TRAFFIC AND PARKING IMPACT ASSESSMENT OF MIXED USE DEVELOPMENT AT 4-18 NORTHWOOD ROAD & 274-274A LONGUEVILLE ROAD, LANE COVE

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Development Type: **Mixed Use Development**

Site Address: **4-18 Northwood Road & 274-274A Longueville Road, Lane Cove**

Prepared for: **Pathways Property Group**

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1 INTRODUCTION

M^CLaren Traffic Engineering was commissioned by *Pathways Property Group* to provide a Traffic and Parking Impact Assessment of the Mixed Use Development at 4-18 Northwood Road & 274-274A Longueville Road, Lane Cove.

1.1 Description and Scale of Development

1.1.1 Proposed Scale

The proposed development has the following characteristics relevant to traffic and parking, with the relevant plans reproduced in **Annexure A** for reference:

- A six (6) storey mixed use development comprising of:
    - A residential aged care facility containing 143 beds within 122 rooms and associated facilities across four (4) storeys with;
        - 101 x 1-bedroom rooms;
        - 21 x 2-bedroom rooms;
        - 40 staff on-site at any one time.
    - Ground floor commercial premises of 2,051m^2 gross floor area (GFA).
- Three (3) basement car parking levels with vehicular access via a proposed two-way driveway from Northwood Road, accommodating 86 car parking spaces.

1.1.2 Existing Scale

Reference is made to the *Traffic Impact Assessment* prepared by *Traffix* dated October 2017 (ref: 16.326r01v10) of which assessed the subject site during the planning proposal stage and has since been approved. The scale of the existing uses of the site according to this report is as follows:

- Two (2) dwelling houses;
- Service station of 1,558m^2 site area accommodating:
    - Several fuel bowsers;
    - A convenience store of approximately 160m^2 GFA;
    - Mechanical repairs workshop.
- A two (2) storey building containing:
    - Ground floor retail of approximately 98.6m^2 GFA;
    - First floor Pilates studio of approximately 98.6m^2 GFA.
- A two (2) storey building containing:
    - Ground floor retail of approximately 107.4m^2 GFA;
    - First floor residential apartment.
- A single storey building containing:
    - Ground floor retail of approximately 316.3m^2 GFA.

- A two (2) storey building containing:
    - Ground floor veterinary clinic of approximately 154m^2 GFA;
    - Lower ground floor pet grooming parlour of approximately 76m^2 GFA;
    - Two (2) first floor residential apartments.

Existing access to the sites is made via five (5) separate driveways, each with a vehicle crossing on Longueville Road or Northwood Road.

1.2 State Environmental Planning Policy (Infrastructure) 2007

The proposed development does qualify as a traffic generating development with relevant size and/or capacity under *Clause 104* of the *SEPP (Infrastructure) 2007*. Accordingly, formal referral to Transport for New South Wales (TfNSW), formerly Roads and Maritime Services (RMS), is required in conjunction with the application being assessed by Lane Cove Council officers. It is noted that the RMS (now TfNSW) have provided comments during the planning proposal stage of this development with the most recent comments provided in a letter dated 11 May 2018 (reference SYD16/00813/03).

