GTAconsultants

Lots 23 and 24 DP 262886 Hollinsworth Road, Marsden Park Transport Impact Assessment

Client //	Logos Property Group
Office //	NSW
Reference //	N105790
Date //	15/11/17

Lots 23 and 24 DP 262886

Hollinsworth Road, Marsden Park

Transport Impact Assessment

Issue: A 15/11/17

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GTA Consultants Office: NSW

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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1. Introduction

1.1 Background

A State Significant Development Application (SSDA) is to be lodged with the Department of Planning and Environment for a proposed warehouse and distribution facilities estate on land located at lots 23 and 24 DP 262886 Hollinsworth Road, Marsden Park.

A Section 96 development application (S96 DA) has been lodged to modify the approved development application (DA) to subdivide the site into three industrial lots and construct the full road width of Hollinsworth Road adjacent to the site.

This SSDA seeks approval for the proposed development of the site to include nine warehouse buildings, totalling some 107,500 square metres Gross Floor Area (GFA), which includes ancillary office space.

Logos Property Group commissioned GTA Consultants (GTA) to undertake a detailed Transport Impact Assessment that addresses specific matters raised in the Secretary's Environmental Assessment Requirements (SEARs) for this State Significate Development (SSD 8606).

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

i Existing traffic and parking conditions surrounding the site
ii Suitability of the proposed parking in terms of supply (quantum) and layout
iii Service vehicle requirements
iv Pedestrian and bicycle requirements
v The traffic generating characteristics of the proposed development
vi Suitability of the proposed access arrangements for the site
vii The transport impact of the development proposal on the surrounding road network.

The operational transport requirements set out in the SEARs dated 4 August 2017 are detailed in Table 1.1

Table 1.1: Transport SEARs (operation) requirements

Consent description	Relevant sections of this report
A quantitative Traffic Impact Assessment prepared in accordance with the relevant Council, Austroads and Roads and Maritime Services guidelines.	Refer to Section 6.3
Details of all daily and peak traffic and transport movements likely to be generated by the development (vehicle type, public transport, pedestrian and cycle trips) during construction and operation.	Refer to Sections 6.1 (operation) and 6.4 (construction)
A cumulative assessment of the predicted impacts on road safety and the capacity of the road network to accommodate the development including existing and future performance of nearby key intersections.	Refer to Section 6.3
Consideration of traffic volumes from the proposal together with existing and approved developments in the area using SIDRA or a similar model.	Refer to Section 6.3
An assessment of the potential impacts of the proposed Castlereagh Motorway road reserve along the southern boundary of the site.	Refer to Section 5.1

Consent description	Relevant sections of this report
Details of any road upgrades or new roads required for the development, if necessary	Refer to Sections 3.2 and 5.1
Details of vehicle circulation of the largest light and heavy vehicle anticipated to access the site, including swept path analysis, loading dock servicing provisions.	Refer to Section 5.2 and Appendix C and D
Detailed plans of the internal road network and parking provision on-site in accordance with the relevant Australian Standards.	Refer to Section 5 and Appendix C and D
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, if necessary.	N/A
Details of bicycle parking and end of trip facilities	Refer to Section 4.5

1.3 References

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

- An inspection of the site and its surrounds
- *Blacktown City Council Growth Centre Precincts Development Control Plan 2016* (BCC GCP DCP 2016)
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- Roads and Maritime Services' (Roads and Maritime) *Guide to Traffic Generating Developments*, version 2.2, October 2002 and Technical Direction for Updated Traffic Surveys (TDT 2013/04a)
- *Richmond Road Upgrade Review of Environmental Factors* (REF) submission, AECOM, December 2011
- *Marsden Park Industrial Transport and Access Study*, ARUP, August 2009
- Plans for the proposed development prepared by watch this space design, drawing Number LG MAR DA01 Revision B, dated 10 November 2017
- Other documents and data as referenced in this report.

2. Transport Situation

2.1 Subject Site

The subject site is located at lots 23 and 24 DP 262886, Marsden Park. The site of approximately 21.48 hectares, has an access frontage of approximately 630 metres to Hollinsworth Road (including future extension) along the northern boundary. The site is zoned Light Industrial (IN2), with SP2 Infrastructure zonings to the north for the future Hollinsworth Road extension and through the site for a future bus only link.

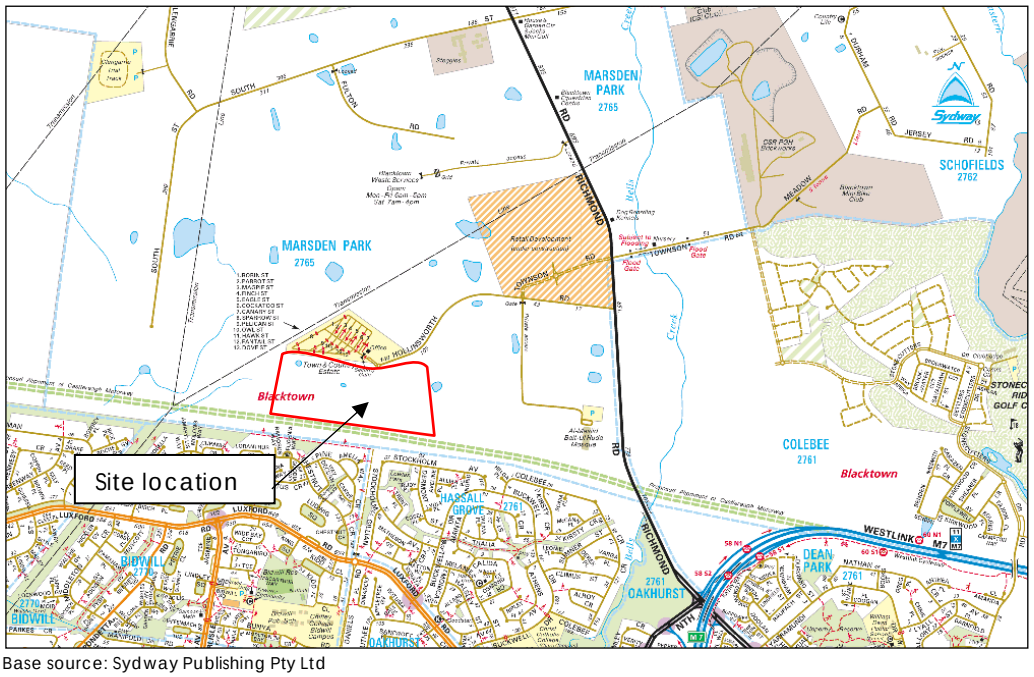
Hollinsworth Road is one of four east-west aligned vehicle access points between the industrial precinct and Richmond Road, the key arterial road connecting Marsden Park with the WestLink M7 Motorway. Hollinsworth Road has been partially upgraded between Richmond Road and Harris Avenue to provide an approximately 18.5 metres wide carriageway that accommodates two lanes in each direction, with an approximately 4.5-metre wide central median. West of Harris Avenue, Hollinsworth Road remains seven metres wide with one lane in each direction; and currently only provides access to a 225-dwelling retirement living facility (Ingenia Lifestyle Stoney Creek Retirement Community) that is located north of the subject site.

To the south of the site is the reserved road corridor for the future Castlereagh Motorway that will link the Westlink M7 Motorway with Springwood Road/ Hawkesbury Road, located west of Hawkesbury-Nepean River. The construction timing of the future motorway and the bus only link are unknown at this stage. The bus only link will connect the Marsden Park Industrial Precinct with Hassall Grove/ Bidwill to the south.

To the east of the site, there are light industrial, warehouse and bulky goods land uses including Linfox Dulux, Lindt Factory Outlet, Aldi, Home Hub, Bunnings, Ikea and Costco.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject site and its environs



Base source: Sydway Publishing Pty Ltd

2.2 Existing conditions

A detailed review of the existing transport situation is provided in Appendix A of this report.

2.3 Future conditions

An overview of the Marsden Park Industrial Precinct is provided the in the following subsections, with a detailed review of the future transport situation provided in Appendix B of this report.

2.3.1 Marsden Park Industrial Precinct

The 551-hectare Marsden Park Industrial Precinct was rezoned in November 2010 under the NSW Government's Precinct Acceleration Protocol. Located 40 kilometres west of the Sydney CBD, the precinct is anticipated to provide 10,000 jobs and 1,200 homes within Sydney's North-West Growth Centre.

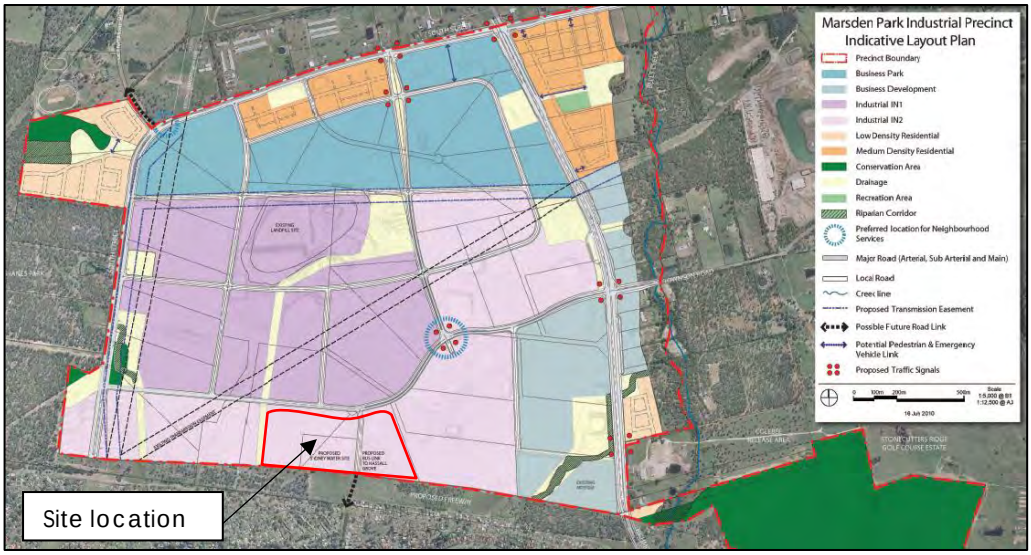
The rezoning was subject to a voluntary planning agreement which has provided funding towards the proposed upgrade of Richmond Road between Hollinsworth Road and Townson Road, which is currently being completed.

On completion, Marsden Park Industrial Precinct will provide:

- 60 hectares of commercial land
- 40 hectares of bulky goods retail
- 206 hectares of industrial land
- 63 hectares of conservation land and open space
- Residential housing close to the planned Marsden Park town centre (located to the north of the industrial precinct) to accommodate 3,500 people.

The Marsden Park Industrial Precinct is shown in Figure 2.2.

Figure 2.2: Marsden Park industrial precinct – indicative layout plan



Base source: Blacktown City Council DCP 2014 Schedule 3 – Marsden Park Industrial Precinct

The road network for the Marsden Park Industrial Precinct is currently being constructed in stages. Most of the roads within the precinct will be designed as industrial roads with either single traffic or parking lane or two traffic lanes in each direction.

3. Development proposal

3.1 Land uses

A summary of the proposed land uses is provided in Table 3.1, with a detailed breakdown by buildings within the estate provided in Table 3.2. The site layout and locations of the buildings within the estate are shown in Figure 3.1.

