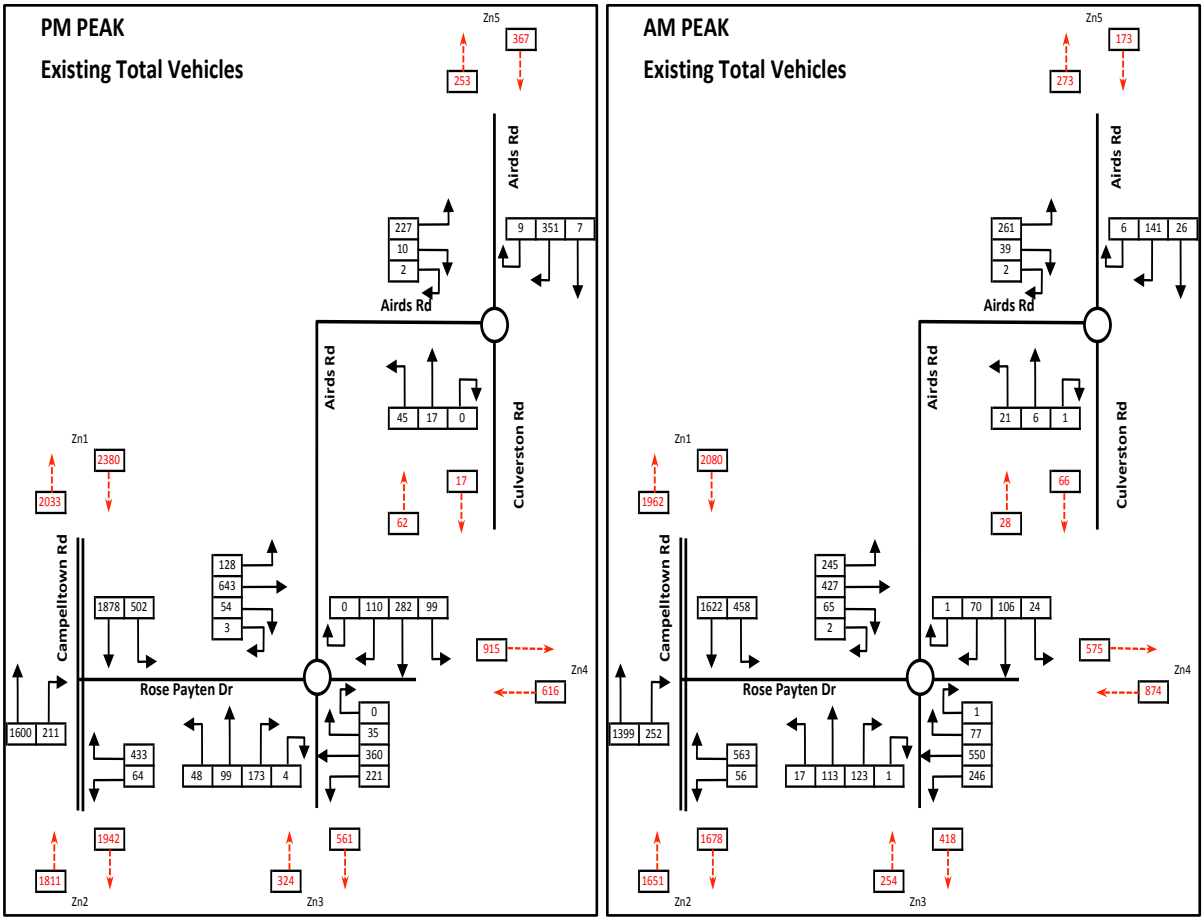


Figure 3: Baseline Traffic Volumes

3.4.2 Study Network Performance

SIDRA intersection modelling has been undertaken to establish the baseline performance of the key intersections. In this regard, SIDRA modelling outputs a range of performance measures relevant to this assessment, including:

- *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 recommended that DOS to be 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 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.

Table 1 provides a recommended baseline for assessment as per the RMS Guide.

Table 1: 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.

A summary of the SIDRA results for the performance of the key intersections is shown in **Table 2** and detailed intersection performance outputs are attached at **Appendix B**.

Table 2: Baseline Intersection Performance

Intersection	Period	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Campbelltown Road / Rose Payten Drive	AM	0.793	20.1 sec	B
	PM	0.922	23.7 sec	B
Rose Payten Drive / Airds Road	AM	0.425	14.1 sec	A
	PM	0.437	13.1 sec	A
Airds Road / Culverston Road	AM	0.210	12.3 sec	A
	PM	0.241	11.5 sec	A

The results show that all key intersections are currently operating at 'good' levels of performance during the morning and evening peak hours with a LOS of B or better.

3.4.3 Site Traffic

Recognising that the Site comprises all areas accessed from Culverston Road, a 7-day, 24-hour tube count surveys of Culverston Road was undertaken to determine the existing traffic generation of Site. The weekday results identified the following peak hour traffic volumes:

- 65 trips during the morning peak hour.
- 55 trips during the evening peak hour.

4 Traffic Impacts

4.1 Traffic Generation

For the assessment of the future traffic generation of the Proposal, the RMS Guide Update trip rates for Business Parks and Industrial Estates developments – based specifically on the Wonderland Business Park, Eastern Creek and the Erskine Park Industrial Estate site surveys – have been adopted. The relevant trip rates are as follows:

- 0.156 per 100 m^2 of total GFA (warehouse + ancillary office) during the morning peak hour.
- 0.158 per 100 m^2 total GFA during the evening peak hour.
- 2.100 per 100 m^2 total GFA per day.

Application of these trip rates to the Proposal's development yield of 112,000 m^2 GFA results in the following traffic generation forecasts:

- 175 trips during the morning peak hour.
- 176 trips during the evening peak hour.
- 2,352 trips per day.

Having consideration for the existing traffic generation of the Site – as outlined in Section 3.4.3 – the following summarises the 'net' (additional) peak hour traffic forecast for the Proposal:

- 110 trips during the morning peak hour (83 in, 27 out)
- 121 trips during the evening peak hour (30 in, 91 out)

4.2 Modal Analysis

The RMS Guide Update also provides details in relation to the principal mode of travel used by staff at the sites surveyed. **Table 3** presents the relevant mode share details and the results of the application of these percentages to the Proposal. In summary, the table indicates that 98.2% of persons accessing the future site would arrive via car and 90% as car drivers. The analysis indicates that only 3 persons would use alternative means of transport (in this instance, bus public transport). It is clear that this level of bus use would have no material impact on the capacity of bus services in the area and pedestrian and cycling facilities would be unaffected by the Proposal.

Table 3: Peak Hourly and Daily Person Trips by Transport Mode

Transport Mode	Mode Share %	Peak Hour		Daily
		AM	PM	
Vehicle	90%	175	176	2352
Car (as passenger)	8.2%	16	16	214
Bus	1.5%	3	3	39
Cycle	0.2%	0	0	5
Motorbike	0.1%	0	0	3
On Foot	0.2%	0	0	5
Other	0%	0	0	0
TOTAL	**100%**	**194**	**195**	**2618**

4.3 Existing Trip Distribution & Assignment

With regard to the local road network, the following 5 'Zones' have been identified as study network origin-destination zones:

- Zone 1 – Campbelltown Road, north of the intersection with Rose Payten Drive.
- Zone 2 – Campbelltown Road, south of the intersection with Rose Payten Drive.
- Zone 3 – Airds Road, south of the intersection with Rose Payten Drive.
- Zone 4 – Rose Payten Drive, east of the intersection with Airds Road.
- Zone 5 – Airds Road, north of the intersection with Culverston Road.

The trips have been distributed onto the surrounding road network based generally on the travel patterns evident from the existing traffic flows on the network, combined with a review of Journey to Work census data for workers in the surrounding area. Within the context of the 5 identified zones, the following trip distribution has been adopted.

- 25% from/to Zone 1.
- 15% from and 5% to Zone 2.
- 15% from and 30% to Zone 3.
- 10% from and 15% to Zone 4
- 35% from and 25% to Zone 5.

Application of the distribution assumptions above to the net traffic generation results in the forecast trip assignment on the study road network presented in **Figure 4**.

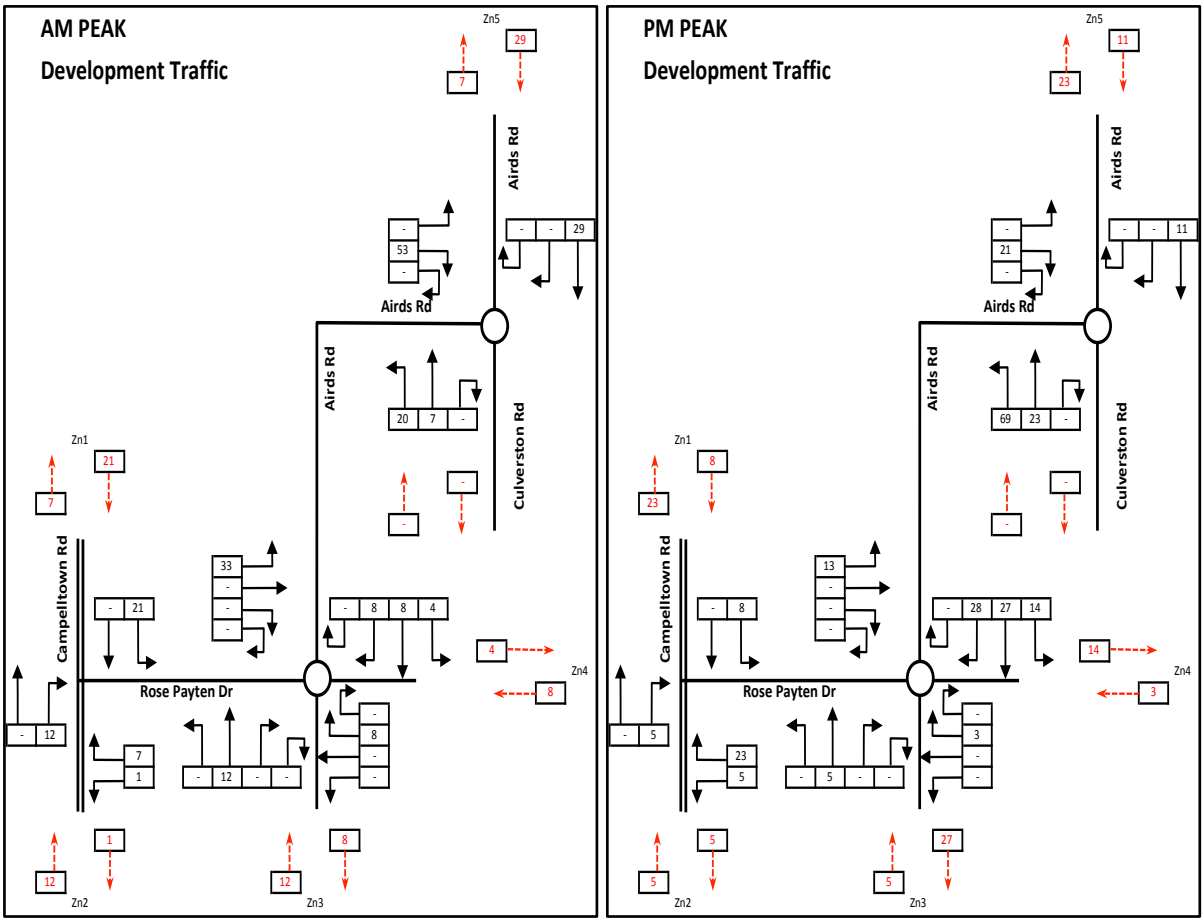


Figure 4: Development Traffic Volumes

4.4 'Baseline + Development' Traffic Volumes

By combining the Baseline flows (Figure 3) with the development traffic volumes (Figure 4), the future traffic volumes of the study road network have been calculated and are presented in **Figure 5**.