1.3 Site Description

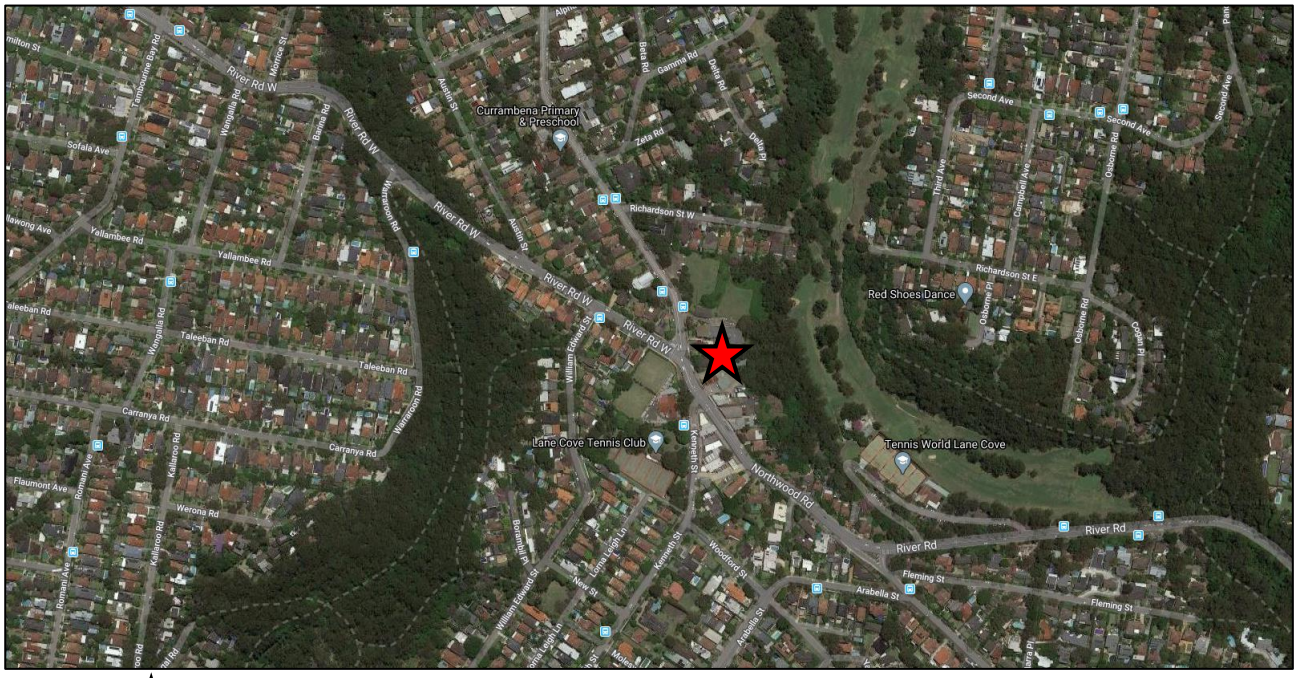
The subject proposal involves the demolition of existing structures consisting of two (2) residential dwellings, a service station and three (3) retail developments and construction of a proposed mixed-use development. The subject site is currently zoned *B4 - Mixed Use* under the *Lane Cove Local Environmental Plan 2009*.The site has frontages to Longueville Road to the west and Northwood Road to the west, with the road changing name at the intersection with Kenneth Street.

The site is generally surrounded by low-density residential developments (zoned *R2 – Low Density Residential*) to the north, west and south, with pockets of *R4 – High Density Residential* zoning along Longueville Road to the north. The eastern boundary of the site is shared with land zoned *E2 – Environmental Conservation* with a strip of *RE1 – Public Recreation* thereafter, containing the Lane Cove Golf Club, Tennis World Lane Cove and Gore Creek. A retail pocket (zoned *B2 – Local Centre*) is located directly to the south, containing a service station and various retail premises. The Lane Cove Tennis Club and Longueville Sporting Club, zoned *RE1 – Public Recreation*, is located to the west of the site.

Woodford Bay is located approximately 600m to the south, with the Northwood Wharf located at the end of Northwood Road approximately 1,200m to the south of the site. Numerous public and community facilities are located to the north of the site along Longueville Road including Shinnyo Australia (150m away), Currambena Primary & Preschool (330m away), St Michael's Catholic Primary School (550m away), St Michael's Catholic Church (650m away), Uniting Kamilaroi (750m away), Lane Cove Public School (800m away) and the southern edge of the Lane Cove town centre, including Lane Cove Market Square shopping centre (950m away).