Table 3.1: Summary of proposed land uses

Land Use	Size (GFA) (m^2)
Warehouse/ Light Industrial	101,139
Office	6,633
Total	107,772

Table 3.2: Breakdown of proposed land uses by building

Subdivision lot	Building	Land use	Size (m^2)
1	Building 1a	Warehouse	6,225
		Office	500
		Total	6,725
	Building 1b	Warehouse	6,245
		Office	500
		Total	6,745
	Building 2A	Warehouse	9,440
		Office	625
		Total	10,065
	Building 2B	Warehouse	9,440
		Office	625
		Total	10,065
2	Building 3	Warehouse	37,110
		Office	2,333
		Total	39,443
3	Building 4	Warehouse	3,263
		Office	300
		Total	3,563
	Building 5	Warehouse + produce sorting facility	5,924
		Office	300
		Total	6,224
	Building 6	Warehouse	11,140
		Office	1,000
		Total	12,140
	Building 7	Warehouse	12,352
		Office	450
		Total	12,802

3.2 Vehicle Access

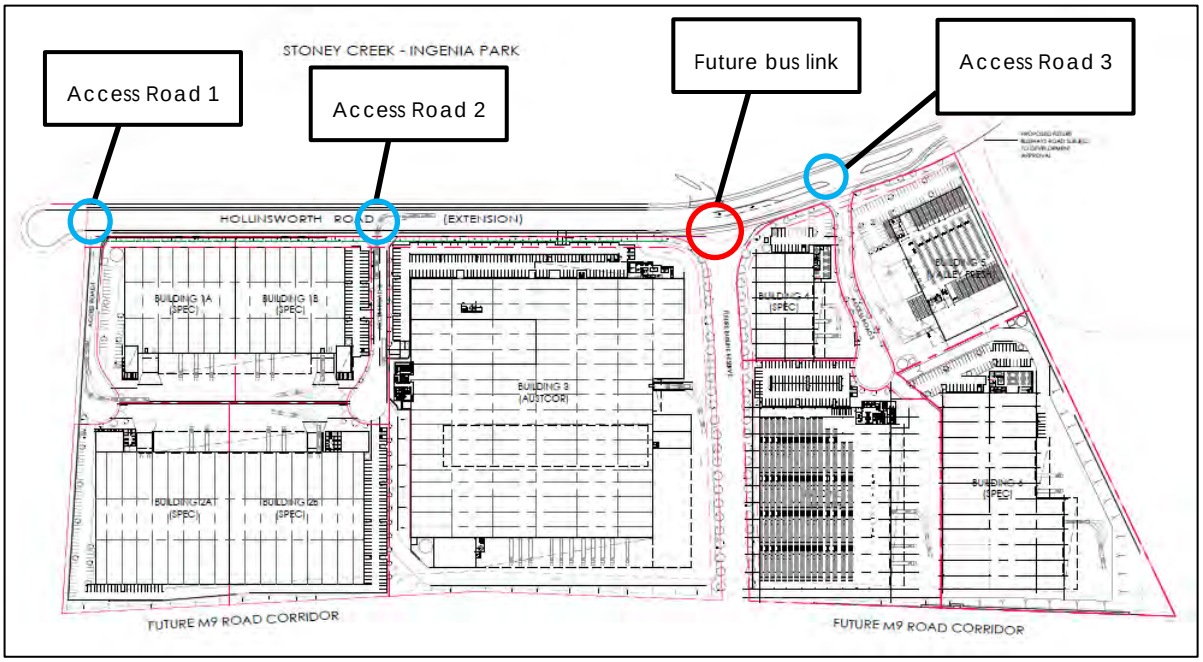
Vehicle access to the estate is proposed via three access roads from the Hollinsworth Road along the northern boundary of the estate. Each access road has a 7.2 to 9.5-metre wide carriageway set within an approximately 13-metre wide road reserve. No footpath facilities are shown within the verges on the development plans.

Whilst Access Roads 1 and 2 permit all-movement access at Hollinsworth Road, Access Road 3 would ultimately be restricted to left in/ left out once a roundabout is constructed to the west, at the location of the future bus only link. It is proposed to permit the right turn movements to/ from Access Road 3 in the interim to maintain appropriate accessibility for the warehouse buildings, with driveway crossovers along the access road. The raised central median proposed along Hollinsworth Road adjacent to Access Road 3 will initially include an opening to permit right turn movements.

A temporary cul-de-sac is provided at the western end of Hollinsworth Road to allow vehicles to U-turn. The cul-de-sac is approximately 27 metres in diameter to accommodate the U-turn manoeuvre of a 26 metre B-double vehicle.

The locations of the proposed access roads are shown in Figure 3.1, along with the road reverse for the future bus only link through the estate. The suitability of the proposed access arrangements is discussed in Section 5 of this report.

Figure 3.1: Proposed site layout and access road locations



Base source: watch this space design, drawing Number LG MAR DA01 revision B, dated 10 November 2017

3.3 Car Parking

The proposed estate will provide a total of 663 at-grade off-street car parking spaces (including 15 accessible parking spaces), with a breakdown of the parking spaces provided for each building site summarised in Table 3.3.

Table 3.3: Breakdown of proposed car parking provision by building

Building	Total parking provision	Accessible parking
Building 1a	34 spaces	1 space
Building 1b	50 spaces	1 space

Building	Total parking provision	Accessible parking
Building 2a	92 spaces	2 spaces
Building 2b	72 spaces	2 spaces
Building 3	165 spaces	4 spaces
Building 4	28 spaces	1 space
Building 5	66 spaces	1 space
Building 6	59 spaces	1 space
Building 7	97 spaces	2 spaces

The suitability of the parking provisions and layouts for each building site is discussed in Section 4 and Section 5, respectively of this report.

3.4 Loading Areas

Each building site has a designated loading area adjacent to the warehouse structure that will generally cater for vehicles up to and including 19-metre articulated vehicles or 26-metre B-double vehicles.

The suitability of the proposed loading arrangements is discussed in Section 5 of this report.

3.5 Bicycle Facilities

The development plans do not have provision for any bicycle parking. Suitable bicycle provisions for each building site are discussed in Section 4.5 of this report.

4. Parking

4.1 Car Parking Requirements

The car parking requirements for different development types are set out in Blacktown City Council's Growth Centre Precinct Development Control Plan 2016 (DCP 2016). The relevant rates are reproduced as follows:

- Warehouse/ light industrial:
  - 1 space per 75 square metres GFA of floor areas up to 7,500 square metres GFA
  - 1 space per 200 square metres GFA of floor area in excess of 7,500 square metres GFA.
- Office:
  - 1 space per 40 square metres GFA.

Based on the above DCP 2016 parking rates, the parking requirement for the proposed estate is summarised in Table 4.1.

Table 4.1: DCP 2016 car parking requirements

Building	Land use	Size (m^2)	DCP 2016 parking requirements	Total DCP 2016 parking requirements	Parking provision
Building 1a	Warehouse	6,225	83 spaces	96 spaces	34 spaces
	Office	500	13 spaces		
Building 1b	Warehouse	6,245	83 spaces	96 spaces	50 spaces
	Office	500	13 spaces		
Building 2a	Warehouse	9,440	110 spaces	126 spaces	92 spaces
	Office	625	16 spaces		
Building 2b	Warehouse	9,440	110 spaces	126 spaces	72 spaces
	Office	625	16 spaces		
Building 3	Warehouse	37,110	248 spaces	306 spaces	165 spaces
	Office	2,333	58 spaces		
Building 4	Warehouse	3,263	44 spaces	52 spaces	28 spaces
	Office	300	8 spaces		
Building 5	Warehouse	5,924	79 spaces	87 spaces	66 spaces
	Office	300	8 spaces		
Building 6	Warehouse	11,140	118 spaces	143 spaces	59 spaces
	Office	1,000	25 spaces		
Building 7	Warehouse	12,352	124 spaces	135 spaces	97 spaces
	Office	450	11 spaces		
			Total	1,167 spaces	663 spaces

Table 4.1 indicates that the proposed estate requires 1,167 car parking spaces across the building sites to comply with the DCP 2016 requirements.

4.2 Empirical assessment of car parking demand

The parking requirements defined by the Roads and Maritime's *Guide to Traffic Generating Developments* (Roads and Maritime, 2002) have been referenced for the proposed land uses and reproduced as follows:

- Warehouse/ light industrial:
  - 1 space per 300 square metres GFA of floor area.
- Office:
  - 1 space per 40 square metres GFA.

The car parking requirement for the proposed estate based on these Roads and Maritime parking rates is summarised in Table 4.2.

Table 4.2: *Guide to Traffic Generating Developments* car parking requirements

Building	Land use	Size (m^2)	Roads and Maritime parking requirements	Total parking requirements	Parking provision
Building 1a	Warehouse	6,225	21 spaces	33 spaces	34 spaces
	Office	500	13 spaces		
Building 1b	Warehouse	6,245	21 spaces	33 spaces	50 spaces
	Office	500	13 spaces		
Building 2a	Warehouse	9,440	31 spaces	47 spaces	92 spaces
	Office	625	16 spaces		
Building 2b	Warehouse	9,440	31 spaces	47 spaces	72 spaces
	Office	625	16 spaces		
Building 3	Warehouse	37,110	124 spaces	182 spaces	165 spaces
	Office	2,333	58 spaces		
Building 4	Warehouse	3,263	11 spaces	18 spaces	28 spaces
	Office	300	8 spaces		
Building 5	Warehouse	5,924	20 spaces	27 spaces	66 spaces
	Office	300	8 spaces		
Building 6	Warehouse	11,140	37 spaces	62 spaces	59 spaces
	Office	1,000	25 spaces		
Building 7	Warehouse	12,352	41 spaces	52 spaces	97 spaces
	Office	450	11 spaces		
			Total	503 spaces	663 spaces

Table 4.2 indicates that based on the Roads and Maritime parking requirements, the proposed estate would generate a car parking demand for 503 car parking spaces across the building sites.

4.3 Adequacy of parking

A total of 663 car parking spaces are proposed across the building sites. Whilst the provisions are less than the parking requirements of DCP 2016 (1,167 spaces), it exceeds the Roads and Maritime requirements for warehouse facilities with office (503 spaces).

As such, the proposed car parking supplies across the building sites are considered acceptable for the intended uses given the automated nature of modern warehouse and distribution facilities that are less reliant on floor staff to operate the facilities. Should any of the sites require greater staffing levels, a staggering of shift times would reduce the long-term parking demand, with appropriate management

at the time of shift change to reduce the overlap. This should be considered as part of tenants' staff working structure/ policy.

4.4 Accessible parking

DCP 2016 indicates that all developments with more than 50 car parking spaces must provide at least two per cent of all spaces allocated to accessible parking. Table 4.3 summaries the accessible parking requirements for the proposed estate.

Table 4.3: DCP 2016 accessible parking requirement

Building	Parking provision	Accessible parking requirement	Proposed accessible parking
Building 1a	34 spaces	1 space	1 space
Building 1b	50 spaces	1 space	1 space
Building 2a	92 spaces	2 spaces	2 spaces
Building 2b	72 spaces	2 spaces	2 spaces
Building 3	165 spaces	3 spaces	4 spaces
Building 4	28 spaces	1 space	1 space
Building 5	66 spaces	1 space	1 space
Building 6	59 spaces	1 space	1 space
Building 7	97 spaces	2 spaces	2 spaces
	Total	14 spaces	15 spaces

Table 4.3 indicates that the proposed provisions of 15 accessible spaces across the buildings is in accordance with the DCP 2016 parking requirements.

4.5 Bicycle end-of-trip facilities

DCP 2016 indicates that one bicycle locker or other suitable form of secure bicycle accommodation is to be provided for staff for every 200 square metres GFA. Based on this requirement and the proposed area of 107,772 square metres, the proposed estate is required to provide 537 bicycle parking spaces across the building sites, as summarised in Table 4.5.

Reference has been made to mode share data for business parks and industrial estates presented in the Roads and Maritime *Guide to Traffic Generating Developments* (Technical Direction TDT 2013-04a dated August 2013). Four sites were surveyed in metropolitan Sydney including Erskine Park, Helensburgh, Eastern Creek and Riverwood. The mode share data for each of these sites is presented in Table 4.4.

Table 4.4: Roads and Maritime guide mode share data – Business park/ industrial estates

Travel Mode [1]	Erskine Park	Helensburgh	Eastern Creek	Riverwood	Average
Car (as driver)	87.3%	85.5%	85.3%	78.7%	84.2%
Car (as passenger)	11.2%	8.7%	11.2%	14.1%	11.3%
Other (Pedestrian, Cycle, Public Transport)	1.5%	5.8%	3.5%	7.2%	4.5%

[1] The data excludes commercial vehicle movements.

Table 4.4 indicates that there is an average mode share for cycling, walking and public transport for existing industrial estates of less than five per cent. Further extrapolation of the data indicates that cycling makes up less than one per cent of trips.

Reference to the *Planning Guidelines for Walking and Cycling* (Department of Planning, 2004) suggests long-term (staff) bicycle parking should be provided at a rate of three to five per cent of staff.

The recommended bicycle parking provisions for each building site is summarised in Table 4.5.