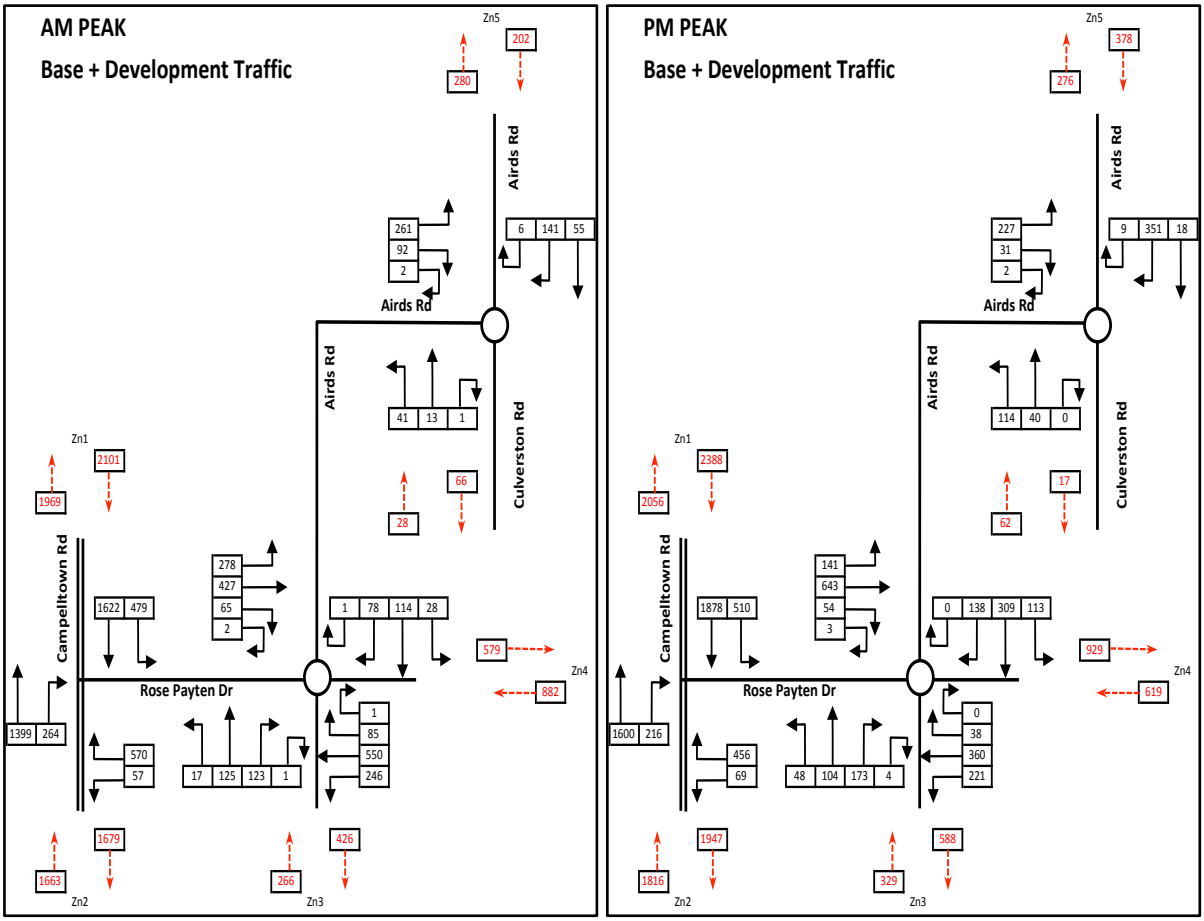


Figure 5: Baseline + Development Traffic Volumes

4.5 Future Road Network Performance

The traffic impacts of the Proposal have been analysed using SIDRA modelling. The Baseline and Development traffic volumes represent the future traffic flow of the local road network. **Table 4** shows a comparison of the baseline and future intersection performance results determined by the SIDRA modelling. Detailed SIDRA outputs are attached to this report at Appendix B, which show that for the signalised intersection of Campbelltown Road with Rose Payten Drive, all short lanes (in particular right-turn lanes) would satisfactorily accommodate forecast 95th-percentile queues.

Table 4: Comparison of Future to Existing Road Network Performance

Intersection	Scenario	Period	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Campbelltown Road / Rose Payten Drive	Existing	AM	0.793	20.1 sec	B
		PM	0.922	23.7 sec	B
	With Development	AM	0.812	20.7 sec	B
		PM	0.923	24.0 sec	B
Rose Payten Drive / Airds Road	Existing	AM	0.425	14.1 sec	A
		PM	0.437	13.1 sec	A
	With Development	AM	0.436	14.2 sec	A
		PM	0.447	13.3 sec	A
Airds Road / Culverston Road	Existing	AM	0.210	12.3 sec	A
		PM	0.241	11.5 sec	A
	With Development	AM	0.251	12.4 sec	A
		PM	0.264	11.6 sec	A

Table 4 demonstrates that all intersections are expected to continue to operate at 'good' levels with a LOS of B or better following completion of the Proposal. Furthermore, it should be noted that the results indicate that the development traffic would result in very minor increases in DOS and AVD.

4.6 Wider Study Network

4.6.1 Additional RMS Intersections

As stated earlier, RMS requested that the following intersections also be addressed by this TIA report, in addition to the key intersection assessed in detail above:

- Campbelltown Road / Ben Lomond Road – Signalised Intersection.
- Rose Payten Drive / Pembroke Road – Signalised Intersection.

With reference to Figure 4, the Proposal is expected to generate the following development trips on the northern section of Airds Road, towards the intersection of Campbelltown Road with Lomond Road:

- 36 trips during the morning peak hour.
- 34 trips during the evening peak hour.

When taking into account that not all the development traffic on that section of Airds Road would be departing to or arriving via the intersection of Campbelltown Road with Lomond Road, it is anticipated that during the peak hours the Proposal would on average generate just 1 additional trip every 2 minutes through the intersection.

Figure 4 also indicates that the Proposal is expected to generate the following development trips on the eastern section of Rose Payten Drive, towards the intersection with Pembroke Road:

- 12 trips during the morning peak hour.
- 17 trips during the evening peak hour.

These traffic volumes indicate that during the peak hours, the Proposal would on average generate just 1 additional trip every 4 minutes through the intersection.

It is clear that the volumes above of additional traffic are of such a low order that the Proposal would have no material impact on the performance of these intersections. Accordingly, the intersections would be expected to continue to operate at similar levels of performance as currently occurs, following completion of the Proposal.

4.6.2 Cumulative Assessment

Firstly, it is noted that the analysis covered in Section 4.5 is referred to as 'Standard Assessment' analysis as it assesses the performance of the network under Existing traffic *plus* subject Development traffic volumes. 'Cumulative Assessment' testing adds another layer of traffic and consists of Standard Assessment traffic *plus* traffic associated with 'other' development potential in the area.

With regard to cumulative traffic impacts, these generally fall into 2 categories:

- Local Cumulative Impacts – Implications of other development potential that would have an impact on the local road network.
- Wider Cumulative Impacts – Implications of other development potential that would have an impact on the wider strategic road network.

In terms of priority, the responsibility of the developer is greatest in relation to assessing and mitigating (as necessary) local impacts, whereas wider impacts become the responsibility of Council and (eventually) RMS.

With regard to the Proposal, the local road network generally consists of Airds Road and Culverston Road and the key intersection is the roundabout junction of these 2 roads. The local area of

significance is the existing industrial land accessed directly from these roads (and indirectly via Montore, Pembury & Huntsmore Roads), between Ben Lomond Road in the north and Rose Payten Drive in the south.

It is clear from aerial mapping that this area is reasonably well 'built out' with limited scope for additional development. Accordingly, in terms of local cumulative impacts at the key roundabout junction of Airds Road with Culverston Road, it is expected that the intersection would continue to operate at good levels with a LOS of A as presented in Table 4.

With regard to the wider area, the key development of significance is the Keylink Industrial Estate, a site of similar size to the subject site located immediately to the east across the Main Southern Railway line. It is noteworthy that whilst the sites are effectively neighbouring, the distance between the sites via the road network is approximately 2.7 kilometres. More importantly, the roads connecting the sites consist significantly of the strategic RMS road network of Pembroke Road and Rose Payten Drive and the key intersections (with respect to both sites) are the Rose Payten Drive intersections with Campbelltown Road and Airds Road.

As mentioned, wider cumulative impacts on the strategic road network are generally the responsibility of Council and/or RMS. Notwithstanding – and with reference to the SIDRA results in Table 4 – the SIDRA modelling of the 2 key Rose Payten Drive intersections indicates that under the standard assessment conditions, the intersections are expected to operate at good levels with a LOS of B or better following completion of the Proposal. Importantly, levels of service of B or better indicate that the intersections have a reasonable amount of spare capacity and it is anticipated that this spare capacity would adequately accommodate traffic demands arising from the development of the Keylink Industrial Estate.

4.7 Traffic Analysis Summary

Traffic demand analysis indicates that the development would result in 110 additional trips on the surrounding road network during morning peak hour and 121 during the evening peak hour with reduced generation at other times. SIDRA analysis indicates that the study network is expected to continue to operate at 'good' levels with a LOS of B or better following completion of the Proposal.

It is anticipated that the network would also accommodate cumulative traffic demand and modal analysis indicates that the Proposal would generate no material demand on public transport services or local pedestrian & cycling facilities. Accordingly, the Proposal is supportable on traffic planning grounds.

5 Parking Requirements

5.1 Proposed Warehouse Parking Provisions

Council's DCP – Part 7 – Industrial Development, Section 7.3 – provides Council's parking controls, which are:

- 1 space for every 100 m^2 for the first 2,000 m^2 GFA and 1 space per 250 m^2 for all floor space exceeding more than 2,000 m^2 GFA.
- 1 space for every 35 m^2 for all office and ancillary GFA.

The RMS Guide provides parking controls for warehouse developments, which are:

- 1 space for every 300 m^2 of warehouse GFA.
- 1 space for every 40 m^2 for all office and ancillary GFA.

Table 5 presents the required parking based on Council's DCP rates.