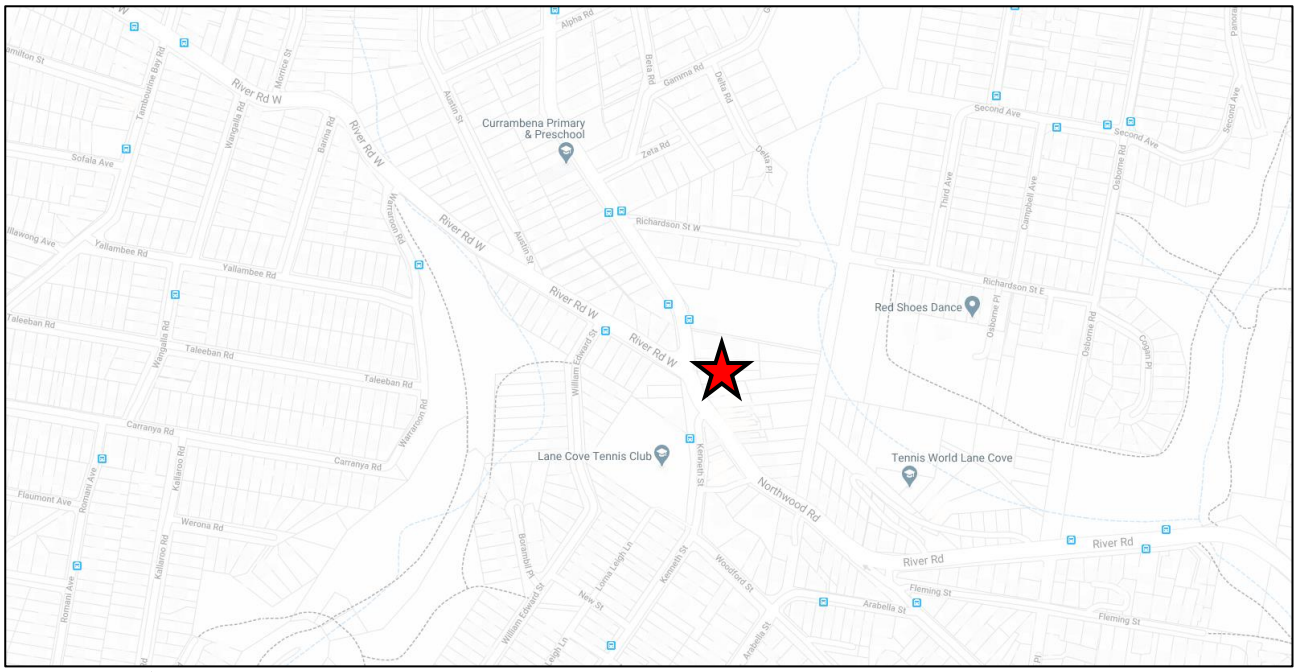
1.4 Site Context

The location of the site is shown on an aerial photo and a street map in **Figure 1** and **Figure 2** respectively.



Site Location

FIGURE 1: SITE CONTEXT – AERIAL PHOTO



Site Location

FIGURE 2: SITE CONTEXT – STREET MAP

2 EXISTING TRAFFIC AND PARKING CONDITIONS

2.1 Road Hierarchy

The road network servicing the site has characteristics as described in the following sub-sections.

2.1.1 Longueville Road

- Unclassified collector road;
- Approximately 13.5m wide two-way carriageway, line-marked bicycle lane and kerbside parking on both sides of the road;
- Two (2) traffic lanes in each direction between River Road West and Kenneth Street;
- Signposted 50km/h speed limit;
- Unrestricted kerbside parking permitted along both sides of the road to the north of River Road West in a line-marked parking lane.

2.1.2 Northwood Road

- RMS Classified State Regional Road (No. 2070);
- Approximately 12.5m wide two-way carriageway within close vicinity of the site facilitating two (2) lanes in each direction;
- Signposted 50km/h speed limit;
- Signposted "*No Stopping – 6.30am-9.30am, 3.30pm-6.30pm, Mon-Fri*" on the north-eastern side of the road;
- Signposted time-restricted kerbside parking *"1/2-P – 9.30am-3.30pm, Mon- Fri, 8.30am-12.30pm, Sat*" along the frontage of 18 Northwood Road;
- Signposted bus stop on the 14 Northwood Road frontage;
- Signposted time-restricted kerbside parking *"2 Hour Parking, 9.30am-3.30pm, Mon-Fri*" to the south-east of 18 Northwood Road;
- No signposting along the southern side of the road, but it appears that parking is not generally undertaken.

2.1.3 River Road West

- RMS Classified State Regional Road (No. 2070);
- Approximately 12m wide two-way carriageway within close vicinity of the site facilitating two (2) lanes in each direction;
- Signposted 50km/h speed limit;
- Signposted *"No Stopping*" on both sides of the road for approximately 50m from the intersection with Longueville Road;
- Signposted *"No Parking – 6.30am - 9.30am, Mon-Fri*" on the northern side of the road;

- Signposted *"No Parking*" and "*Bus Zone*" on the southern side of the road between Longueville Road and William Edward Street;