In the situation that there is a sustained demand for additional bicycle parking spaces for any of the building sites, additional provisions should be considered.

Table 4.5: Bicycle parking requirement

Building	Total size (m^2)	Parking provision	DCP bicycle parking requirement	Recommended provision [1]
Building 1a	6,725	34 spaces	34 spaces	4 spaces
Building 1b	6,745	50 spaces	34 spaces	5 spaces
Building 2a	10,065	92 spaces	50 spaces	10 spaces
Building 2b	10,065	72 spaces	50 spaces	8 spaces
Building 3	39,443	165 spaces	197 spaces	17 spaces
Building 4	3,563	28 spaces	18 spaces	3 spaces
Building 5	6,224	66 spaces	31 spaces	7 spaces
Building 6	12,140	59 spaces	61 spaces	6 spaces
Building 7	12,802	97 spaces	64 spaces	10 spaces
	Total	645 spaces	539 spaces	70 spaces

[1] Based on approximately 1 spaces per 10 car spaces

5. Design Review

5.1 Estate Layout

The overall estate layout maintains an appropriate road reserve through the site for the future bus only link as well as for a roundabout that would be constructed as the ultimate arrangement to service the future bus only link. Consideration has been given to maintaining an appropriate setback between the future roundabout and Access Road 3.

The estate layout also provides appropriate separation from the reserved road corridor for the future Castlereagh Motorway to the south ensuring there are no potential impacts on either development when the motorway is constructed in the future.

The proposed 7.2 to 9-metre wide access roads for the estate have been designed to accommodate the U-turn manoeuvre of a 26-metre B-double vehicle, which is the largest vehicle anticipated to access the estate. The access road crossovers at Hollinsworth Road provide wide splays that improve heavy vehicle access to limit conflicts with opposing traffic. However, any on-street parking permitted along the access roads would impede on two-way traffic flows, especially for heavy vehicles. It is therefore recommended that 'No Stopping' restrictions are implemented along the access roads to maintain appropriate two-way flow and minimise potential conflicts between opposing vehicles.

Swept paths analyses completed for the access roads are provided in Appendix C.

5.2 Building Sites Layout

An initial review of the car parking and loading dock layouts for each building site has been completed against the requirements of DCP 2016 and the Australian Standard for Off Street Car Parking and Commercial Vehicle Facilities (AS2890.1:2004, AS2890.2:2002 and AS2890.6:2009). This initial assessment included a review of the following:

- site accesses
- bay and aisle width
- circulation roads
- internal queuing
- accessible parking
- loading vehicle access and facilities.

The review indicates that the car parking spaces (5.4 metres by 2.5 metres) are provided in accordance with the Australian Standards requirements for 'medium-term parking' user class. These spaces are generally accessed from 6.2-metre wide aisles. As such, it is expected that each car park layout will be in accordance with all the requirements of the relevant design standards with further design development.

The loading docks within each building site will generally accommodate vehicles up to 12.5-metre large rigid or 19-metre articulated vehicles. Swept paths of 19-metre articulated vehicle entering and exiting each site from the road in a forward direction are provided in Appendix D.

Where 26-metre B-double vehicle access is required to a building site, loading/ unloading would occur from the hardstand area. Swept path analyses indicate there is sufficient area within the hardstand areas of most building sites to allow for a B-double vehicle to enter, manoeuvre within the site and exit to the road in a forward direction. For some of the smaller buildings sites, B-double vehicle access requires the loading areas to be empty.

A detailed review of the car parking and loading dock layouts will be completed during the design development of each building site.

6. Traffic Impact Assessment

6.1 Traffic Generation

Typical traffic generation estimates for the proposed estate have been sourced from the *Guide to Traffic Generating Developments* (Roads and Maritime, Technical Direction: August 2013).

Estimates of the AM and PM peak hour and daily traffic generation for the three subdivision lots within the proposed industrial estate are provided in Table 6.1.

Table 6.1: Proposed estate traffic generation estimates

Lot	Buildings	Size (m^2)	Traffic generation rate (movements per 100 m^2 GFA)			Traffic generation (movements per hour)		
			AM peak hour	PM peak hour	Daily	AM peak	PM peak	Daily
1	1a, 1b, 2a and 2b	33,600	0.52	0.56	4.6	175	188	1,546
2	3	39,443				205	221	1,814
3	4, 5, 6 & 7	34,729				181	194	1,598
					Total	561	603	4,958

Table 6.1 indicates by adopting generic traffic generation rates, the proposed estate is anticipated to generate 561 and 603 vehicle movements in the AM and PM peak hours respectively and 4,958 movements daily.

Reference to the Roads and Maritime Technical Direction (Technical Direction TDT 2013/04a: August 2013) indicates that heavy vehicles typically account for 18 per cent of traffic generated by an industrial estate. As such, of the 4,958 daily vehicle movements generated by the proposed estate, 892 movements are anticipated to be heavy vehicles.

The profile provided in the Roads and Maritime Guide (2002) indicates that approximately 80 per cent of heavy vehicle movements occur between 9am and 4pm (i.e. outside of the typical commuter road network peak periods), with up to nine per cent of the daily heavy vehicle traffic generation occurring in a road network peak hour (equating to 80 vehicle movements).

For the purpose of estimating vehicle movements, the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) is assumed to be 80 per cent inbound and 20 per cent outbound during the AM peak hour and the reverse in the PM peak hour.

6.2 Vehicle Routes to the Site

Access to the proposed estate from Richmond Road will be provided via Hollinsworth Road as illustrated in Figure 6.1.

Figure 6.1: Vehicle access routes

Base source: watch this space design, drawing Number LG MAR MP16_Context, dated 04 October 2017

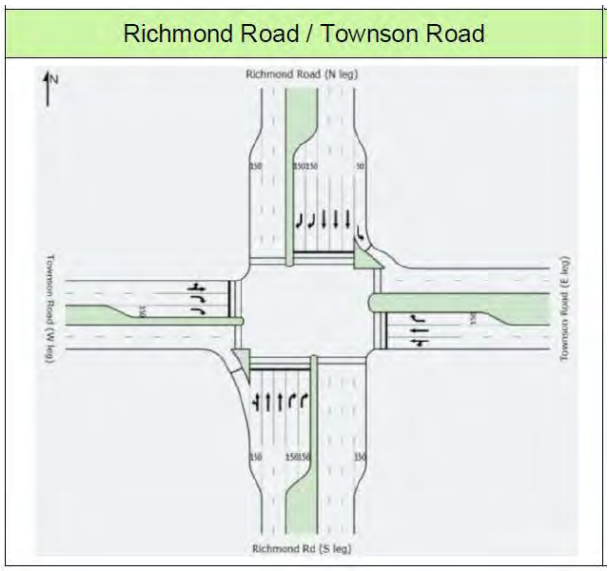
6.3 Traffic Impact

Richmond Road

AECOM undertook a traffic study to support the *Richmond Road Upgrade Review of Environmental Factors* in December 2011. The REF assessed the revised land zoning that has since been approved within the precinct (including the addition of a bulky goods precinct); as well as the provision of four access points between Richmond Road and the industrial precinct, including Hollinsworth Road/ Townson Road (previously two access points were proposed).

Figure 6.2 is extracted from Appendix A of the AECOM report and shows the intersection layout used for the assessment of the Hollinsworth Road/ Townson Road access point. Whilst the study suggests two right turn lanes are required from Richmond Road into Hollinsworth Road, only one has been constructed to date. However, it is noted the existing central median provides sufficient width along Richmond Road to construct the additional right turn lane when demand triggers the need. This is likely to occur around the time the Schofields Roads upgrade is completed that will provide a continuous link from Richmond Road to Windsor Road and the greater portion of the North West Growth Centre to the east.

Figure 6.2: Richmond Road/ Hollinsworth Road/ Townson Road intersection – Indicative layout



Source: Richmond Road Upgrade REP Submission – Traffic Modelling and Operation Assessment, AECOM, 2011

Figure 6.3 presents the results of the 2021 modelling for key intersections, which was extracted from Table 4.8 of the AECOM report.

Figure 6.3: 2021 intersection operating conditions – Richmond Road

Year	Demand Flow (Veh/h)	Level of Service	Deg of Satn (v/c)	Ave. Delay (sec)	95% Back of Queue (m)	Approach with longest queue
AM Peak (2021)						
Richmond Rd / South St	6,362	C	0.92	39.8	328	Richmond Road (SB)
Richmond Rd / Central Coll.	4,668	A	0.84	13.6	122	Richmond Road (SB)
Richmond Rd / Townson Rd	5,189	B	0.89	18.4	186	Richmond Road (SB)
Richmond Rd / Smith access	4,412	A	0.84	10.5	151	Richmond Road (NB)
PM Peak (2021)						
Richmond Rd / South St	5,685	D	0.97	51.6	450	Richmond Road (NB)
Richmond Rd / Central Coll.	4,423	D	1.00	45.5	889	Richmond Road (NB)
Richmond Rd / Townson Rd	5,422	D	0.98	47.5	620	Richmond Road (NB)
Richmond Rd / Smith access	5,605	C	0.95	36.3	438	Richmond Road (NB)

Source: Richmond Road Upgrade REP Submission – Traffic Modelling and Operation Assessment, AECOM, 2011

The 2021 intersection modelling suggests the intersection of Richmond Road/ Hollinsworth Road/ Townson Road would be operating at or near capacity during the weekday AM and PM peak periods with the additional right turn lane.

However, it is noted that it is ultimately planned for Richmond Road to be upgraded to provide a six-lane configuration (three lanes in each direction) as development continues in the area, which is expected improve intersection capacity.

Industrial Precinct

The road network within the Marsden Park Industrial Precinct has been designed to allow for traditional industrial and factory uses.

The 2036 NETANAL traffic model data from the *Marsden Park Industrial (Employment) Precinct Transport and Assess Study* (Arup, 2009) estimated the following traffic volumes near the proposed estate:

- AM peak: 171 eastbound, 778 westbound (949 two-way)
- PM peak: 763 eastbound, 165 westbound (928 two-way).

As such, the anticipated traffic generation of the proposed estate, 561 and 603 two-way vehicle movements in the AM and PM peak hours, respectively, are included within the 2036 estimates previously used in the *Transport and Assess Study* (Arup, 2009) to determine suitable intersection treatments for the Industrial Precinct road network.

Estate access roads

The access roads have been assessed using SIDRA Intersection 7.0[1], a computer based modelling package which calculates intersection performance. A conservative assessment was completed that assumed the 2036 NETANAL traffic volumes (Arup, 2009) detailed above is through traffic along Hollinsworth Road (i.e. not considered to be partially generated by the estate).

The commonly used measure of intersection performance, as defined by the Roads and Maritime, is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 6.2 shows the criteria that SIDRA Intersection adopts in assessing the level of service. A level of service of D or better is generally considered acceptable operation.

Table 6.2: SIDRA Intersection level of service criteria

Level of service	Average delay per vehicle (secs/veh)	Traffic signals, roundabout	Give way and stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 6.3 presents a summary of the future operation of the intersection, with full results presented in Appendix E of this report.

Table 6.3: 2036 operating conditions – Estate access roads (ultimate arrangement)

Access road	Peak	Degree of saturation	Average delay (sec)	Level of service [1]	Turning movement with worst delay
1 (all-movements)	AM	0.51	18	B	Access Road 1 (right turn)
	PM	0.46	19	B	Access Road 1 (right turn)
2 (all-movements)	AM	0.51	20	B	Access Road 2 (right turn)
	PM	0.77	31	C	Access Road 2 (right turn)
3 (left-in/ left out)	AM	0.56	13	A	Access Road 3 (left turn)
	PM	0.46	7	A	Access Road 3 (left turn)

[1] Level of service reported based on the worst movement for unsignalised intersections.

Table 6.3 indicates the access roads would operate at acceptable levels of service of D or better in 2036, based on this conservative assessment of the ultimate arrangements.

[1] Program used under license from Akcelik & Associates Pty Ltd.

Modelling of the interim arrangement of Access Road 3, which will permit all movement access, also suggests the intersection would operate at a level of service of B based on the 2036 traffic conditions, with the right turn experiencing the worst delay.

Summary

The proposed warehouse and distribution estate is consistent with the land uses assessed in both the *Transport and Access Study* (Arup, 2009) and subsequent AECOM report (2011).