Table 5: Car Parking Numbers

Warehouse	Gross Floor Area	DCP Parking Requirement	RMS Parking Requirement
Warehouse A	Warehouse: 40,000 m^2 Office: 2,000 m^2	231	183
Warehouse B	Warehouse: 22,000 m^2 Office: 1,000 m^2	131	98
Warehouse C	Warehouse: 22,000 m^2 Office: 1,000 m^2	131	98
Warehouse D	Warehouse: 23,000 m^2 Office: 1,000 m^2	135	102
TOTAL		**628**	**481**

Table 5 demonstrates that the Proposal requires a parking provision of 628 spaces to comply with Council's DCP rates and 481 spaces (147 fewer spaces) to comply with RMS Guide rates. It is noted that initial forecasts suggest that the warehouse would employ significant fewer employees than the 628 that would be required (as a minimum) to reach a parking capacity consistent with Council's DCP requirement.

Accordingly, the Proposal – as a whole and as indicated on the plans attached at Appendix A – includes the construction of 481 parking spaces in accordance with the RMS Guide requirements and

identifies sufficient area (initially dedicated to landscaping) within which an additional 147 spaces could be provided to meet Council's DCP requirements in the future, should a demonstrated demand indicate additional parking is required.

5.2 Accessible Parking

Council's DCP – Part 7 – Industrial Development, Section 7.3 requires accessible parking be provided in accordance with the Disability (Access to Premises – Buildings) Standards 2010 from the Building Code of Australia. Accessible parking for industrial developments are to be provided at a rate of:

- 1 space for every 100 car parking spaces or part thereof.

Application of this control to the individual warehouse's car parking provision is shown in **Table 6**.

Table 6: Accessible Car Parking Provisions

Warehouse	Accessible Parking Rate	Car Parking Provision RMS (DCP)	Minimum Accessible Car Parking Provision
Warehouse A	1 space for every 100 car parking spaces or part thereof	183 (231)	3
Warehouse B	1 space for every 100 car parking spaces or part thereof	98 (131)	2
Warehouse C	1 space for every 100 car parking spaces or part thereof	98 (131)	2
Warehouse D	1 space for every 100 car parking spaces or part thereof	102 (135)	2

The accessible parking provision complies with the BCA control in accordance with Council's DCP parking requirement. Furthermore, all accessible parking is designed in accordance with AS2890.6 and generally located as close as practicable to the building entrance.

5.3 Additional 'External Storage' Parking

As previously mentioned, the Proposal includes an area of hardstand that will provide up to 69,066m^2 of external (open) storage for the use of Warehouse A. The exact operations and/or the extent of the area to be used are yet to be determined; however, the storage would be ancillary to the function of the warehouse and would attract limited (if any) additional staffing. Accordingly, parking demands would relate solely to the operation of the Warehouse A building, which is covered by the commentary in the sections above.

Notwithstanding the above, a triangular area in the north-western corner of the external storage area has been identified that could provide in the order of 80 parking spaces. These spaces are in addition to the proposed warehouse parking spaces, both the 481 parking spaces to be constructed to meet RMS requirements and the potential 628 parking spaces that could be provided to meet Council's DCP requirements.

These spaces are shown on the development plans. However, to avoid an oversupply of car parking – that could lead to increased traffic – it is recommended that this identified area be retained for future car parking, but the physical construction and/or line-marking of these spaces be undertaken at a later date in response to a demonstrated demand.

5.4 Parking Summary

The 481 parking spaces provided comply with the requirements of the RMS Guide. Based on current employee forecasts, this volume of parking is expected to adequately accommodate the future parking demands of the 4 warehouses on-site without placing any demands on on-street parking in the area. In the event that the forecasts are exceeded, then the design of the Proposal ensures that additional car parking could be constructed in response to a demonstrated demand. Accessible parking is also provided in accordance with Council's DCP and an area has been identified where up to 80 parking spaces could be provided to respond to unforeseen parking demands generated by the external storage area attached to Warehouse A. Accordingly, the Proposal is supportable on parking grounds.

6 Access and Internal Design Aspects

The access, internal circulation and car parking complies with the requirements of Council's DCP and relevant Australian Standard requirements of AS2890.1, AS2890.2 and AS2890.6. The following characteristics are noteworthy with regard to the design of the site access driveway, loading docks and on-grade car park.

Site Access

- All vehicles will enter the proposed developments via access driveways locate on Culverston Road.
- All vehicles would enter and exit the warehouses in a forward direction.
- Each warehouse provides separate driveways for light vehicles (cars) accessing the car parking areas and heavy vehicles (trucks) accessing the loading dock.
- Commercial vehicle access to Warehouse B and C is provided via a shared driveway crossing. In the event that a subdivision was to be sought to separate these building lots, then a Right of Carriageway would be required to formalise this shared arrangement.
- All truck driveways have been designed in accordance with AS2890.2, either through strict application of the guide requirements or based on swept path analysis as is permissible by the guide. As required, relevant swept path analysis demonstrating acceptable access is presented on plans attached at **Appendix C**.
- All car driveways have been designed (as a minimum) in accordance with AS2890.1. As required, some driveways have been widened to accommodate the swept paths of fire appliances as shown on plans attached at Appendix C.

Car Park Design

- All standard staff and employee parking is provided (as a minimum) in accordance with AS2890.1 for a Class 1A user, which requires a minimum space length of 5.4m, a minimum width of 2.4m and a minimum aisle width of 5.8m.
- All spaces located adjacent to obstructions of greater than 150mm in height have been provided with an additional 'clearance width' of 300mm. This includes any landscaping that exceeds 150mm.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- All accessible parking spaces are designed in accordance with AS2890.6. Spaces are provided with a clear width of 2.4m and located adjacent to a shared area of 2.4m minimum width.

Relevant swept path analysis is provided on plans attached at Appendix C, which demonstrate compliance with relevant standards.

Commercial Vehicle Facilities

The commercial (heavy) vehicle facilities of the Proposal have been designed having regard for the operational requirements of the future tenant and the requirements of AS2890.2. In this regard, the following is noteworthy:

- The internal design of the service area has been undertaken in accordance with the requirements of AS2890.2 for the maximum length vehicle accessing each dock.
- A minimum clear head height of 4.5 metres is provided within all areas traversed by service vehicles.
- A minimum bay width of 3.5 metres is provided for all service bays.
- All warehouses provide an area within which trucks (up to B-Doubles) can perform a U-turn.
- Sufficient room between the hardstand area of Warehouse A and the external storage area is provided to accommodate manoeuvrability of commercial vehicles.
- The design includes consideration for emergency vehicles, in particular the provision of a fire trail (where required) around the perimeter of each warehouse building.

Swept path analysis is provided on plans attached at Appendix C, which demonstrate compliance with relevant standards.

In summary, the internal configuration of the Site – including light and heavy vehicular access, car parking and servicing areas – has been designed in accordance with Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

7 Preliminary Construction Traffic Management Plan

A Construction Traffic Management Plan (**CTMP**) will be provided as part of detailed construction planning. For the purposes of this TIA report, the following general principles for managing construction traffic have been assumed and provide an understanding of the likely traffic impacts during the construction period. It should be noted that the construction programme for the development has not yet been finalised.

7.1 Potential Haulage Routes

The primary potential haulage route to and from the Site would be via Campbelltown Road, with trucks accessing the Site from the M31 Motorway either via the Campbelltown Road interchange from the north or the Narellan Road interchange via Blaxland Road from the south. RMS currently identifies both routes as heavy vehicle routes. Construction of the Proposal would generate additional truck movements along these routes. Given that these routes currently carry high volumes of heavy vehicles, construction of the development would not have a significant impact of heavy vehicle volumes on Campbelltown Road, Narellan Road, Blaxland Road or the M31 Motorway.

The movement of materials would be managed through the scheduling of deliveries and would aim to minimise the number of heavy vehicles accessing the Site during peak network periods and weekends.

7.2 Proposed Working Hours

The construction work would vary depending on the phase of construction and associated activities and includes both construction and design personnel. The size of the on-site workforce has not been finalised and as a result, the peak working population on-site at any given time during the construction period may vary. Construction works would be undertaken during standard construction-working hours, which are likely to be as follows:

- Monday to Friday: 6.00AM to 6.00PM
- Saturday: 8.00AM to 5.00PM
- Sunday: 8.00AM to 5.00PM
- Public holidays: No planned work.

It may (on occasions) be necessary to undertake night works to minimise disruption to traffic with the relevant approvals from authorities.

7.3 Construction Traffic Generation

Light vehicle traffic generation would be generally associated with staff movements to and from the Site. Staff would be comprised of project managers, various trades and general construction staff. Over the full construction period, the peak workforce represents the worst-case scenario for vehicle movements during the morning or evening road network peak hour. The workforce arrival and departure periods (6.30-7.00AM and 5.00-5.30PM) represent the peak construction traffic periods.

Light vehicle construction trips are expected to arrive in the morning and depart in the evening and the number of trips will be based on the workforce numbers. Parking for these construction related-vehicles will be provided on-site.

Heavy vehicle traffic would mainly be generated by activities associated with the removal of excavated material, delivery of construction equipment and delivery of material for construction works. As the construction programme has yet to be finalised, a worst-case scenario for heavy vehicle movements per day required for the delivery of construction materials to the Site cannot be accurately determined. However, these deliveries are likely to occur outside of the peak network traffic periods and would have limited (if any) impact on traffic on Campbelltown Road, Narellan Road, Blaxland Road or the M31 Motorway, which currently all have high proportions of heavy vehicles.

Importantly, the construction traffic volumes are expected to be lower than the volumes anticipated for the proposed development once it becomes operational. Therefore, recognising that the key intersections are expected to perform satisfactorily once the Proposal is completed, it can be assumed that the intersections would satisfactorily accommodate the lower volumes of construction traffic.

7.4 Construction Mitigation Measures

While the traffic impacts of construction of the development are likely to be negligible, the following measures should be undertaken to minimise the impacts of the construction activities of the development:

- Traffic control would be required to manage and regulate traffic movements into and out of the site during construction.
- Disruption to road users would be kept to a minimum by scheduling intensive delivery activities outside of peak hours.
- Construction and delivery vehicles would be limited to use of Campbelltown Road, Narellan Road, Blaxland Road or the M31 Motorway and restricted to non-peak periods.

8 Response to Secretary's Environmental Assessment Requirements

As mentioned, the SEARs documented key areas that must be addressed to ensure the environmental impacts of the Proposal are suitably assessed. This TIA report responds to the traffic and transport issues raised in the SEARs report as detailed in Section 1. A response to each issue is detailed below. Generally the response is to simply identify the section with this TIA report that addresses each requirement; however, some responses provide further information as required.

A Traffic Impact Assessment detailing all daily and peak traffic and transport movements likely to be generated (vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development, including a description of vehicle access routes and the impacts on nearby intersections.