2.1.4 Kenneth Street

- Unclassified collector road;
- Approximately 12m wide two-way carriageway with two (2) lanes in both directions within close proximity to the intersection of Longueville Road/Northwood Road and kerbside parking on both sides of the road thereafter;
- Signposted 50km/h speed limit;
- Signposted "*No Parking*" and "*1/2-P, 8.30am-6pm, Mon-Fri, 8.30-12.30, Sat*" on the eastern side of the road, between 1 and 9 Northwood Road;'
- Signposted "*2-P 8.30am-6pm, Mon-Fri, 8.30am-12.30pm, Sat*" along the eastern side of the road to Woodford Street;
- Signposted "*No Parking*" and "*Bus Zone*" along the western side of the road along the western side of the road for approximately 55m from the Longueville Road/Northwood Road intersection;
- Signposted "*2-P, 8.30am-6pm, Mon-Fri*" from approximately 55m from the Longueville Road/Northwood Road intersection for approximately 12m followed by signposted "*No Parking*" for approximately 5m and signposted "*4-P, 8.30am-6pm, Mon-Fri*" for approximately 50m on the western side of the road.
- Unrestricted kerbside parking thereafter along the western side of the road.

2.2 Existing Traffic Management

- Signal-controlled intersection of Longueville Road / River Road West;
    - Signposted "*No Right Turn*" from Longueville Road to River Road West.
- Signal-controlled intersection of Longueville Road / Northwood Road / Kenneth Street;
- Give-way line-controlled intersection of Northwood Road / River Road.

2.3 Existing Traffic Volumes

2.3.1 Traffic Surveys

Intersection traffic surveys were conducted at the intersections of Longueville Road / River Road West, Longueville Road / Northwood Road / Kenneth Street and Northwood Road / River Road from 7:00am to 9:00am and 4:00pm to 6:00pm on Wednesday 1 July 2020, representing a typical operating weekday. The full survey results are shown in **Annexure B** for reference.

It is relevant to note that the above surveys have been undertaken during the COVID-19 pandemic and as such a comparison of the traffic volumes within the *Traffic Impact Assessment* prepared by *Traffix* dated October 2017 was undertaken. The comparison indicated that the traffic volumes were similar to those undertaken within the *Traffix Report* and as such can be relied upon to inform existing conditions.

2.3.2 Existing Road Performance

The performance of the surrounding intersections under the existing traffic conditions has been assessed using SIDRA INTERSECTION 9.0, with the layout of the signalised intersections created with respect to aerial imagery and the appropriate TfNSW Traffic Control Signal (TCS) plans as reproduced in **Annexure C**. It is noted that although the TCS plans do not indicate that the signal phasing is linked, a network (linked) model has been used as a basis for analysis due to the close proximity of the intersections. Further, a review of the traffic survey footage has been undertaken in order to identify the general traffic signal phasing sequence and cycle times for the subject intersections.

Table 1 summarises the resultant intersection performance data, with full SIDRA results reproduced in **Annexure D**.

TABLE 1: EXISTING INTERSECTION PERFORMANCES (SIDRA INTERSECTION 9.0)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Longueville Road / Northwood Road / River Road West	AM	0.68	17	**B**	Signals	T from Northwood Road
	PM	0.76	13.4	**A**		T from Northwood Road
Kenneth Street / Northwood Road	AM	0.42	9.8	**A**	Signals	RT from Kenneth Street
	PM	0.81	17.2	**B**		RT from Kenneth Street
River Road / Northwood Road	AM	0.78	4.9 (Worst: >70)	**NA** (Worst: F)	Give Way	RT from Northwood Road
	PM	0.54	3.4 (Worst: >70)	**NA** (Worst: F)		RT from Northwood Road

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown above, the signalised intersections are currently performing at a high level of efficiency, with a level of service “A” or “B” conditions in both the AM & PM peak hour periods. The level of service “A” and “B” performance is characterised by low approach delays and spare capacity.

The give-way controlled intersection of River Road / Northwood Road is operating with worst turn movement of LoS “F”, which is associated with the right turn movement onto River Road from Northwood Road (south) during both the AM and PM peak hour periods. The right turn movement into Northwood Road (south) from Northwood Road (west) is operating at LoS “A” during the AM peak hour period and LoS “B” during the PM peak hour period, which indicates low delays and spare capacity.

It should be noted that the traffic surveys indicated that the largest queue observed for vehicles turning right from Northwood Road (south) to River Road was five (5) vehicles in the AM period and six (6) vehicles in the PM period (100th percentile queue). Further, a sample of 13 vehicles turning right from Northwood Road (south) to River Road was taken during a site visit during the AM peak hour period, of which showed an average delay of 18 seconds during the AM peak period, a maximum delay of 45 seconds and a minimum delay of 2 seconds for vehicles turning right out of River Road.