As such, it is expected that there will be adequate capacity on the broader road network within the industrial precinct, as well as along Richmond Road, to accommodate the traffic generated by the proposed estate.

Therefore, the traffic generated from the proposed estate is not expected to compromise the safety or function of the surrounding road network.

6.4 Construction Traffic Impact

The construction of the proposed estate is expected to be staged, commencing with infrastructure works that would include bulk earthworks, extension of Hollinsworth Road and construction of the access roads. As the infrastructure works conclude, it is expected that the construction of individual building sites will be staggered as tenants are secured.

As such, it is anticipated that the site would not generate more traffic during the construction phase than expected once fully developed and operational of the proposed estate.

Furthermore, considering that the Marsden Park Industrial Precinct was designed to accommodate the expected full development of the site, the volume and composition of traffic during construction could not be expected to compromise the safety or function of the surrounding road network.

A detailed construction traffic management plan would be prepared prior to issue of the construction certificate.

7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i The proposed development of lots 23 and 24 DP 262886, Marsden Park incorporates nine warehouse buildings, totalling some 107,772 square metres GFA, including ancillary office space.

ii The proposed access roads, on-site parking and loading layouts are consistent with the dimensional requirements as set out in the DCP 2016 and the Australian Standard for Off Street Car Parking and Commercial Vehicle Facilities (AS2890.1:2004, AS2890.2:2002 and AS2890.6:2009).

iii The loading dock facilities for each building site has been designed to accommodate up to 19 metre articulated vehicles, with 26 metre B-double vehicle access for loading/ unloading within the hardstand area possible for most sites, including restricted access (i.e. when facility is empty).

iv The proposed development generates a total DCP parking requirement of 1,167 spaces across the proposed buildings.

v Whilst the proposed supply of 663 spaces does not meet the DCP parking requirement, it is considered appropriate to provide parking in accordance with the Roads and Maritime Guide 2002 requirements (503 spaces).

vi As such, the proposed car parking supplies across the building sites are considered acceptable for the intended uses given the automated nature of modern warehouse and distribution facilities that are less reliant on floor staff to operate the facilities. Should any of the sites require greater staffing levels, a staggering of shift times would reduce the long-term parking demand, with appropriate management at the time of shift change to reduce the overlap. This should be considered as part of tenants' staff working structure/ policy.

vii It is recommended that a total of at least 70 bicycle parking spaces are provided across the buildings, with additional provisions considered should there be sustained demand observed once the site is operational.

viii The site is expected to generate up to 603 vehicle movements in the peak hours and 4,958 vehicle movements daily.

ix The proposed development is consistent with the intended uses for the Marsden Park Industrial Precinct and therefore is not expected to compromise the safety or function of the surrounding road network during the peak periods based on the findings from previous reports prepared by Arup (2009) and AECOM (2011).

x The three proposed access roads have been designed to accommodate 26-metre B-double vehicles and are expected to operate satisfactorily during the surrounding road network peak periods.

xi A detailed construction management plan would be prepared for the development prior to issue of the construction certificate.

Appendix A

Existing Conditions Assessment

A.1 Road network

Richmond Road

Richmond Road is a classified State Road (MR537) aligned in a north-south direction and is a key link between the Westlink M7 Motorway and Richmond that travels through the Marsden Park Industrial Precinct.

Richmond Road has been upgraded between Bells Creek and South Creek floodplain. The road was initially upgraded to a four-lane divided road with a shared path provided on the western side within an approximately 50 metres wide road reserve. In the future the road will be able to be upgraded to a six-lane divided carriageway with shared paths on both sides of the carriageway.

There are four new signalised intersections provided between the upgraded Richmond Road and the Marsden Park Industrial Precinct, as follows:

- Alderton Drive
- Hollinsworth Road/ Townson Road
- Quarry Road
- South Street.

Richmond Road carries approximately 33,000 vehicles per day[2].

Hollinsworth Road

Hollinsworth Road is a local road aligned in an east-west direction. Hollinsworth Road is a two-way road that forms a four-leg intersection with Townson Road. Hollinsworth Road has been partially upgraded between Richmond Road and Harris Avenue to provide an approximately 18.5-metre wide carriageway that accommodates two lanes in each direction, with an approximately 4.5-metre wide central median. West of Harris Avenue, Hollinsworth Road is seven metres wide with one-lane in each direction; and currently only provides access to a 225-dwelling retirement living facility (Ingenia Lifestyle Stoney Creek Retirement Community), located north of the subject site.

A.2 Traffic Volumes

The Roads and Maritime permanent traffic count station on Richmond Road located between Rooty Hill Road and Townson Road records average daily traffic. The results of these counts are provided in Table A.1.

Table A.1: Roads and Maritime count data – Richmond Road (February counts)

Year	Week commencing	Weekday daily count data (average vehicles per day)
2011	14 February	31,547
2012	13 February	31,292
2013	4 February	32,551

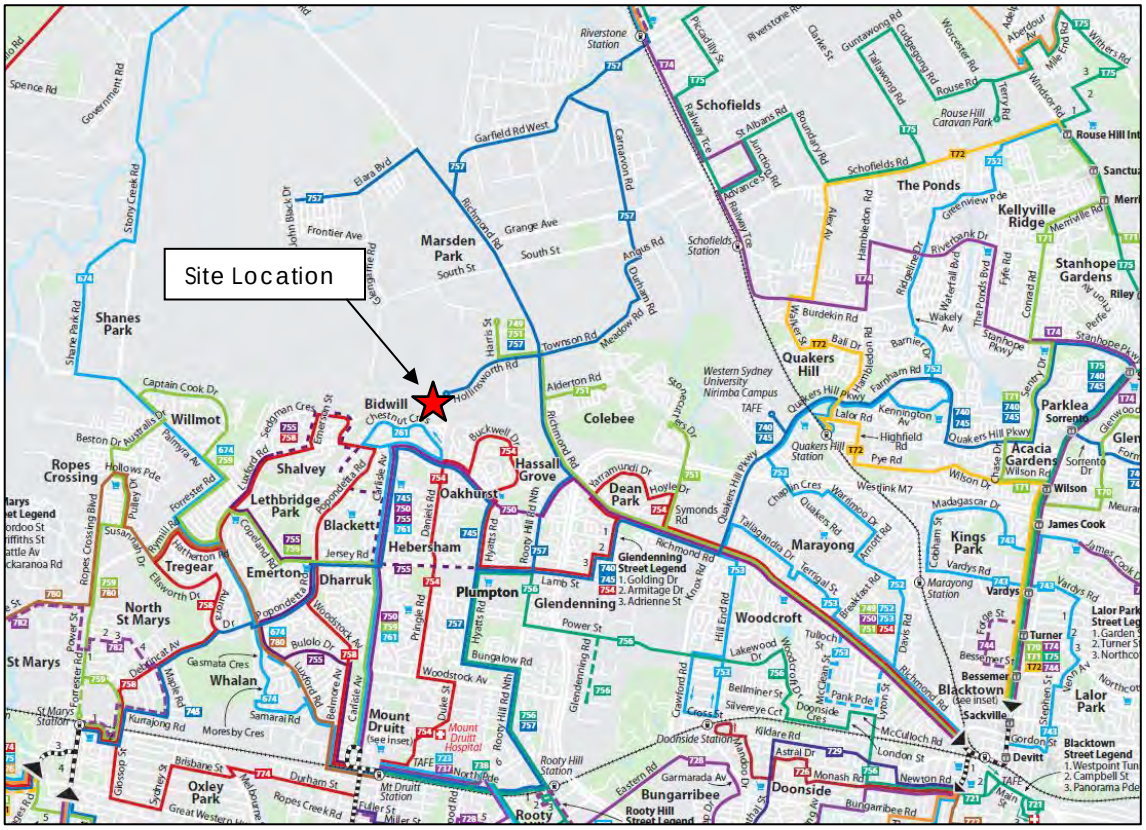
Table A.1 indicates that between 2011 and 2013 the daily traffic volumes on Richmond Road increased by 1.6 per cent per annum.

[2] Based on RMS permanent count station data for Richmond Road from 2013.

A.3 Public Transport

Hollinsworth Road is served by the routes 749, 751 and 757 bus service operated by Busways, as shown in Figure A.1. Route 757 services a bus stop adjacent to the subject site, with hourly services between Riverstone to Marsden Park and Mt Druitt via Plumpton, including to Riverstone Station.

Figure A.1: Bus network map



Source: Busways (effective 28 May 2017)

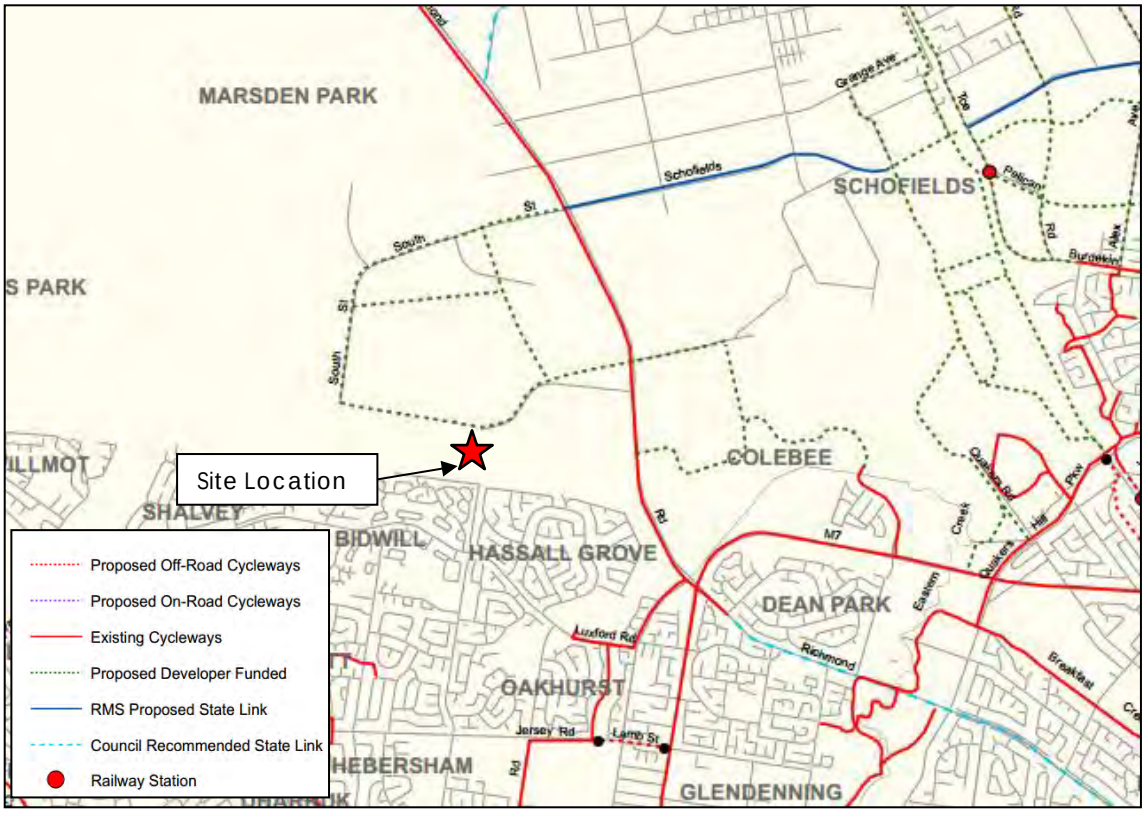
Riverstone Station is located approximately seven kilometres north-east from Marsden Park Industrial Precinct on the T1 Western Line of the Sydney Trains network. T1 Western Line rail services stopping at Riverstone operate between Richmond and Chatswood with services every 30 minutes during peak and off-peak periods.

A.4 Pedestrian and Cyclist Infrastructure

Richmond Road forms part of an on-road cycle route connecting Rooty Hill Road North and Richmond as shown in Figure A.2. As part of the recent Richmond Road upgrade, shared paths have been constructed along both sides of Richmond Road near the subject site.

Along Hollinsworth Road, a shared path has been partially constructed along the southern side with footpath on the northern side along the frontages of the IKEA, Bunnings and Lindt sites. There is no pedestrian/ cyclist infrastructure to the west of these three sites at this stage.