- Section 4.1 covers peak hour and daily traffic generation for total vehicle movements. Section 4.2 covers person trips for public transport, pedestrian and cycle travel generated by the Proposal.
- As the construction programme has yet to be finalised, a worst-case scenario for heavy vehicle movements per day required for the delivery of construction materials to the Site cannot be accurately determined. However, construction traffic volumes are expected to be lower than the volumes anticipated for the Proposal once it becomes operational; therefore, the local road network would continue to operate satisfactorily during the construction stage.
- Section 4.3 provides details on vehicle access routes (trip distribution and assignment) for future development traffic and Section 7.1 provides details on potential haulage routes for construction traffic.
- Relevant intersection modelling (network performance testing) is provided at Section 4.4.

Details of access to the site from the road network including intersection location, design and sight distance.

- Section 6 provides details on direct site access and internal design requirements, including car parking and loading dock design.

An assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development.

- Relevant intersection modelling (capacity testing) is provided at Section 4.4 and 4.5, which demonstrates satisfactory performance of the study road network following completion of the Proposal.

Plans of any road upgrades or new roads required for the development if necessary.

- As mentioned, the key intersections analysed are anticipated to operate satisfactorily under the current arrangements. Accordingly, no upgrades are required in response to the traffic demands forecast for the Proposal.

Detailed plans of the proposed layout of the internal road network and parking provision on-site in accordance with the relevant Australian Standards.

- Relevant architectural plans are attached at Appendix A.
- Section 5 covers on-site car parking provisions and Section 6 provides details of car parking design with regard to relevant AS2890 standards.

Details of any likely dangerous goods to be transported on arterial and local roads to/from the site, if any, and the preparation of an incident management strategy.

- The Proposal does not include any operations that would result in the transportation of dangerous goods.

9 Conclusions

The key findings of this Traffic Impact Assessment are:

- The Proposal generally seeks approval for 4 warehouses, ancillary office space and external storage area with a total of 181,066 m^2 of GFA with supporting infrastructure and servicing areas and 481 car parking spaces.

- Traffic demand analysis indicates that the development would result in 110 additional trips on the surrounding road network during morning peak hour and 121 during the evening peak hour with reduced generation at other times. SIDRA analysis indicates that the study network is expected to continue to operate at 'good' levels with a LOS of B or better following completion of the Proposal. It is anticipated that the network would also accommodate cumulative traffic demand and modal analysis indicates that the Proposal would generate no material demand on public transport services or local pedestrian & cycling facilities.

- The 481 parking spaces provided comply with the requirements of the RMS Guide. Based on current employee forecasts, this volume of parking is expected to adequately accommodate the future parking demands of the 4 warehouses on-site without placing any demands on on-street parking in the area. In the event that the forecasts are exceeded, then the design of the Proposal ensures that additional car parking could be constructed in response to a demonstrated demand.

- Accessible parking is also provided in accordance with Council's DCP and an area has been identified where up to 80 parking spaces could be provided to respond to unforeseen parking demands generated by the external storage area attached to Warehouse A.

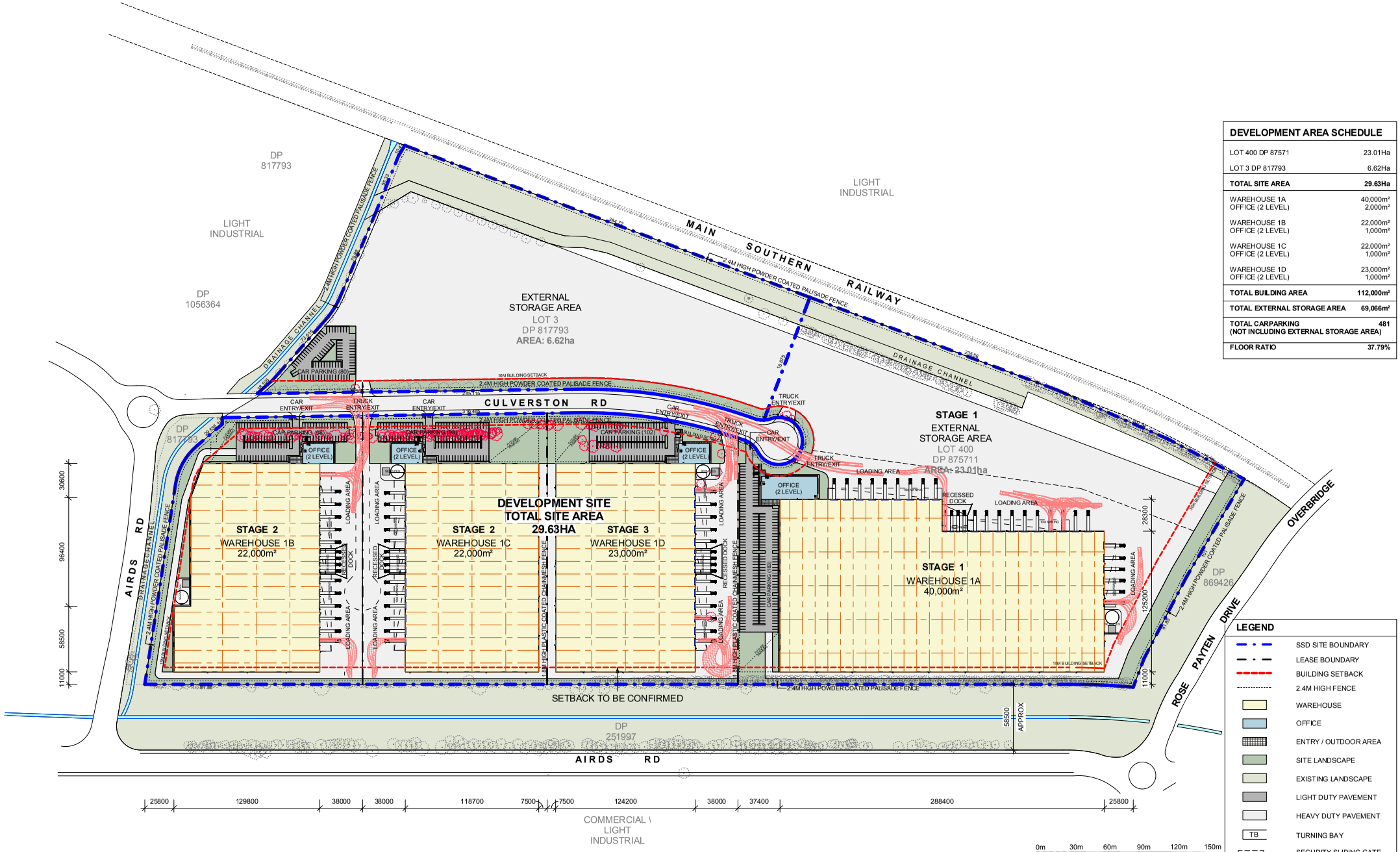
- The internal configuration of the Site – including light and heavy vehicular access, car parking and servicing areas – has been designed in accordance with Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

- A construction traffic management plan will be provided as part of detailed construction planning. This TIA report provides general principles for managing construction traffic, which provide an understanding of the likely traffic impacts during the construction period. The construction traffic volumes are expected to be lower than the volumes anticipated for the proposed development once it becomes operational. Therefore, recognising that the key intersections are anticipated to perform satisfactorily once the Proposal is completed, it can be assumed that the intersections would satisfactorily accommodate the lower volumes of construction traffic.

- This TIA Report satisfactorily addresses the traffic and transport related SEARs.

It is therefore concluded that the proposed development at 5 & 9 Culverston Road, Minto is supportable on traffic planning grounds.

Appendix A



DEVELOPMENT AREA SCHEDULE

LOT 400 DP 87571	23.01Ha
LOT 3 DP 817793	6.62Ha
TOTAL SITE AREA	**29.63Ha**
WAREHOUSE 1A	40,000m²
OFFICE (2 LEVEL)	2,000m²
WAREHOUSE 1B	22,000m²
OFFICE (2 LEVEL)	1,000m²
WAREHOUSE 1C	22,000m²
OFFICE (2 LEVEL)	1,000m²
WAREHOUSE 1D	23,000m²
OFFICE (2 LEVEL)	1,000m²
TOTAL BUILDING AREA	**112,000m²**
TOTAL EXTERNAL STORAGE AREA	**69,066m²**
TOTAL CARPARKING (NOT INCLUDING EXTERNAL STORAGE AREA)	**481**
FLOOR RATIO	**37.79%**

LEGEND

- SSD SITE BOUNDARY
- LEASE BOUNDARY
- BUILDING SETBACK
- 2.4M HIGH FENCE
- WAREHOUSE
- OFFICE
- ENTRY / OUTDOOR AREA
- SITE LANDSCAPE
- EXISTING LANDSCAPE
- LIGHT DUTY PAVEMENT
- HEAVY DUTY PAVEMENT
- TB TURNING BAY
- SECURITY SLIDING GATE

0m 30m 60m 90m 120m 150m

VISUAL SCALE 1:1500 @ A1

NOTE: ALL FFL LEVELS ± 500mm

PRELIMINARY

Notes

This drawing and design is subject to Reid Campbell (NSW) Pty Ltd copyright and may not be reproduced without prior written consent.
Contractor to verify all dimensions on site before commencing work.
Report all discrepancies to project manager prior to proceeding.
Figured dimensions to be taken in preference to scaled drawings.
All work is to conform to relevant Australian Standards and other Codes as applicable, together with other Authorities' requirements and regulations.

Issue	Description	Date	Vor	Auth
1	REVISED MASTERPLAN	26/02/2016		
2	DRAWING NUMBER CHANGED	07/03/2016		
3	PRELIMINARY ISSUE	24/03/2016		
4	CARPARK REVISED	29/04/2016		
5	ISSUE FOR INFORMATION	28/04/2016		

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Fax: 61 02 9954 4946 Web: www.reidcampbell.com

STATE SIGNIFICANT DEVELOPMENT

Client: DUAC

Managing Consultant: TACTICAL

Project: **MINTO INDUSTRIAL DEVELOPMENT**
LOT 400 DP 875711 AND LOT 3 DP 817793, 5-9 CULVERSTON ROAD, MINTO NSW

Drawn: BF Checked: JH Print Date: 4/22/2016 5:17:58 PM

North Point

Drawing Title: **SITE MASTERPLAN (OVERALL)**

Drawing Number: **116101_A _SSD_A0006** Issue: **5**

C:\Revit\116101_Minto_DOCUMENTATION_bfreid.rvt

Appendix B

LANE SUMMARY

Site: BASE AM

Campbelltown Rd x Rose Payten Dr
Base
AM Peak
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Campbelltown Rd (485m)													
Lane 1	736	5.0	1294	0.569	100	3.4	LOS A	7.8	57.1	Full	485	0.0	0.0
Lane 2	736	5.0	1294	0.569	100	3.4	LOS A	7.8	57.1	Full	485	0.0	0.0
Lane 3	135	10.0	187	0.719	100	36.8	LOS C	6.1	46.1	Short	100	0.0	NA
Lane 4	131	10.0	182	0.719	100	35.8	LOS C	5.9	44.8	Short	100	0.0	NA
Approach	1738	5.8		0.719		8.4	LOS A	7.8	57.1				
East: Rose Payten Dr (175m)													
Lane 1	59	10.0	695	0.085	100	18.5	LOS B	1.7	13.1	Short	70	0.0	NA
Lane 2	295	10.0	372[1]	0.793	100	58.0	LOS E	17.5	132.9	Full	175	0.0	0.0
Lane 3	298	10.0	376	0.793	100	58.1	LOS E	17.7	134.4	Full	175	0.0	0.0
Approach	652	10.0		0.793		54.5	LOS D	17.7	134.4				
North: Campbelltown Rd (500m+)													
Lane 1	482	10.0	1216	0.397	100	13.1	LOS A	10.6	80.9	Short	160	0.0	NA
Lane 2	854	5.0	1097	0.778	100	20.8	LOS B	37.9	276.6	Full	1680	0.0	0.0
Lane 3	854	5.0	1097	0.778	100	20.8	LOS B	37.9	276.6	Full	1680	0.0	0.0
Approach	2189	6.1		0.778		19.1	LOS B	37.9	276.6				
Intersection	4579	6.5		0.793		20.1	LOS B	37.9	276.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: BASE PM