The over estimation of the right turn movement out of River Road within the SIDRA analysis is likely the result of SIDRA being incapable of replicating the platooning benefits that the give-way controlled intersection has due to the nearby signalised intersection of Kenneth Street / Northwood Road or the on-site observations are not of a sufficient sample size to determine the average delay.

Further, it should be noted that give-way controlled intersections, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should be taken into account. Thus, for example, an intersection where all movements are operating at a level of service ‘A’, except one which is at level of service ‘E’, may not necessarily define the intersection level of service as ‘E’ if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

The above is the case with the give-way controlled intersection of River Road / Northwood Road whereby an average delay in excess of 70 seconds is exhibited for vehicles turning right out of Northwood Road onto River Road (based upon the SIDRA results). Due to the relatively low number of vehicles attempting this manoeuvre, this is an acceptable outcome with local users understanding the standard delay required to undertake this manoeuvre. It is not uncommon for minor roads accessing major roads to exhibit large delays while waiting for acceptable gap in the major road traffic stream.

2.4 Public Transport

The subject site has access to existing bus stops (ID: 2066121 and ID: 206640) located along the site frontage adjacent to 14 Northwood Road and approximately 60m to the north of the site on Longueville Road. The bus stops service existing bus routes 253 (Riverview to City Wynyard via Freeway), 254 (Riverview to McMahons Point) and 261 (Lane Cove to City King Street Wharf via Longueville) provided by State Transit.

No train station is within an accessible distance from the subject site. The location of the site subject to the surrounding public transport network is shown in **Figure 3** below.