Figure A.2: Cycle routes



Source: Blacktown City Council

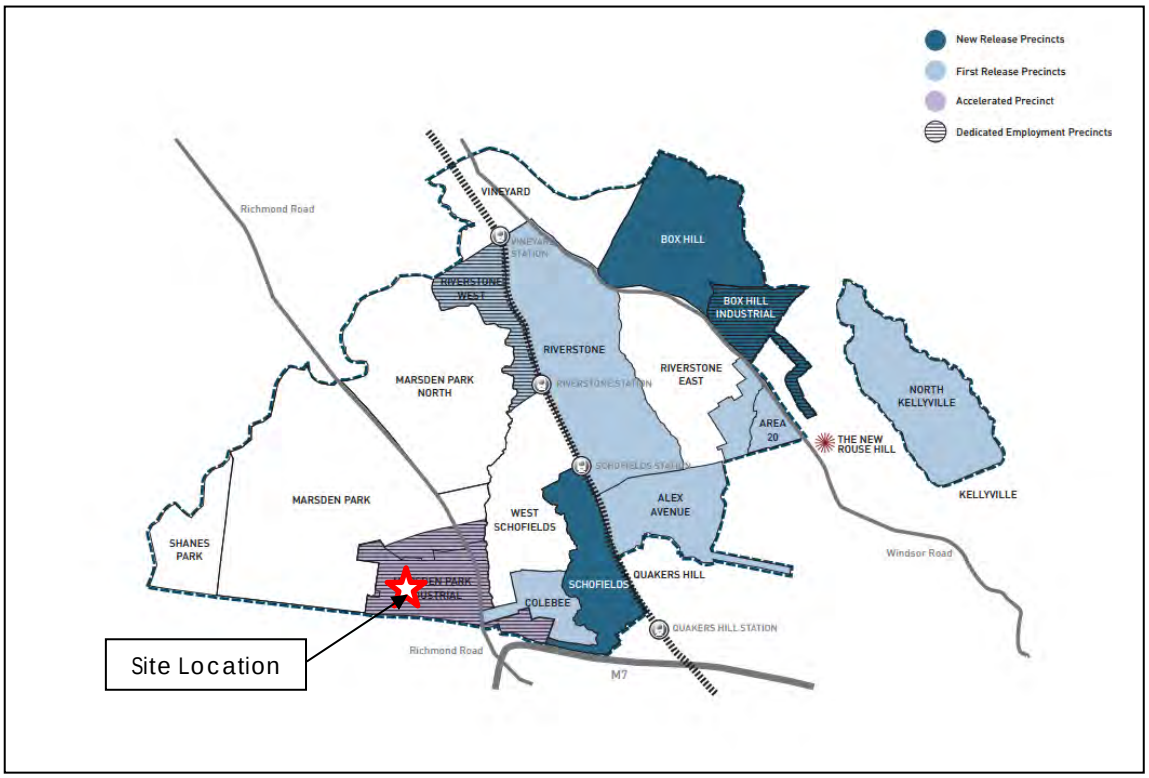
Appendix B

Future Marsden Park transport situation

B.1 Overview

Marsden Park Industrial Precinct is located within the North West Growth Centre, 40 kilometres west of the Sydney CBD. The Growth Centre of approximately 10,000 hectares is comprised of 16 precincts which on completion will contain about 70,000 new dwellings for 200,000 people. The North West Growth Centre is shown in Figure B.1.

Figure B.1: North West Growth Centre



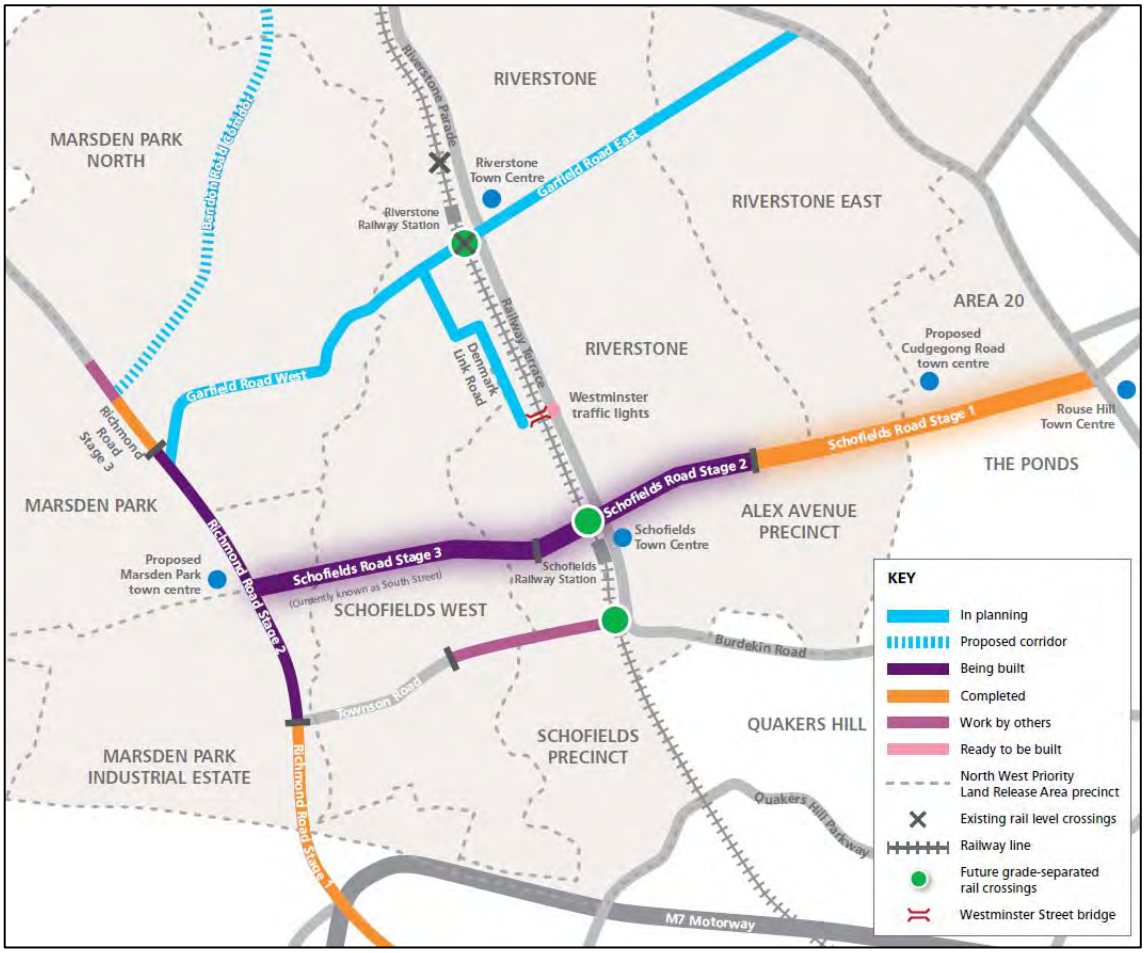
Source: NSW Department of Planning and Infrastructure website (accessed 26 March 2014)

B.2 Future Road Network

Similar to the recently upgraded Richmond Road, Schofields Road is currently being upgraded and extended to provide a future link between Richmond Road and Windsor Road. It will intersect with Richmond Road at South Street and form a continuous east-west link. The new link will provide improve access to the east (including Rouse Hill) from the site. Schofields Road will be delivered in three stages as illustrated in Figure B.2, with Stage 1 completed.

Figure B.2 also indicates that Garfield Road East is an additional east-west link between Richmond Road and Windsor Road that is in the planning process, with a link between Townson Road and Burdekin Road to form a third east-west link.

Figure B.2: Schofields Road upgrade – Staging plan



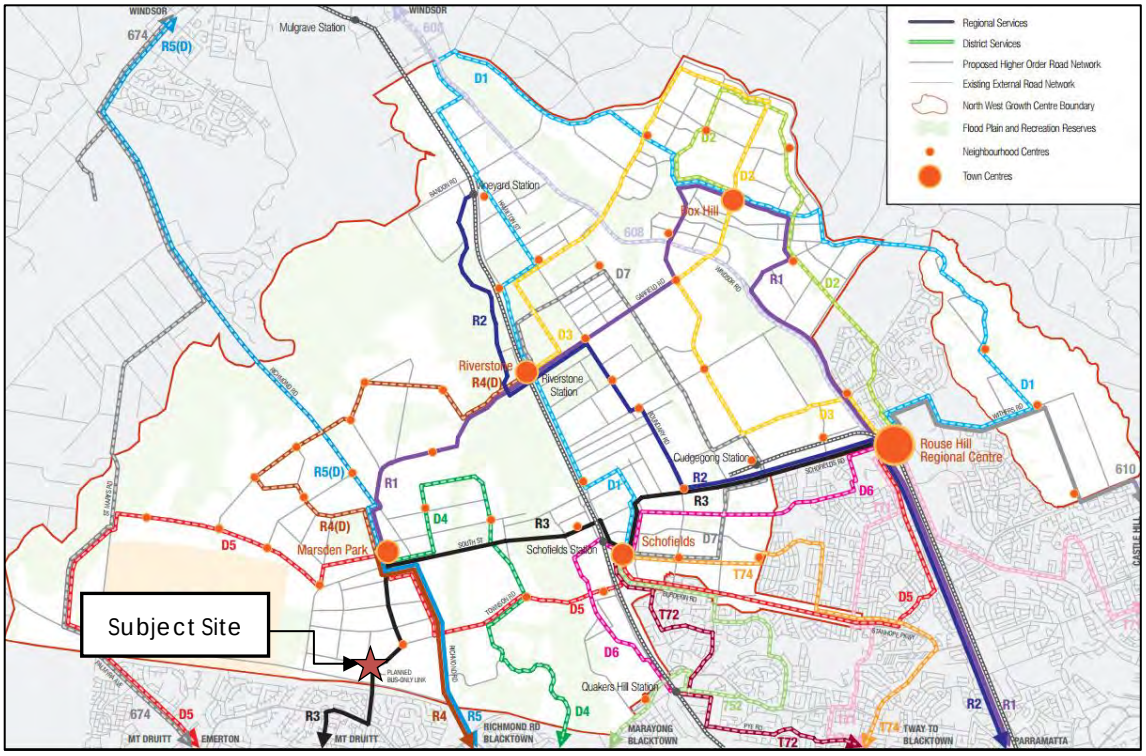
Source: Schofields Road Upgrade – March 2016

B.3 Future Sustainable Transport Opportunities

B.3.1 Bus Network

Bus network planning for the North West Growth Centre is directed by the *North West Sector Bus Servicing Plan* (2012) prepared by McCormick Rankin Cagney for NSW Transport and Infrastructure. The recommended North West Growth Centre bus network, including regional and district services is shown in Figure B.3.