Campbelltown Rd x Rose Payten Dr
Base
PM Peak
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Campbelltown Rd (485m)													
Lane 1	842	5.0	1341	0.628	100	2.1	LOS A	6.6	48.3	Full	485	0.0	0.0
Lane 2	842	5.0	1341	0.628	100	2.1	LOS A	6.6	48.3	Full	485	0.0	0.0
Lane 3	113	5.0	164	0.689	100	41.2	LOS C	5.2	37.9	Short	100	0.0	NA
Lane 4	109	5.0	159	0.689	100	40.3	LOS C	5.0	36.7	Short	100	0.0	NA
Approach	1906	5.0		0.689		6.6	LOS A	6.6	48.3				
East: Rose Payten Dr (175m)													
Lane 1	67	5.0	635	0.106	100	27.0	LOS B	2.5	18.6	Short	70	0.0	NA
Lane 2	228	5.0	344	0.663	100	55.0	LOS D	12.6	92.1	Full	175	0.0	0.0
Lane 3	228	5.0	344	0.663	100	55.0	LOS D	12.6	92.1	Full	175	0.0	0.0
Approach	523	5.0		0.663		51.4	LOS D	12.6	92.1				
North: Campbelltown Rd (500m+)													
Lane 1	528	5.0	1488	0.355	100	8.5	LOS A	7.0	50.8	Short	160	0.0	NA
Lane 2	907	5.0	983[1]	0.922	100	37.1	LOS C	51.6	376.4	Full	1680	0.0	0.0
Lane 3	1070	5.0	1161	0.922	100	36.6	LOS C	67.0	489.2	Full	1680	0.0	0.0
Approach	2505	5.0		0.922		30.9	LOS C	67.0	489.2				
Intersection	4935	5.0		0.922		23.7	LOS B	67.0	489.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: BASE + DEV AM

Campbelltown Rd x Rose Payten Dr
Base + Dev.
AM Peak
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Campbelltown Road (485m)													
Lane 1	736	5.0	1294	0.569	100	3.4	LOS A	7.8	57.1	Full	485	0.0	0.0
Lane 2	736	5.0	1294	0.569	100	3.4	LOS A	7.8	57.1	Full	485	0.0	0.0
Lane 3	141	10.0	173	0.812	100	46.8	LOS D	7.2	54.6	Short	100	0.0	NA
Lane 4	137	10.0	169	0.812	100	46.0	LOS D	7.0	53.2	Short	100	0.0	NA
Approach	1751	5.8		0.812		10.2	LOS A	7.8	57.1				
East: Rose Payten Drive (175m)													
Lane 1	60	10.0	682	0.088	100	18.1	LOS B	1.7	13.2	Short	70	0.0	NA
Lane 2	297	10.0	369[1]	0.806	100	58.8	LOS E	17.8	135.5	Full	175	0.0	0.0
Lane 3	303	10.0	376	0.806	100	58.9	LOS E	18.2	138.2	Full	175	0.0	0.0
Approach	660	10.0		0.806		55.2	LOS D	18.2	138.2				
North: Campbelltown Road (500m+)													
Lane 1	504	10.0	1186	0.425	100	14.1	LOS A	12.0	91.1	Short	160	0.0	NA
Lane 2	854	5.0	1113	0.767	100	20.0	LOS B	37.1	271.1	Full	1680	0.0	0.0
Lane 3	854	5.0	1113	0.767	100	20.0	LOS B	37.1	271.1	Full	1680	0.0	0.0
Approach	2212	6.1		0.767		18.6	LOS B	37.1	271.1				
Intersection	4622	6.6		0.812		20.7	LOS B	37.1	271.1				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: BASE + DEV PM

Campbelltown Rd x Rose Payten Dr
Base + Dev.
PM Peak
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Campbelltown Road (485m)													
Lane 1	842	5.0	1341	0.628	100	2.1	LOS A	6.6	48.3	Full	485	0.0	0.0
Lane 2	842	5.0	1341	0.628	100	2.1	LOS A	6.6	48.3	Full	485	0.0	0.0
Lane 3	115	5.0	164	0.704	100	42.1	LOS C	5.4	39.2	Short	100	0.0	NA
Lane 4	112	5.0	159	0.704	100	41.2	LOS C	5.2	38.0	Short	100	0.0	NA
Approach	1912	5.0		0.704		6.8	LOS A	6.6	48.3				
East: Rose Payten Drive (175m)													
Lane 1	73	5.0	635	0.114	100	26.7	LOS B	2.7	20.1	Short	70	0.0	NA
Lane 2	240	5.0	344	0.698	100	56.0	LOS D	13.5	98.8	Full	175	0.0	0.0
Lane 3	240	5.0	344	0.698	100	56.0	LOS D	13.5	98.8	Full	175	0.0	0.0
Approach	553	5.0		0.698		52.2	LOS D	13.5	98.8				
North: Campbelltown Road (500m+)													
Lane 1	537	5.0	1502	0.357	100	8.3	LOS A	6.8	49.3	Short	160	0.0	NA
Lane 2	906	5.0	982[1]	0.923	100	37.3	LOS C	51.6	376.8	Full	1680	0.0	0.0
Lane 3	1071	5.0	1161	0.923	100	36.8	LOS C	67.2	490.4	Full	1680	0.0	0.0
Approach	2514	5.0		0.923		30.9	LOS C	67.2	490.4				
Intersection	4978	5.0		0.923		24.0	LOS B	67.2	490.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.
The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the adjacent full-length lanes. Some upstream delays at entry to short lanes are not included.

MOVEMENT SUMMARY

Site: BASE AM

Airds Rd x Rose Payten Dr
Base
AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Airds Road (450m)											
1	L2	18	10.0	0.097	8.6	LOS A	0.4	3.0	0.61	0.75	47.4
2	T1	119	20.0	0.272	7.1	LOS A	1.3	10.3	0.62	0.78	52.0
3	R2	129	10.0	0.272	11.7	LOS A	1.3	10.3	0.63	0.78	52.6
3u	U	1	10.0	0.272	13.9	LOS A	1.3	10.3	0.63	0.78	52.6
Approach		267	14.4	0.272	9.4	LOS A	1.3	10.3	0.63	0.78	52.1
East: Rose Payten Drive (500m+)											
4	L2	259	10.0	0.425	5.2	LOS A	2.3	17.2	0.45	0.56	54.0
5	T1	579	10.0	0.425	5.0	LOS A	2.3	17.2	0.45	0.57	53.1
6	R2	81	20.0	0.425	10.6	LOS A	2.2	17.2	0.46	0.57	54.6
6u	U	1	10.0	0.425	12.5	LOS A	2.2	17.2	0.46	0.57	56.3
Approach		920	10.9	0.425	5.5	LOS A	2.3	17.2	0.45	0.57	53.5
North: Airds Road (500m)											
7	L2	25	20.0	0.133	6.6	LOS A	0.6	5.2	0.57	0.64	53.4
8	T1	112	20.0	0.133	6.2	LOS A	0.6	5.2	0.57	0.66	53.6
9	R2	74	20.0	0.133	11.9	LOS A	0.6	5.0	0.57	0.74	47.6
9u	U	1	20.0	0.133	14.1	LOS A	0.6	5.0	0.57	0.74	52.5
Approach		212	20.0	0.133	8.3	LOS A	0.6	5.2	0.57	0.69	51.8
West: Rose Payten Drive (175m)											
10	L2	258	20.0	0.409	5.9	LOS A	1.9	15.2	0.43	0.61	50.9
11	T1	449	10.0	0.409	5.4	LOS A	1.9	15.2	0.43	0.61	53.6
12	R2	68	10.0	0.409	10.8	LOS A	1.9	14.4	0.43	0.61	51.8
12u	U	2	10.0	0.409	13.0	LOS A	1.9	14.4	0.43	0.61	48.7
Approach		778	13.3	0.409	6.0	LOS A	1.9	15.2	0.43	0.61	52.6
All Vehicles		2177	13.1	0.425	6.5	LOS A	2.3	17.2	0.48	0.62	52.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE PM

Airds Rd x Rose Payten Dr
Base
PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Airds Road (450m)											
1	L2	51	5.0	0.108	7.4	LOS A	0.4	3.1	0.55	0.71	48.9
2	T1	104	10.0	0.302	5.9	LOS A	1.5	11.0	0.57	0.73	52.4
3	R2	182	5.0	0.302	11.0	LOS A	1.5	11.0	0.57	0.73	53.0
3u	U	4	5.0	0.302	13.1	LOS A	1.5	11.0	0.57	0.73	53.1
Approach		341	6.5	0.302	8.9	LOS A	1.5	11.0	0.57	0.73	52.4
East: Rose Payten Drive (500m+)											
4	L2	233	5.0	0.343	5.7	LOS A	1.7	12.1	0.53	0.65	53.9
5	T1	379	5.0	0.343	5.5	LOS A	1.7	12.1	0.53	0.63	53.1
6	R2	37	10.0	0.343	11.1	LOS A	1.6	11.9	0.54	0.62	54.8
Approach		648	5.3	0.343	5.9	LOS A	1.7	12.1	0.53	0.64	53.5
North: Airds Road (500m)											
7	L2	104	10.0	0.338	7.4	LOS A	1.9	14.1	0.70	0.77	53.1
8	T1	297	10.0	0.338	7.2	LOS A	1.9	14.1	0.70	0.80	53.0
9	R2	116	10.0	0.338	12.9	LOS A	1.8	13.4	0.70	0.85	48.8
Approach		517	10.0	0.338	8.5	LOS A	1.9	14.1	0.70	0.81	52.3
West: Rose Payten Drive (175m)											
10	L2	135	10.0	0.437	5.7	LOS A	2.2	16.1	0.43	0.57	51.2
11	T1	677	5.0	0.437	5.3	LOS A	2.2	16.1	0.44	0.59	53.9
12	R2	57	5.0	0.437	10.7	LOS A	2.1	15.7	0.44	0.60	52.3
12u	U	3	5.0	0.437	12.9	LOS A	2.1	15.7	0.44	0.60	49.9
Approach		872	5.8	0.437	5.7	LOS A	2.2	16.1	0.44	0.58	53.4
All Vehicles		2378	6.7	0.437	6.8	LOS A	2.2	16.1	0.54	0.67	53.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE + DEV AM