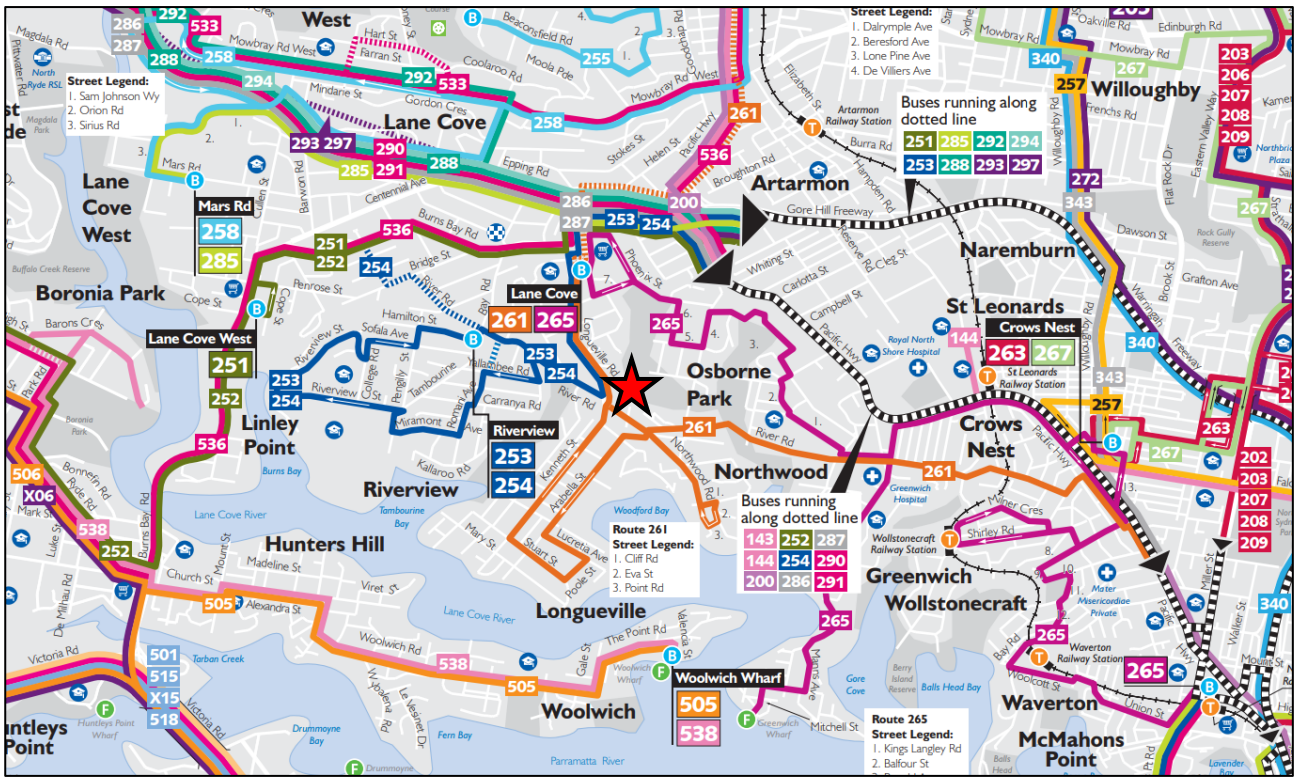


FIGURE 3: PUBLIC TRANSPORT NETWORK MAP

2.4.1 Bus Stop Location

The location of the existing bus stop on Northwood Road is close to the location of the proposed driveway facilitating access to the proposed development. With buses timetabled to service this stop throughout the day, there is the potential for sightlines from the access driveway to be obstructed such that vehicles exiting the site cannot see vehicles travelling southbound on Northwood Road. This can lead to potential vehicular conflict whereby vehicles travelling southbound may attempt to overtake and merge in front of the stationery bus while a vehicle leaves the proposed driveway.

It is noted that the operation of the existing driveway servicing 18 Northwood Road currently operates in the described manner but with the consolidation of driveways to the single proposed location therefore concentrates the associated traffic load of the site to this access point, increasing the potential road safety risks.

In order to improve road safety outcomes, it is recommended that the bus stop be relocated further south along Northwood Road (adjacent to 20 or 22 Northwood Road). The relocation process should be undertaken in conjunction with Council and the relevant bus operators.

2.4.2 Transport Access Guide (TAG)

Reference is made to the *Lane Cove Development Control Plan 2010 – Part R - Traffic, Transport and Parking Section 5.1* which requires the provision of a Transport Access Guide (TAG) when the proposal meets the following:

> *A TAG is required for medium sized development that generate more than 10 peak hour vehicle trips*

A TAG is a customised guide that is provided to people travelling to and from a subject site to promote alternative modes of transport other than private motor vehicles. Alternative modes of transport include walking, cycling and public transport. Considering the subject site generates in excess of 10 peak hour vehicle trips it is recommneded that a Transport Access Guide is prepared as part of a consent condition to be approved by Coucnil prior to Occupation (Section 5.3 of Lane Cove DCP Part R) and provided to each commercial tenancy to promote alternative modes of transport other than private motor vehicles.

2.5 Future Road and Infrastructure Upgrades

From the Lane Cove Council Development Application tracker and website, it appears that there are no future planned road or public transport changes that will affect traffic conditions within the immediate vicinity of the subject site.

3 PARKING ASSESSMENT

3.1 Car Parking

Reference is made to the *Lane Cove Development Control Plan 2010 – Part D – Commercial and Mixed Use Localities* which is the applicable site specific DCP, which does not outline car parking requirements for the subject site. As such reference is made to *Lane Cove Development Control Plan 2010 – Part R - Traffic, Transport and Parking* which designates the following parking rates applicable to the proposed development:

> ***Table 1 – Car parking rates***
>
> ***Commercial & Mixed Use Development (Commercial Component)***
>
> *Shop*
>
> *1 space per 40m^2*
>
> *1 disabled space per 20 car spaces (minimum 1 disabled space)*

Further, in absence of parking rates applicable to aged care developments within the Lane Cove DCP, reference is made to the *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004*, referred to as SEPP (ARH) hereinafter, which designates the following applicable parking rates:

> ***Division 2 Residential care facilities***
>
> *48 Standards that cannot be used to refuse development consent for residential care facilities*
>
> *(d) parking for residents and visitors: if at least the following is provided—*
>
> *(i) 1 parking space for each 10 beds in the residential care facility (or 1 parking space for each 15 beds if the facility provides care only for persons with dementia), and*
>
> *(ii) 1 parking space for each 2 persons to be employed in connection with the development and on duty at any one time, and*
>
> *(iii) 1 parking space suitable for an ambulance.*

Table 2 presents the parking requirements of the proposal according to the Council's and SEPP(ARH) car parking rates.