Figure B.3: Proposed all day bus routes



Source: North West Sector Bus Servicing Plan (McCormick Rankin Cagney, 2012)

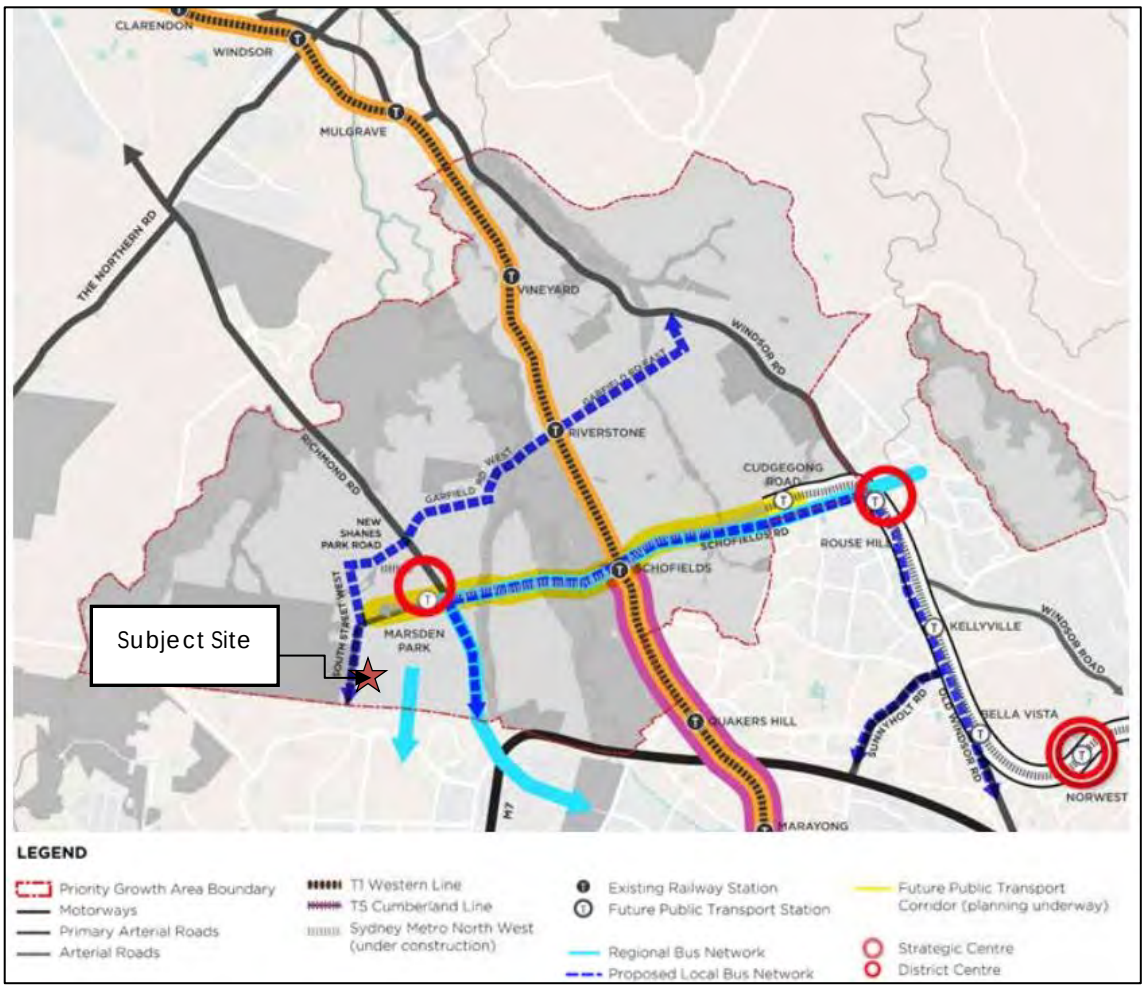
As shown in Figure B.3, the Marsden Park Industrial Precinct will be served by three regional services and one district service as follows:

- Regional routes:
  - R3: Mount Druitt – Marsden Park – Schofields – Rouse Hill
  - R4/R5: Blacktown – Richmond Road – Marsden Park
- District routes:
  - D4: Blacktown – Colebee – Marsden Park
  - D5: Rouse Hill – Schofields – Marsden Park - Emerton.

The regional route R3 would provide access to Mount Druitt, Schofields, and Rouse Hill stations via the future bus only link that traverses through the site; while R4/ R5 would provide a direct service to Blacktown Station.

The *North West Land Use and Infrastructure Implementation Plan* prepared by the Department of Planning and Environment also identified the future bus infrastructure requirements in relation to the proposed development of the North West Growth Centre as shown in Figure B.4.

Figure B.4: Bus infrastructure requirements



Source: North West Land Use and Infrastructure Implementation Plan, NSW Planning and Environment, 2017

As shown in Figure B.4, the bus interchange requirements within Marsden Park Industrial Precinct identified in the Implementation Plan include:

- One on-street bus interchange west of Richmond Road
- Two north-south bus links west of Richmond Road.

B.3.2 Sydney Metro Northwest

The Sydney Metro Northwest link is a priority rail infrastructure project for the NSW Government to provide a 23-kilometre rail link through the North West Growth Centre. The rail link will connect to the existing Sydney Trains network and provide eight new stations at Cherrybrook, Castle Hill, Hills Centre, Norwest, Bella Vista, Kellyville, Rouse Hill and Cudgegong Road as well as 4,000 commuter car parking spaces. The Sydney Metro Northwest link is shown in Figure B.5.

Figure B.5: Sydney Metro Northwest

Source: North West Rail Link website: http://northwestrail.com.au, (Transport for NSW) accessed 30/08/2012

The NSW Government has dedicated a public transport corridor from the end of the Sydney Metro Northwest at Cudgegong Road west to Schofields Station and to Marsden Park, which is a distance of approximately 6.8 kilometres.

Figure B.6: Marsden Park public transport corridor

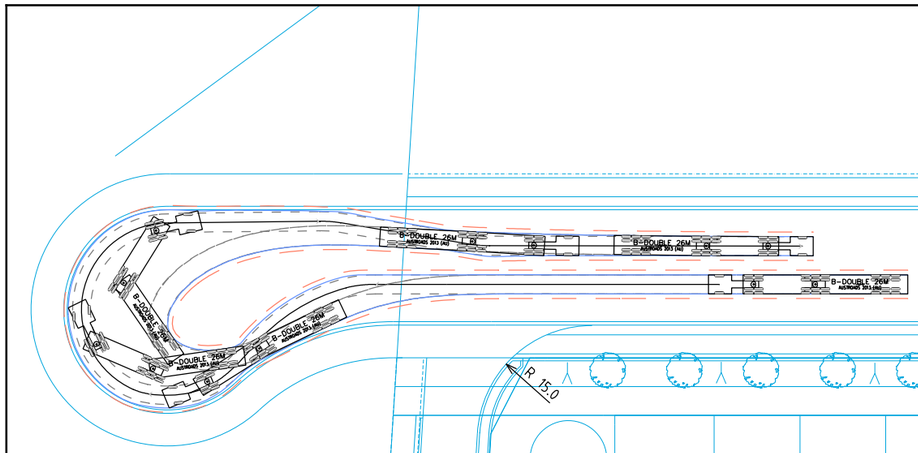
Source: North West Land Use and Infrastructure Implementation Plan, NSW Planning and Environment, 2017

B.3.3 Walking and Cycling Network

Shared paths are proposed on both sides of Richmond Road as part of the road upgrade. The signalised intersections along Richmond Road would provide safe crossing points for pedestrians and cyclists. All sub-arterial roads within Marsden Park Industrial Precinct, including Hollinsworth Road, are proposed to provide a shared path along one side of the road.

Appendix C

Swept path analysis – access roads



HOLLINSWORTH ROAD EXTENSION

ACCESS ROAD 1

ACCESS ROAD 2

BUILDING 1

R 15.0

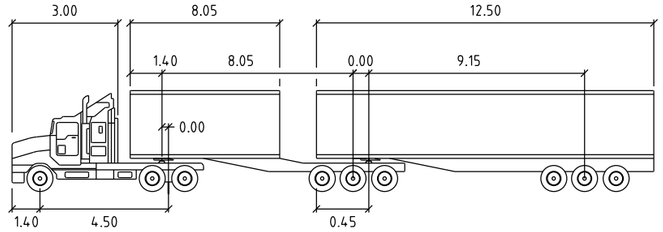
R 15.0

R 15.0

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h



B-DOUBLE 26M

metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

N

MAP REF XXX/XXX

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APPROVED BY	-
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DP 262886 HOLLINSWORTH ROAD MARSDEN PARK ACCESS ROADS VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-01-00-01 SHEET 01 OF 05 ISSUE P5

ENTRY

HOLLINSWORTH ROAD EXTENSION

ACCESS ROAD 1

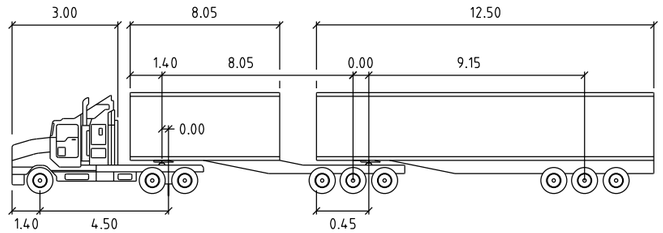
ACCESS ROAD 2

BUILDING 1

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h



B-DOUBLE 26M metres

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Trailer Track	: 2.50		

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DRAWING NO. N105790-01-00-02 SHEET 02 OF 05 ISSUE P5

EXIT

HOLLINSWORTH ROAD EXTENSION

ACCESS ROAD 1

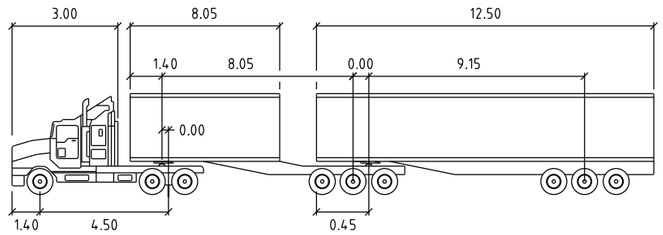
ACCESS ROAD 2

BUILDING 1

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h



B-DOUBLE 26M metres

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Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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ENTRY

HOLLINSWORTH ROAD

ACCESS ROAD 3

FUTURE BUS LINK RESERVE

BUILDING 3

BUILDING 4

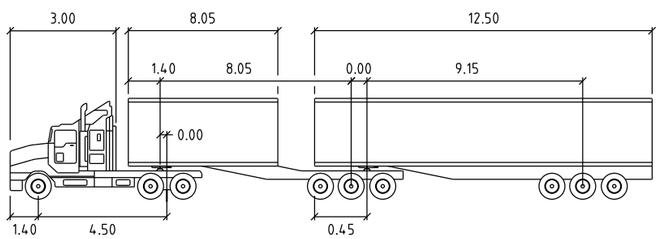
BUILDING 5

BUILDING 7

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h



B-DOUBLE 26M — metres

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Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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EXIT

HOLLINSWORTH ROAD

BUILDING 3

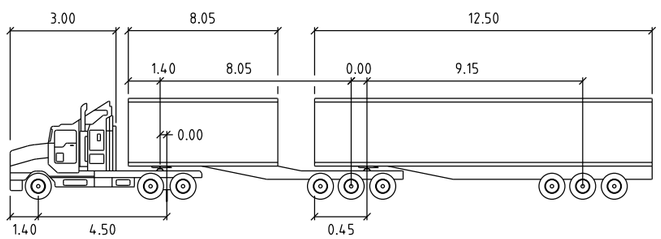
BUILDING 4

BUILDING 5

BUILDING 7

FUTURE BUS LINK RESERVE

ACCESS ROAD 3



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 10km/h

B-DOUBLE 26M — metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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DRAWING NO. N105790-01-00-05 SHEET 05 OF 05 ISSUE P5

Appendix D

Swept path analysis – individual sites

ENTRY

ACCESS ROAD 1

BUILDING 1A

BUILDING 1B

19m SEMI TRUCK LOADING BAYS

19m SEMI TRUCK LOADING BAYS

12.5m TRUCK LOADING BAYS

12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAYS

19m SEMI TRUCK LOADING BAYS

EXIT

ACCESS ROAD 1

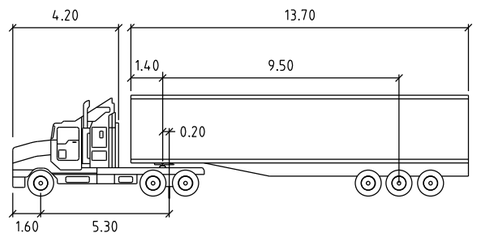
BUILDING 1A

BUILDING 1B

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



PM S 19M — metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

N

PLOTTED BY : Clifford.Aguirre ON 14/11/2017 AT 5:32:39 PM

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Sydney	02 8448 1800
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PRELIMINARY PLAN

FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

WARNING

BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DESIGNED	C.AGUIRRE
DESIGN CHECK	H.OBERMAIER
APPROVED BY	-
DATE ISSUED	14 NOVEMBER 2017
SCALE	A3 — 0 8 16 — 1:800
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDINGS 1A AND 1B VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-01-01 SHEET 01 OF 09 ISSUE P3