Airds Rd x Rose Payten Dr
Base + Dev.
AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Airds Road (450m)											
1	L2	18	10.0	0.103	8.7	LOS A	0.4	3.2	0.62	0.76	47.3
2	T1	132	20.0	0.288	7.2	LOS A	1.4	11.1	0.64	0.78	52.0
3	R2	129	10.0	0.288	11.8	LOS A	1.4	11.1	0.64	0.79	52.6
3u	U	1	10.0	0.288	14.0	LOS A	1.4	11.1	0.64	0.79	52.6
Approach		280	14.7	0.288	9.4	LOS A	1.4	11.1	0.64	0.79	52.1
East: Rose Payten Drive (500m+)											
4	L2	259	10.0	0.436	5.3	LOS A	2.3	17.7	0.46	0.57	53.9
5	T1	579	10.0	0.436	5.1	LOS A	2.3	17.7	0.47	0.58	52.9
6	R2	89	20.0	0.436	10.7	LOS A	2.3	17.8	0.47	0.59	54.5
6u	U	1	10.0	0.436	12.6	LOS A	2.3	17.8	0.47	0.59	56.2
Approach		928	11.0	0.436	5.7	LOS A	2.3	17.8	0.47	0.58	53.4
North: Airds Road (500m)											
7	L2	29	20.0	0.148	6.7	LOS A	0.7	5.9	0.58	0.65	53.3
8	T1	120	20.0	0.148	6.3	LOS A	0.7	5.9	0.58	0.67	53.5
9	R2	82	20.0	0.148	12.0	LOS A	0.7	5.7	0.59	0.75	47.5
9u	U	1	20.0	0.148	14.2	LOS A	0.7	5.7	0.59	0.75	52.4
Approach		233	20.0	0.148	8.4	LOS A	0.7	5.9	0.58	0.70	51.7
West: Rose Payten Drive (175m)											
10	L2	293	20.0	0.435	6.1	LOS A	2.1	16.5	0.45	0.63	50.8
11	T1	449	10.0	0.435	5.5	LOS A	2.1	16.5	0.45	0.62	53.5
12	R2	68	10.0	0.435	11.0	LOS A	2.1	15.6	0.45	0.62	51.7
12u	U	2	10.0	0.435	13.1	LOS A	2.1	15.6	0.45	0.62	48.6
Approach		813	13.6	0.435	6.2	LOS A	2.1	16.5	0.45	0.62	52.4
All Vehicles		2254	13.3	0.436	6.6	LOS A	2.3	17.8	0.49	0.63	52.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE + DEV PM

Airds Rd x Rose Payten Dr
Base + Dev.
PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Airds Road (450m)											
1	L2	51	5.0	0.111	7.6	LOS A	0.4	3.2	0.56	0.72	48.7
2	T1	109	10.0	0.313	6.0	LOS A	1.6	11.5	0.59	0.74	52.3
3	R2	182	5.0	0.313	11.1	LOS A	1.6	11.5	0.59	0.75	52.9
3u	U	4	5.0	0.313	13.3	LOS A	1.6	11.5	0.59	0.75	53.0
Approach		346	6.6	0.313	9.0	LOS A	1.6	11.5	0.58	0.74	52.3
East: Rose Payten Drive (500m+)											
4	L2	233	5.0	0.360	5.9	LOS A	1.8	12.8	0.56	0.68	53.8
5	T1	379	5.0	0.360	5.8	LOS A	1.8	12.8	0.56	0.66	52.9
6	R2	40	10.0	0.360	11.3	LOS A	1.7	12.6	0.57	0.65	54.6
Approach		652	5.3	0.360	6.2	LOS A	1.8	12.8	0.56	0.67	53.4
North: Airds Road (500m)											
7	L2	119	10.0	0.387	7.6	LOS A	2.2	17.0	0.72	0.80	53.0
8	T1	325	10.0	0.387	7.5	LOS A	2.2	17.0	0.72	0.84	52.8
9	R2	145	10.0	0.387	13.3	LOS A	2.2	16.5	0.72	0.89	48.2
Approach		589	10.0	0.387	9.0	LOS A	2.2	17.0	0.72	0.84	51.9
West: Rose Payten Drive (175m)											
10	L2	148	10.0	0.447	5.7	LOS A	2.3	16.7	0.44	0.58	51.2
11	T1	677	5.0	0.447	5.3	LOS A	2.3	16.7	0.45	0.59	53.9
12	R2	57	5.0	0.447	10.8	LOS A	2.2	16.2	0.45	0.60	52.2
12u	U	3	5.0	0.447	12.9	LOS A	2.2	16.2	0.45	0.60	49.8
Approach		885	5.8	0.447	5.8	LOS A	2.3	16.7	0.45	0.59	53.4
All Vehicles		2473	6.8	0.447	7.1	LOS A	2.3	17.0	0.56	0.69	52.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE AM

Culverston Rd x Airds Rd
Base
AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Culverston Road (500m)											
1	L2	22	20.0	0.026	4.5	LOS A	0.1	1.0	0.32	0.45	53.1
2	T1	6	20.0	0.026	4.7	LOS A	0.1	1.0	0.32	0.45	57.6
3u	U	1	20.0	0.026	12.3	LOS A	0.1	1.0	0.32	0.45	57.3
Approach		29	20.0	0.026	4.9	LOS A	0.1	1.0	0.32	0.45	54.8
North: Airds Road (500m+)											
8	T1	27	20.0	0.134	4.2	LOS A	0.7	5.6	0.17	0.57	55.8
9	R2	148	20.0	0.134	9.5	LOS A	0.7	5.6	0.17	0.57	53.8
9u	U	6	20.0	0.134	11.8	LOS A	0.7	5.6	0.17	0.57	57.4
Approach		182	20.0	0.134	8.8	LOS A	0.7	5.6	0.17	0.57	54.3
West: Airds Road (300m)											
10	L2	275	20.0	0.210	3.9	LOS A	0.9	7.7	0.07	0.46	56.5
12	R2	41	20.0	0.210	9.3	LOS A	0.9	7.7	0.07	0.46	55.7
12u	U	2	20.0	0.210	11.6	LOS A	0.9	7.7	0.07	0.46	53.2
Approach		318	20.0	0.210	4.6	LOS A	0.9	7.7	0.07	0.46	56.4
All Vehicles		529	20.0	0.210	6.1	LOS A	0.9	7.7	0.12	0.50	55.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE PM

Culverston Rdx Airds Rd
Base
PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Culverston Road (500m)											
1	L2	47	10.0	0.063	5.5	LOS A	0.3	2.4	0.48	0.54	52.8
2	T1	18	10.0	0.063	5.7	LOS A	0.3	2.4	0.48	0.54	57.4
Approach		65	10.0	0.063	5.6	LOS A	0.3	2.4	0.48	0.54	54.7
North: Airds Road (500m+)											
8	T1	7	10.0	0.241	3.9	LOS A	1.4	10.5	0.08	0.61	55.8
9	R2	369	10.0	0.241	9.2	LOS A	1.4	10.5	0.08	0.61	54.6
9u	U	9	10.0	0.241	11.5	LOS A	1.4	10.5	0.08	0.61	57.5
Approach		386	10.0	0.241	9.2	LOS A	1.4	10.5	0.08	0.61	54.7
West: Airds Road (300m)											
10	L2	239	10.0	0.166	3.8	LOS A	0.8	5.8	0.11	0.44	56.8
12	R2	11	10.0	0.166	9.2	LOS A	0.8	5.8	0.11	0.44	56.5
12u	U	2	10.0	0.166	11.5	LOS A	0.8	5.8	0.11	0.44	55.9
Approach		252	10.0	0.166	4.1	LOS A	0.8	5.8	0.11	0.44	56.8
All Vehicles		703	10.0	0.241	7.0	LOS A	1.4	10.5	0.13	0.54	55.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE + DEV AM

Culverston Rdx Airds Rd
Base + Dev.
AM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Culverston Road (500m)											
1	L2	43	20.0	0.051	4.6	LOS A	0.3	2.1	0.34	0.46	53.1
2	T1	14	20.0	0.051	4.7	LOS A	0.3	2.1	0.34	0.46	57.6
3u	U	1	20.0	0.051	12.4	LOS A	0.3	2.1	0.34	0.46	57.3
Approach		58	20.0	0.051	4.8	LOS A	0.3	2.1	0.34	0.46	54.9
North: Airds Road (500m+)											
8	T1	58	20.0	0.170	4.5	LOS A	0.9	7.3	0.28	0.57	55.9
9	R2	148	20.0	0.170	9.8	LOS A	0.9	7.3	0.28	0.57	53.9
9u	U	6	20.0	0.170	12.1	LOS A	0.9	7.3	0.28	0.57	57.5
Approach		213	20.0	0.170	8.5	LOS A	0.9	7.3	0.28	0.57	54.6
West: Airds Road (300m)											
10	L2	275	20.0	0.251	3.9	LOS A	1.2	9.9	0.10	0.49	56.0
12	R2	97	20.0	0.251	9.3	LOS A	1.2	9.9	0.10	0.49	54.9
12u	U	2	20.0	0.251	11.6	LOS A	1.2	9.9	0.10	0.49	52.3
Approach		374	20.0	0.251	5.4	LOS A	1.2	9.9	0.10	0.49	55.8
All Vehicles		644	20.0	0.251	6.3	LOS A	1.2	9.9	0.18	0.51	55.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: BASE + DEV PM

Culverston Rd x Airds Rd
Base + Dev.
PM Peak
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Culverston Road (500m)											
1	L2	120	10.0	0.158	5.7	LOS A	0.9	6.5	0.52	0.59	52.6
2	T1	42	10.0	0.158	5.9	LOS A	0.9	6.5	0.52	0.59	57.3
Approach		162	10.0	0.158	5.8	LOS A	0.9	6.5	0.52	0.59	54.5
North: Airds Road (500m+)											
8	T1	19	10.0	0.264	4.0	LOS A	1.6	12.0	0.16	0.59	55.7
9	R2	369	10.0	0.264	9.3	LOS A	1.6	12.0	0.16	0.59	54.5
9u	U	9	10.0	0.264	11.6	LOS A	1.6	12.0	0.16	0.59	57.4
Approach		398	10.0	0.264	9.1	LOS A	1.6	12.0	0.16	0.59	54.7
West: Airds Road (300m)											
10	L2	239	10.0	0.190	3.9	LOS A	0.9	7.0	0.16	0.46	56.4
12	R2	33	10.0	0.190	9.3	LOS A	0.9	7.0	0.16	0.46	55.9
12u	U	2	10.0	0.190	11.6	LOS A	0.9	7.0	0.16	0.46	55.1
Approach		274	10.0	0.190	4.6	LOS A	0.9	7.0	0.16	0.46	56.4
All Vehicles		834	10.0	0.264	7.0	LOS A	1.6	12.0	0.23	0.55	55.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.

Appendix C

16.675

DRAINAGE CHANNEL

TRUCK
ENTRY/EXIT

CAR
ENTRY/EXIT

TRUCK
ENTRY/EXIT

CAR
ENTRY/EXIT

10M BUILDING SETBACK

OFFICE
(2 LEVEL)

SERVICES

TRUCK
ENTRY/EXIT

LOADING AREA

10M AWNING

OFFICE
(2 LEVEL)

10M AWNING

RECESSED
DOCK

5M AWNING

LOADING AREA

D DOCK

FENCE

D

EXTERNAL STORAGE AREA

LOT 400
DP 875711
AREA: 23.01ha

Revision notes:

Rev:	Date:	Notes:

Drawn By: TL

Client: Tactical Group

Project: 0191
5 & 9 Culverston Road, Minto

Drawing Title: Warehouse 1A
Site Access

Date: 27 April 2016

Scale @ A3: 1:750

Revision: 01

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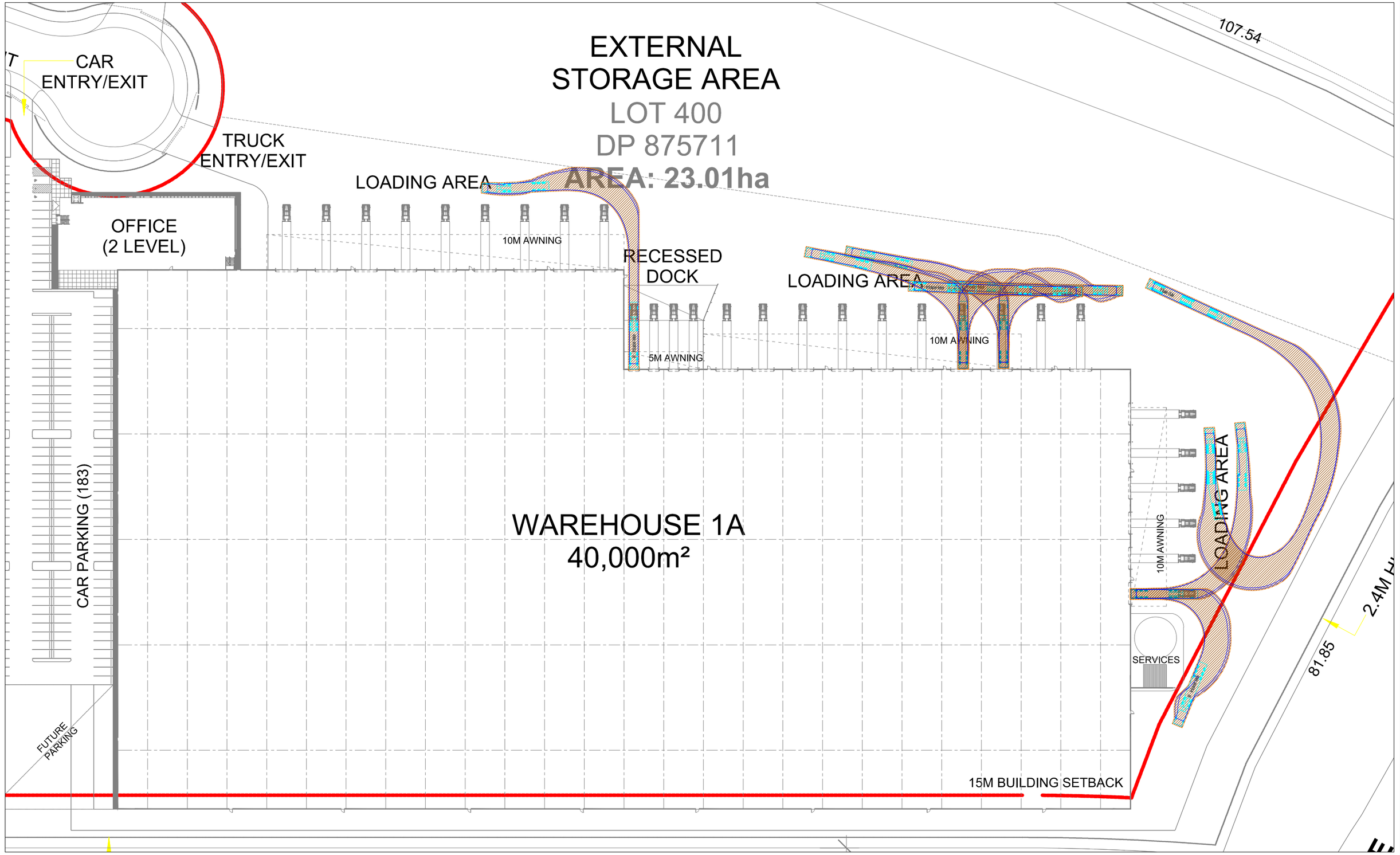


Revision notes:

Rev:	Date:	Notes:

Drawn By: TL

Client: Tactical Group

Project: 0191 5 & 9 Culverston Road, Minto

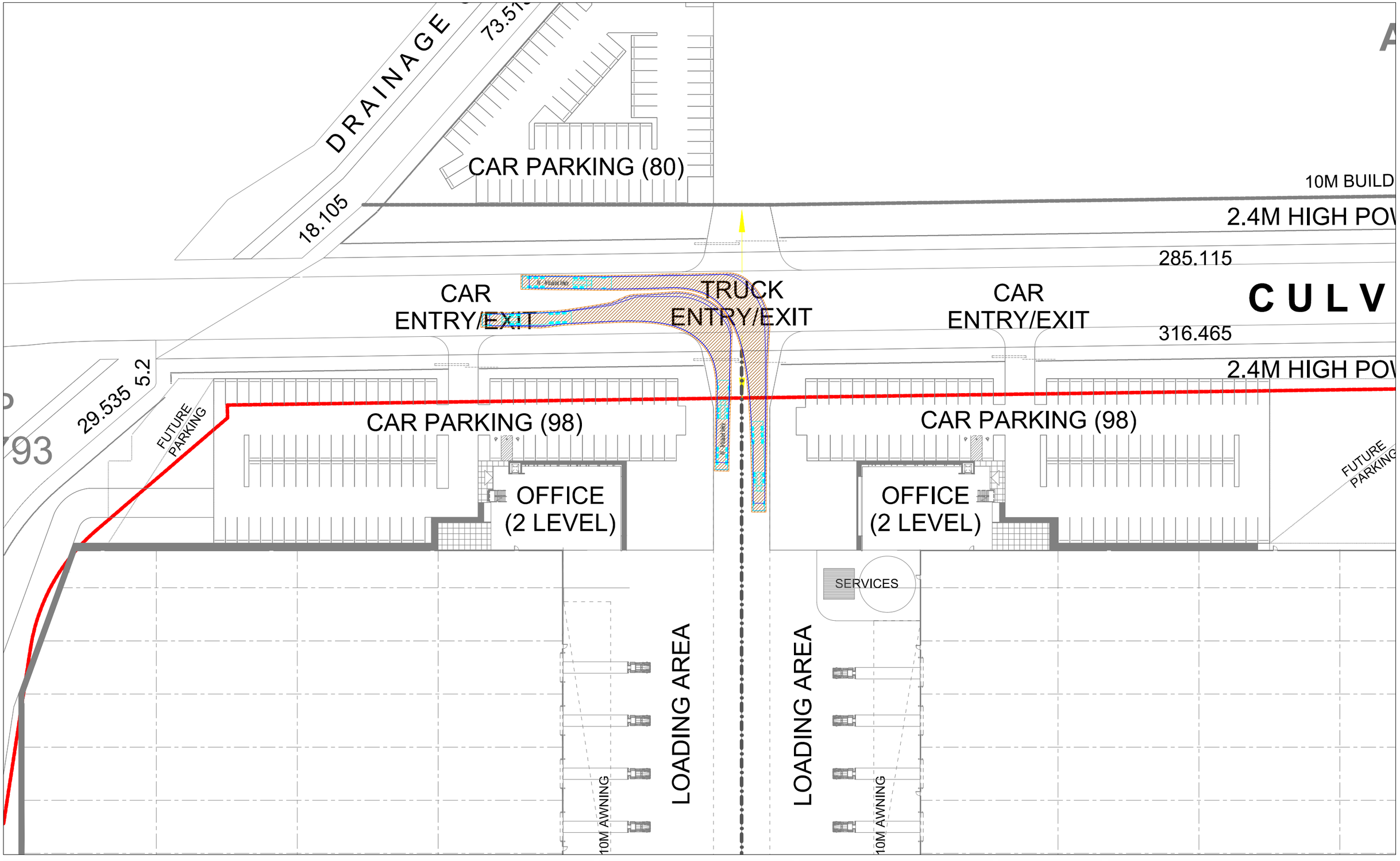
Drawing Title: Warehouse 1A Parking Manoeuvres

Date: 27 April 2016

Scale @ A3: 1:1000

Revision: 01

asongroup
Suite 1404, Level 14, 101 Grafton Street
Bondi Junction, NSW 2022
info@asongroup.com.au



Revision notes:

Rev:	Date:	Notes:

Drawn By: TL

Client: Tactical Group

Project: 0191 5 & 9 Culverston Road, Minto

Drawing Title: Warehouse 1B & 1C Site Access

Date: 27 April 2016

Scale @ A3: 1:750

Revision: 01

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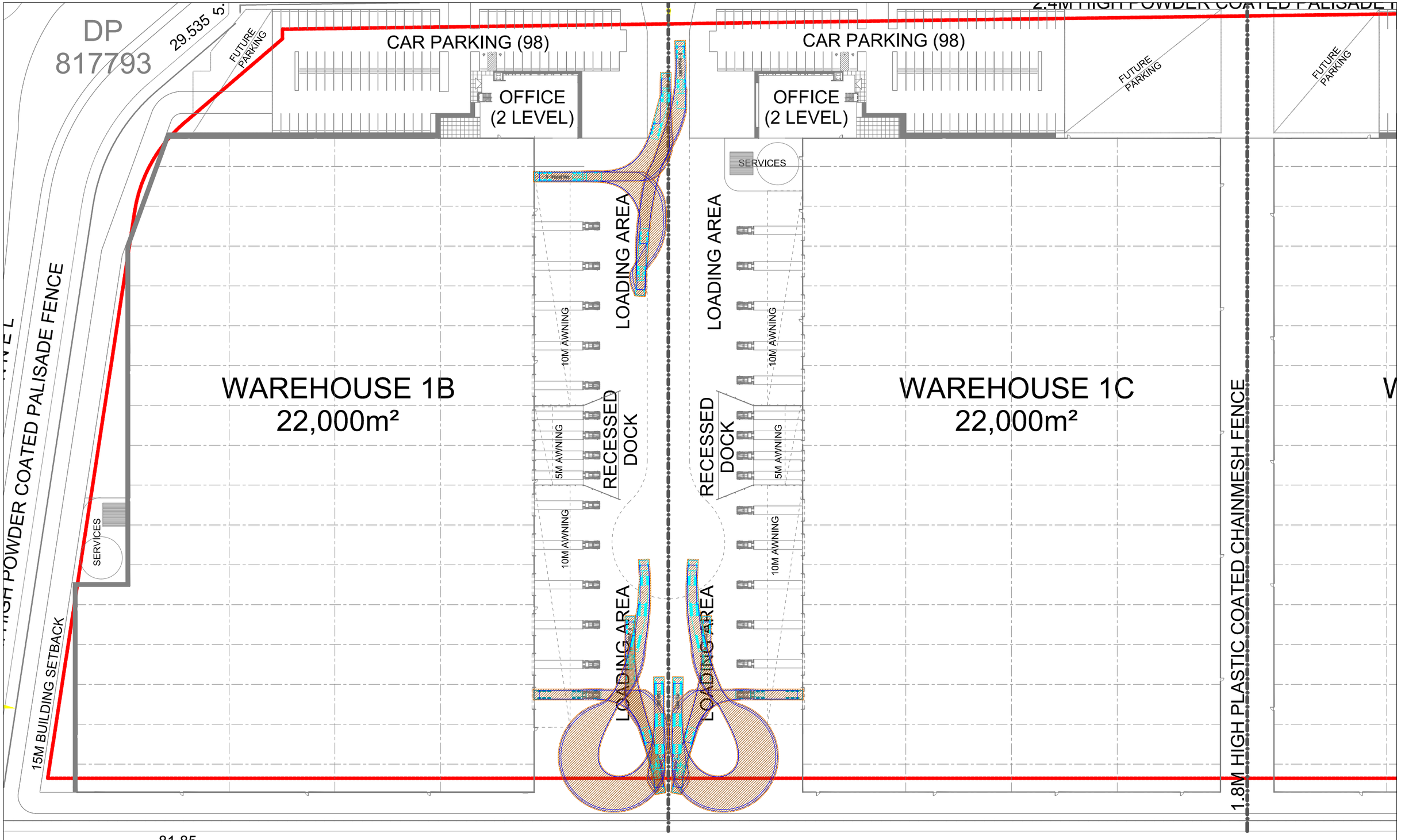

Revision notes:

Rev:	Date:	Notes:

Drawn By: TL

Client: Tactical Group

Project: 0191 — 5 & 9 Culverston Road, Minto

Drawing Title: Warehouse 1B & 1C Parking Manoeuvres

Date: 27 April 2016

Scale @ A3: 1:1000

Revision: 01

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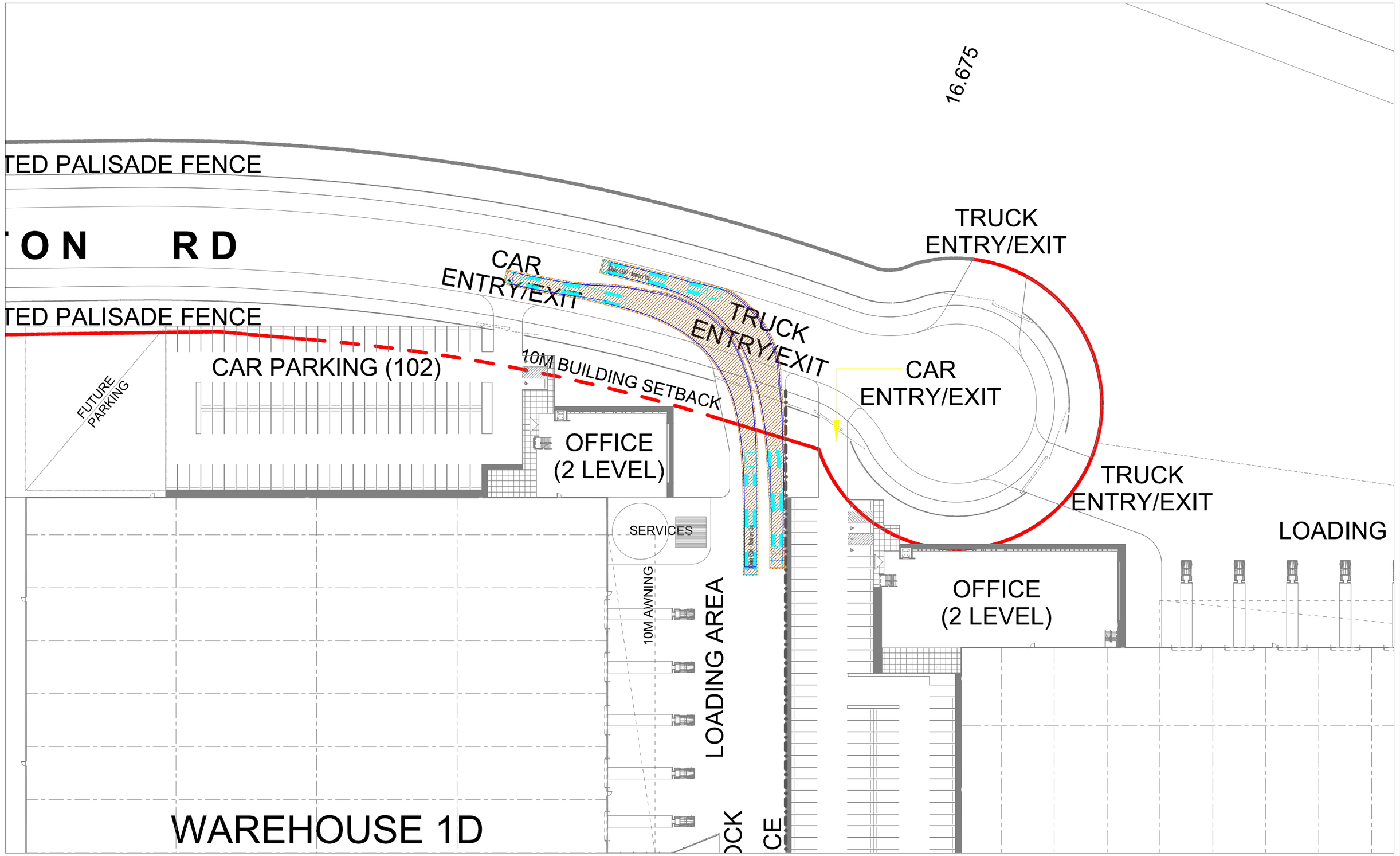
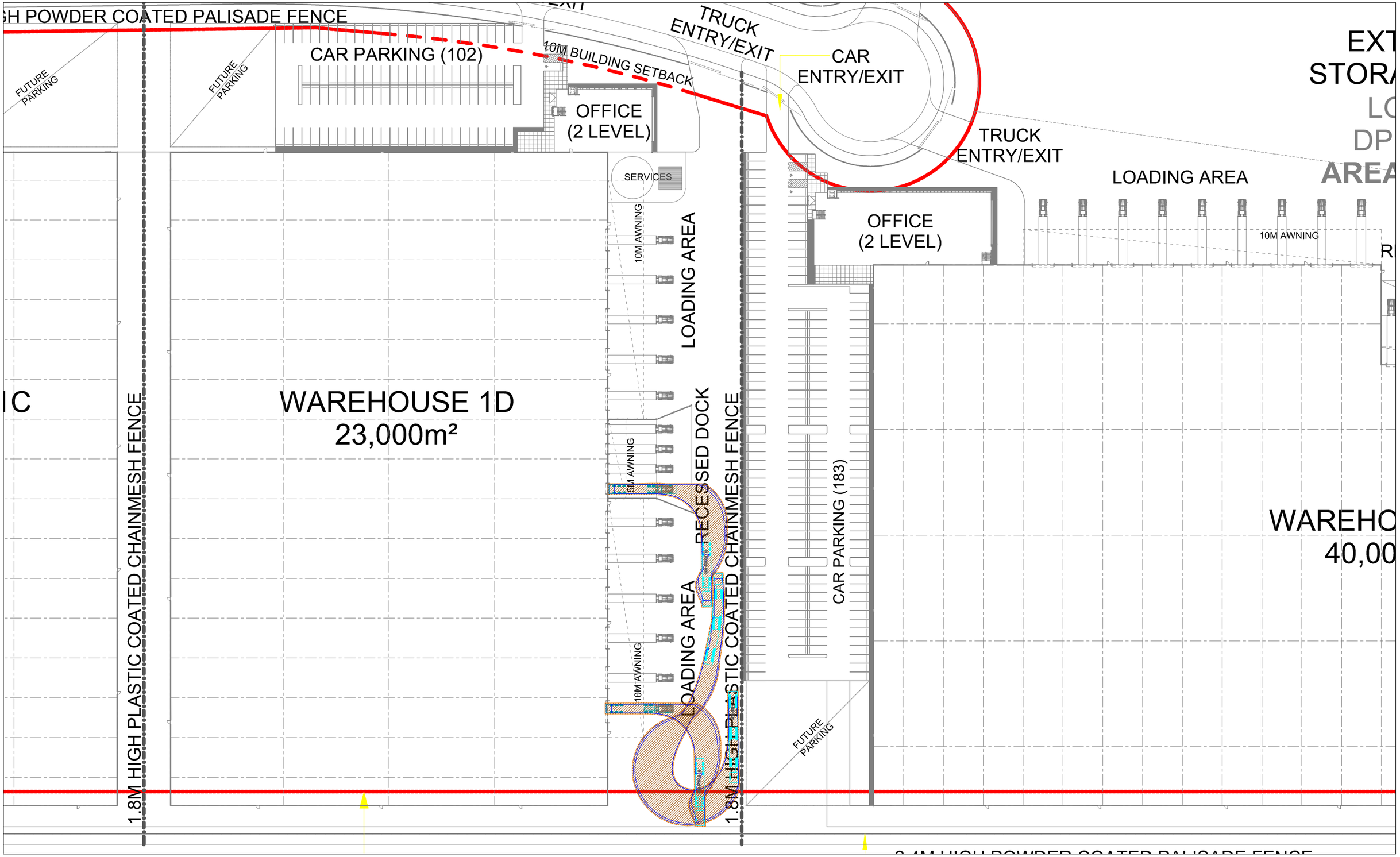


Revision notes:		
Rev:	Date:	Notes:

Drawn By: TL	Project: 0191 5 & 9 Culverston Road, Minto	Date: 27 April 2016	asongroup	
Client: Tactical Group	Drawing Title: Warehouse 1D Site Access	Scale @ A3: 1:750	Suite 1404, Level 14, 101 Grafton Street Bondi Junction, NSW 2022	
		Revision: 01	info@asongroup.com.au	



Revision notes:		
Rev:	Date:	Notes:

Drawn By: TL	Project: 0191 5 & 9 Culverston Road, Minto	Date: 27 April 2016	asongroup	
Client: Tactical Group	Drawing Title: Warehouse 1D Parking Manoeuvres	Scale @ A3: 1:1000	Suite 1404, Level 14, 101 Grafton Street Bondi Junction, NSW 2022	
		Revision: 01	info@asongroup.com.au	