ENTRY

EXIT

ACCESS ROAD 1

19m SEMI TRUCK LOADING BAYS

12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAYS

12.5m TRUCK LOADING BAYS

19m SEMI TRUCK LOADING BAYS

12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAYS

BUILDING 2A

BUILDING 2B

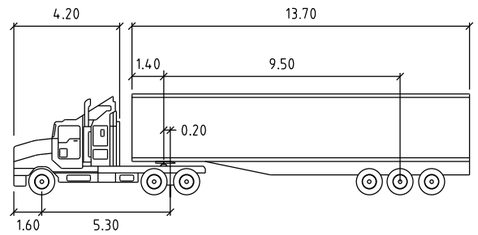
BUILDING 2A

BUILDING 2B

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



PM S 19M — metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

N

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Townsville	07 4722 2765
Perth	08 6169 1000

PRELIMINARY PLAN

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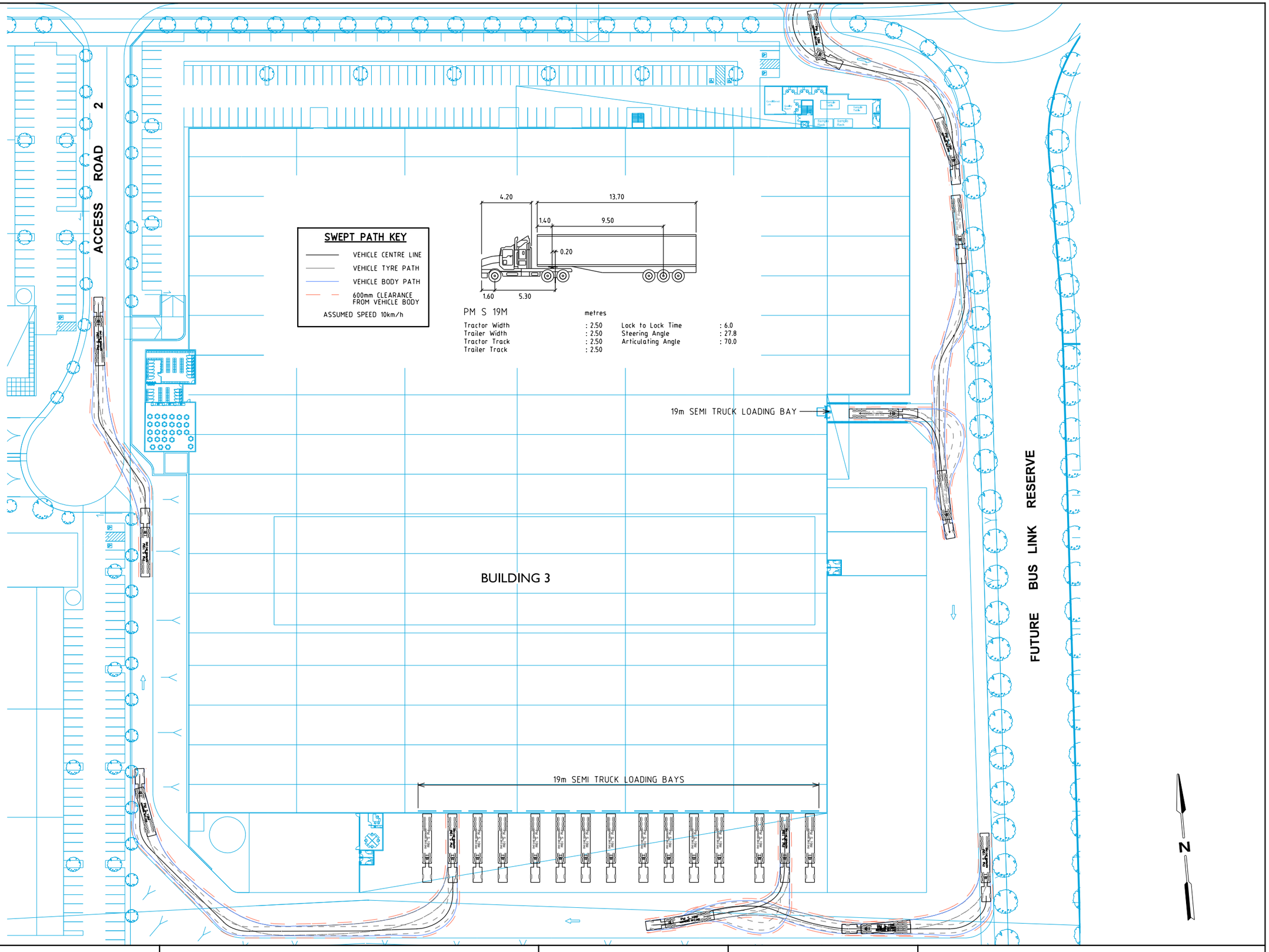
DESIGN CHECK	H.OBERMAIER
APPROVED BY	-
DATE ISSUED	14 NOVEMBER 2017
SCALE	A3 — 0 8 16 — 1:800
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDINGS 2A AND 2B VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-02-01 SHEET 02 OF 09 ISSUE P3



PLOTTED BY : Clifford.Aguirre ON 14/11/2017 AT 5:32:42 PM

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Townsville	07 4722 2765
Perth	08 6169 1000

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

WARNING
BEWARE OF UNDERGROUND SERVICES
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DESIGNED	C.AGUIRRE
DESIGN CHECK	DESIGN CHECK
APPROVED BY	-
DATE ISSUED	14 NOVEMBER 2017
SCALE	A3
	0 10 20 1:1000
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK
BUILDING 3
VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-03-01 SHEET 03 OF 09 ISSUE P3

ENTRY

EXIT

HOLLINSWORTH ROAD

ACCESS ROAD 3

BUILDING 4

8.8m MRV TRUCK LOADING BAY

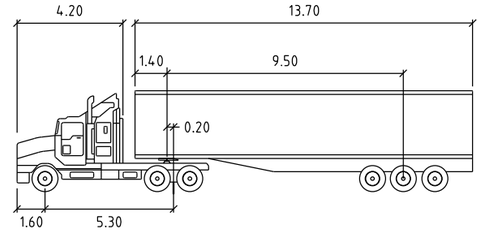
12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAY

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



PM S 19M metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

N

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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

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DATE ISSUED	14 NOVEMBER 2017
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CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK
BUILDING 4
VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-04-01 SHEET 04 OF 09 ISSUE P3

HOLLINSWORTH ROAD

ACCESS ROAD 3

BUILDING 4

8.8m MRV TRUCK LOADING BAY

12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAY

12.50

2.20 6.85

SU TRUCK metres

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

N

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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY SUBJECT TO CHANGE WITHOUT NOTIFICATION

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DATE ISSUED	14 NOVEMBER 2017
SCALE	A3
	0 8 16 1:800
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDING 4 VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-04-02 SHEET 05 OF 09 ISSUE P3

HOLLINSWORTH ROAD

ACCESS ROAD 3

BUILDING 5

19m SEMI TRUCK LOADING BAY

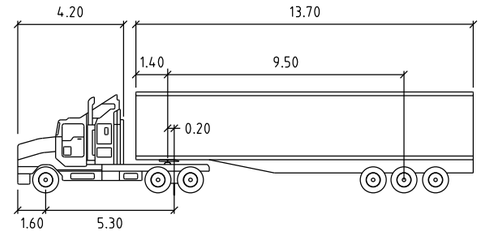
11.0

12.0

SERVICE VEHICLE
ALWAYS ENTER IN A FORWARD DIRECTION

19m SEMI TRUCK

PM S 19M



PM S 19M metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

N

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DESIGN CHECK	H.OBERMAIER
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DATE ISSUED	14 NOVEMBER 2017
SCALE	A3
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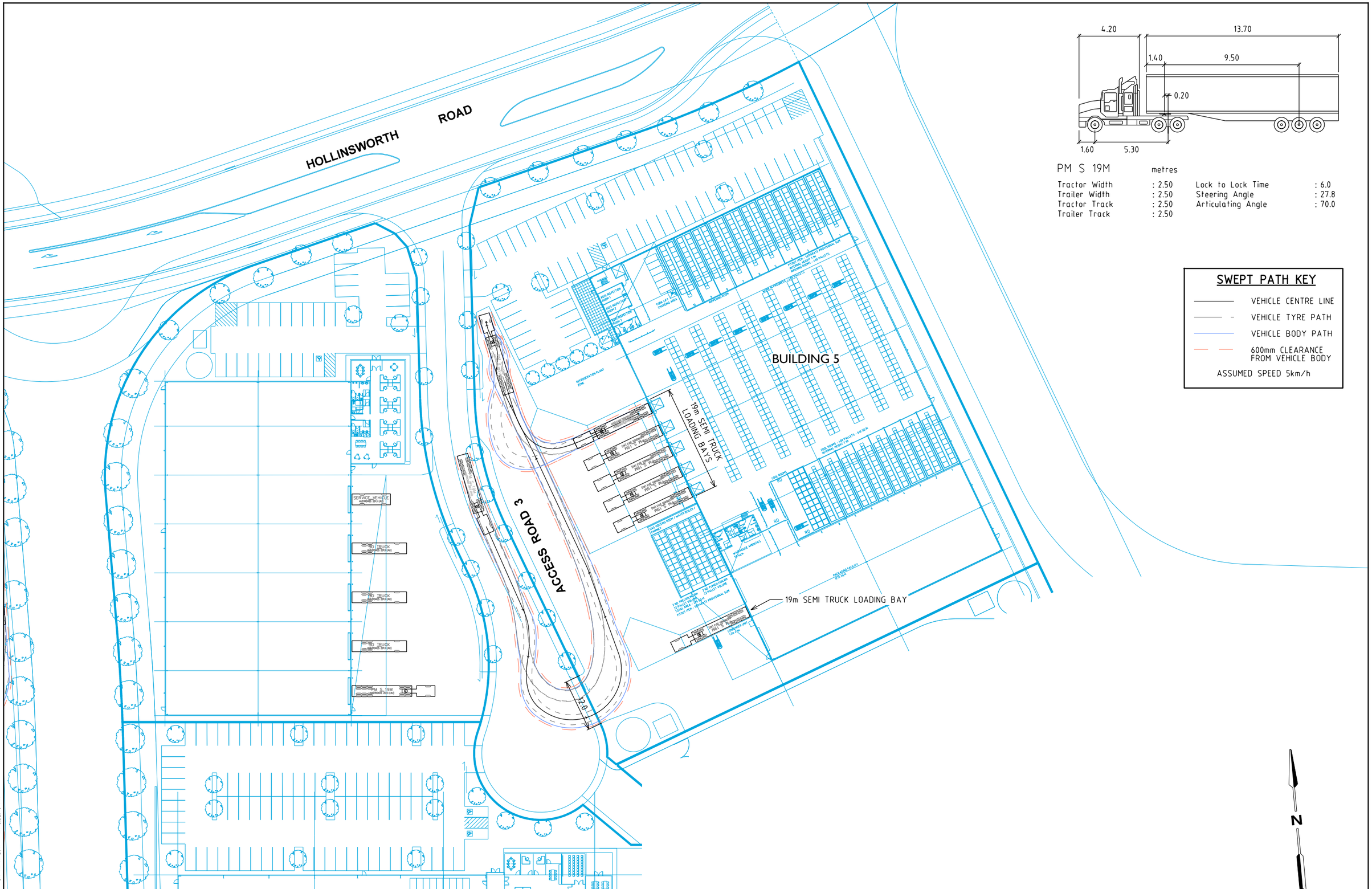
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDING 5 VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-05-01 SHEET 06 OF 09 ISSUE P3



PM S 19M metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

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PRELIMINARY PLAN
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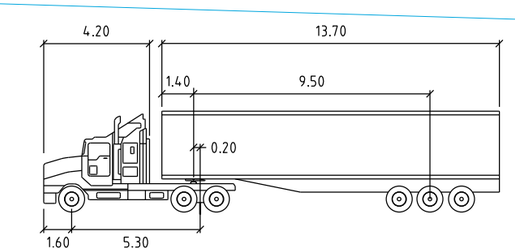
DESIGN CHECK	H.OBERMAIER
APPROVED BY	-
DATE ISSUED	14 NOVEMBER 2017

SCALE A3 0 8 16 1:800

CAD FILE NO. N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDING 5 VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-05-02 SHEET 07 OF 09 ISSUE P3



PM S 19M metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

RECOMMEND PROVIDING SPLAY OR LARGER KERB RADIUS TO AVOID A WIDE TURNING OF VEHICLE ACCESSING BUILDING 6 LOADING DOCKS

12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAYS

12.5m TRUCK LOADING BAY

19m SEMI TRUCK LOADING BAYS

BUILDING 6

STAGING AREA

N

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PRELIMINARY PLAN
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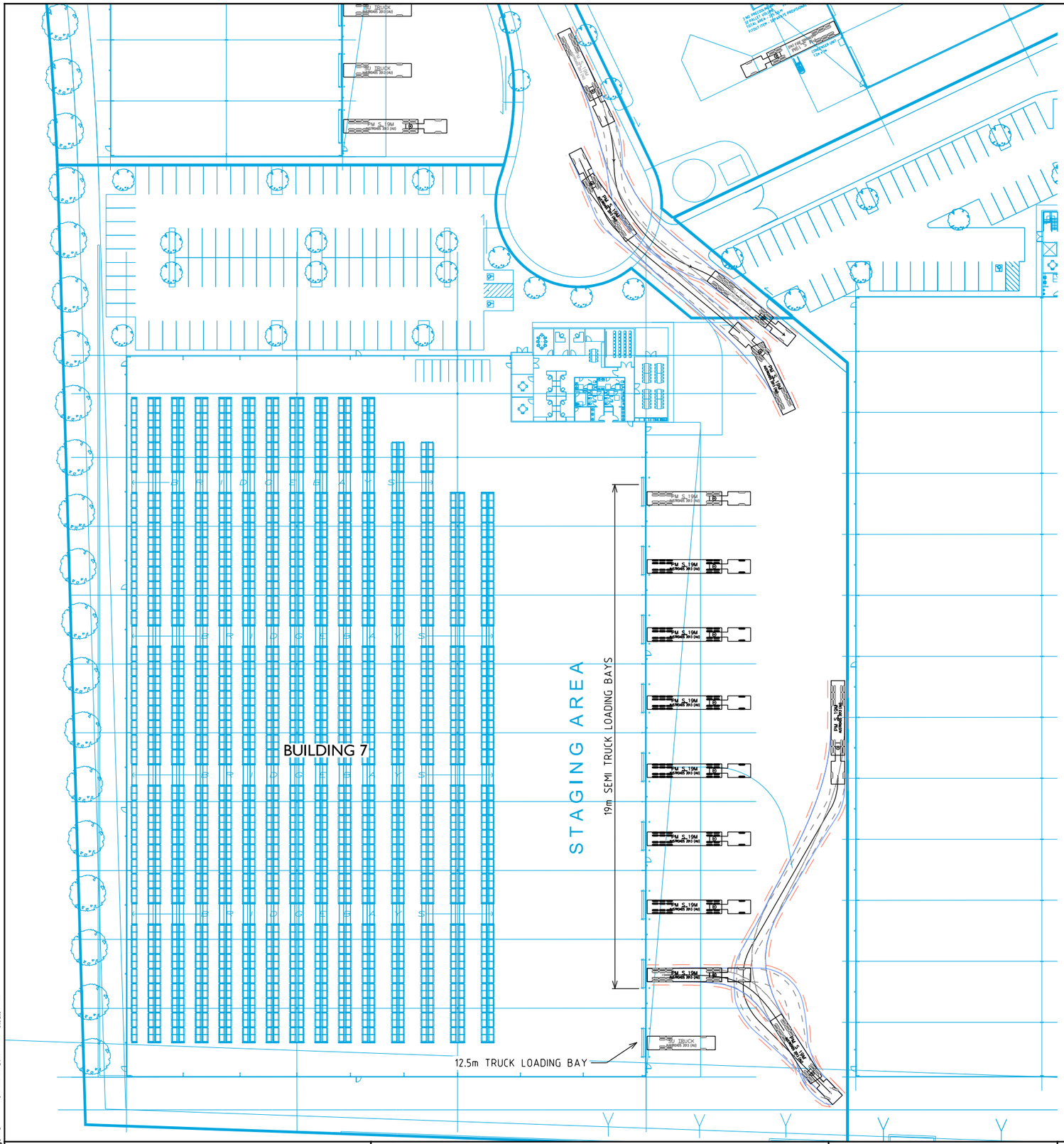
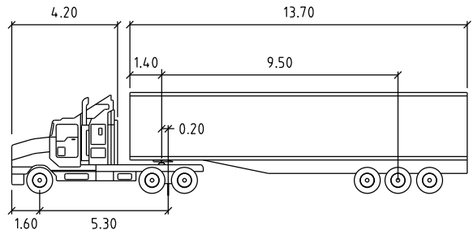
DESIGNED	C.AGUIRRE
DESIGN CHECK	H.OBERMAIER
APPROVED BY	-
DATE ISSUED	14 NOVEMBER 2017
SCALE	A3
	0 8 16 1:800
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDING 6 VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-06-01 SHEET 08 OF 09 ISSUE P3





PM S 19M metres

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 600mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

N

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Adelaide	08 8334 3600
Gold Coast	07 5510 4814
Townsville	07 4722 2765
Perth	08 6169 1000

PRELIMINARY PLAN
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DESIGNED	C.AGUIRRE
DESIGN CHECK	H.OBERMAIER
APPROVED BY	-
DATE ISSUED	14 NOVEMBER 2017
SCALE	A3 — 0 8 16 — 1:800
CAD FILE NO.	N105790-02-P3.dgn

DP 262886 HOLLINSWORTH ROAD MARSDEN PARK BUILDING 7 VEHICLE SWEPT PATHS ASSESMENT

DRAWING NO. N105790-02-07-01 SHEET 09 OF 09 ISSUE P3

Appendix E

SIDRA Intersection Results – Access Roads

MOVEMENT SUMMARY

Site: 102 [Hollinsworth Road / Access Road 1 - AM Peak - 2036]

Giveway / Yield (Two-Way)

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: Access Road 1											
1	L2	1	18.0	0.076	12.5	LOS A	0.2	1.8	0.80	0.92	44.9
3	R2	18	18.0	0.076	18.3	LOS B	0.2	1.8	0.80	0.92	44.5
Approach		19	18.0	0.076	18.0	LOS B	0.2	1.8	0.80	0.92	44.5
East: Hollinsworth Road											
4	L2	74	18.0	0.514	5.8	LOS A	0.0	0.0	0.00	0.05	56.9
5	T1	819	18.0	0.514	0.1	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		893	18.0	0.514	0.6	NA	0.0	0.0	0.00	0.05	59.2
West: Hollinsworth Road											
11	T1	180	18.0	0.106	0.2	LOS A	0.0	0.3	0.02	0.00	59.7
12	R2	1	18.0	0.106	15.4	LOS B	0.0	0.3	0.02	0.00	56.5
Approach		181	18.0	0.106	0.3	NA	0.0	0.3	0.02	0.00	59.7
All Vehicles		1093	18.0	0.514	0.8	NA	0.2	1.8	0.02	0.06	58.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Hollinsworth Road / Access Road 1 - PM Peak - 2036]

Giveway / Yield (Two-Way)

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: Access Road 1											
1	L2	1	18.0	0.288	7.6	LOS A	1.0	7.7	0.81	0.96	44.4
3	R2	79	18.0	0.288	18.9	LOS B	1.0	7.7	0.81	0.96	44.0
Approach		80	18.0	0.288	18.7	LOS B	1.0	7.7	0.81	0.96	44.0
East: Hollinsworth Road											
4	L2	20	18.0	0.112	5.8	LOS A	0.0	0.0	0.00	0.06	56.9
5	T1	174	18.0	0.112	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		194	18.0	0.112	0.6	NA	0.0	0.0	0.00	0.06	59.1
West: Hollinsworth Road											
11	T1	803	18.0	0.461	0.0	LOS A	0.0	0.1	0.00	0.00	60.0
12	R2	1	18.0	0.461	7.2	LOS A	0.0	0.1	0.00	0.00	56.8
Approach		804	18.0	0.461	0.0	NA	0.0	0.1	0.00	0.00	60.0
All Vehicles		1078	18.0	0.461	1.5	NA	1.0	7.7	0.06	0.08	58.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Hollinsworth Road / Access Road 2 - AM Peak - 2036]

Giveway / Yield (Two-Way)

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: Access Road 2											
1	L2	1	18.0	0.256	14.0	LOS A	0.8	6.6	0.84	0.96	43.7
3	R2	62	18.0	0.256	20.3	LOS B	0.8	6.6	0.84	0.96	43.3
Approach		63	18.0	0.256	20.2	LOS B	0.8	6.6	0.84	0.96	43.3
East: Hollinsworth Road											
4	L2	74	18.0	0.514	5.8	LOS A	0.0	0.0	0.00	0.05	56.9
5	T1	819	18.0	0.514	0.1	LOS A	0.0	0.0	0.00	0.05	59.4
Approach		893	18.0	0.514	0.6	NA	0.0	0.0	0.00	0.05	59.2
West: Hollinsworth Road											
11	T1	180	18.0	0.106	0.2	LOS A	0.0	0.3	0.02	0.00	59.7
12	R2	1	18.0	0.106	15.4	LOS B	0.0	0.3	0.02	0.00	56.5
Approach		181	18.0	0.106	0.3	NA	0.0	0.3	0.02	0.00	59.7
All Vehicles		1137	18.0	0.514	1.6	NA	0.8	6.6	0.05	0.09	58.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Hollinsworth Road / Access Road 2 - PM Peak - 2036]

Giveway / Yield (Two-Way)

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: Access Road 2											
1	L2	1	18.0	0.766	17.3	LOS B	4.1	33.2	0.93	1.26	38.9
3	R2	211	18.0	0.766	30.5	LOS C	4.1	33.2	0.93	1.26	38.6
Approach		212	18.0	0.766	30.4	LOS C	4.1	33.2	0.93	1.26	38.6
East: Hollinsworth Road											
4	L2	20	18.0	0.112	5.8	LOS A	0.0	0.0	0.00	0.06	56.9
5	T1	174	18.0	0.112	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		194	18.0	0.112	0.6	NA	0.0	0.0	0.00	0.06	59.1
West: Hollinsworth Road											
11	T1	803	18.0	0.461	0.0	LOS A	0.0	0.1	0.00	0.00	60.0
12	R2	1	18.0	0.461	7.2	LOS A	0.0	0.1	0.00	0.00	56.8
Approach		804	18.0	0.461	0.0	NA	0.0	0.1	0.00	0.00	60.0
All Vehicles		1209	18.0	0.766	5.4	NA	4.1	33.2	0.16	0.23	54.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Hollinsworth Road / Access Road 3 - AM Peak - 2036 - LILO]

Giveway / Yield (Two-Way)

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: Access Road 3											
1	L2	38	18.0	0.084	12.6	LOS A	0.3	2.3	0.72	0.88	48.1
Approach		38	18.0	0.084	12.6	LOS A	0.3	2.3	0.72	0.88	48.1
East: Hollinsworth Road											
4	L2	151	18.0	0.561	5.8	LOS A	0.0	0.0	0.00	0.09	56.5
5	T1	819	18.0	0.561	0.1	LOS A	0.0	0.0	0.00	0.09	58.9
Approach		969	18.0	0.561	1.0	NA	0.0	0.0	0.00	0.09	58.5
West: Hollinsworth Road											
11	T1	180	18.0	0.103	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		180	18.0	0.103	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		1187	18.0	0.561	1.2	NA	0.3	2.3	0.02	0.10	58.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [Hollinsworth Road / Access Road 3 - PM Peak - 2036 - LILO]

Giveway / Yield (Two-Way)

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: Access Road 3											
1	L2	162	18.0	0.129	6.5	LOS A	0.5	4.4	0.31	0.58	51.9
Approach		162	18.0	0.129	6.5	LOS A	0.5	4.4	0.31	0.58	51.9
East: Hollinsworth Road											
4	L2	41	18.0	0.124	5.8	LOS A	0.0	0.0	0.00	0.11	56.5
5	T1	174	18.0	0.124	0.0	LOS A	0.0	0.0	0.00	0.11	58.9
Approach		215	18.0	0.124	1.1	NA	0.0	0.0	0.00	0.11	58.5
West: Hollinsworth Road											
11	T1	803	18.0	0.460	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		803	18.0	0.460	0.1	NA	0.0	0.0	0.00	0.00	59.8
All Vehicles		1180	18.0	0.460	1.2	NA	0.5	4.4	0.04	0.10	58.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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