TABLE 2: PARKING RATES

Land Use	Type	Scale	Rate	Parking Required	Parking Provided
Commercial	Shop	2,051m^2 GFA	1 space per 40m^2	51.3	51
Residential	Aged Care	101 x 1-bed units	1 space per 10 beds	10.1	15
		21 x 2-bed units	1 space per 10 beds	4.2	
		40 staff	1 space per 2 staff	20	20
TOTAL	**-**	**-**	**-**	**86 (85.6)**	**86**

As shown above, strict application of the DCP and SEPP(ARH) requires the provision of **86** car parking spaces, with **51** for commercial use and **14** for residential aged care use and **20** for residential aged care staff. The proposed plans detail the provision of **86** car parking spaces, with **51** for commercial use, **15** for aged care residential use and **20** for residential aged care staff use, satisfying requirements of Council's DCP and the SEPP(ARH). It is noted that the plans detail a loading area, which is suitable for ambulance use and detailed in **Section 3.4**.

The allocation of car parking within the basement car park is as per the following:

- **10** residential age care visitor car parking spaces on Level 3;
- **32** commercial and residential aged care visitor car parking spaces on Level 2;
- **44** commercial staff and residential aged care staff car parking spaces on Level 1.

3.2 Disabled Parking

Council's DCP requires the provision of one (1) disabled space for every 20 car parking spaces for commercial (shop) developments. Further, reference is made to the *Building Code of Australia* (BCA) *Table D3.5* which classifies accommodation for the aged as a Class 3(b) building and a commercial premises as a Class 6 building of which requires the provision of disabled parking at the rates of:

Class 3(b) *1 space for every 100 car parking spaces or part thereof*

Class 6 *1 space for every 50 car parking spaces or part thereof*

By applying a conservative rate of one (1) disabled space per 50 car parking spaces to the entire development, two (**2**) disabled car parking spaces are to be provided. The plans detail two (**2**) disabled car parking spaces as per with *AS2890.6:2009*, complying with BCA requirements.

3.3 Bicycle & Motorcycle Parking Requirements

Reference is made to the Lane Cove DCP which outlines the following requirements for bicycle and motorcycle parking spaces.

> ***Table 3 – Bicycle parking rates***
>
> ***Commercial & Mixed Use (Commercial Component)***
>
> *Shop*
>
> *Employees*
>
> *1 per 50m² GFA*
>
> *Visitors*
>
> *2 racks + 1 rack per 200m² over 200m² GFA*
>
> ***2.7 Motorcycle parking***
>
> *a) Developers shall provide 1 motorcycle parking space per 15 car spaces for all types of development.*

Applying the above rates, results in a requirement of **53** bicycle spaces, with **41** for commercial staff, **12** for commercial visitors and six (**6**) motorcycle parking spaces. The plans detail the provision of six (**6**) motorcycle parking spaces complying with Council's requirements. There is ample room within the basement car parking areas to provide bicycle parking and is to be shown on the plans.

It is not expected that aged care residents require bicycle or motorcycle parking. Further, there is no requirement outlined within the DCP for the provision of residential aged care bicycle spaces.

3.4 Servicing & Loading

Reference is made to the Lane Cove DCP 2010 which does not specify servicing and loading requirements for residential aged care facilities or commercial premises. The client has advised that all servicing and loading, including waste collection for the site can be conducted by an 8.8m length MRV via the proposed loading zone located on Level 3. Swept path testing of an 8.8m MRV to and from the proposed loading area is reproduced in **Annexure E** for reference, showing successful manoeuvring to and from the designated loading and waste collection area.

This loading area also provides an additional loading bay for an SRV It is noted that this area can be used by an ambulance when required, alternatively an ambulance can utilise the drop-off / pick up area. Furthermore, it is important to note that ambulance vehicles range from 2.63m to 3.2m in height depending upon the model, of which can operate within the provided basement headroom of 3.5m.

As the proposed development of not a residential development, it is expected that all waste collection will be undertaken by a private waste contractor from the basement car park, from

within the dedicated loading areas, adjacent to the waste rooms. It is expected that the waste collection vehicle will be capable of operating within the 3.5m of headroom provided.

3.5 Car Park Design & Compliance

The car parking layout as depicted in **Annexure A,** have been assessed to achieve the relevant clauses and objectives of *AS2890.1:2004*, *AS2890.2:2002* and *AS2890.6:2009*. Any variances from standards are addressed in the **Annexure E** and the following subsections including required changes, if any. Swept path testing has been undertaken and are reproduced within **Annexure E** for reference.

The proposed car park design achieves:

- 14m width driveway crossover serving a two-way separated inbound and outbound driveway facilitating MRV access to/from Northwood Road;
- Minimum 5.8m width parking aisles;
- Compliant ramp grades not exceeding 25% and no grade change greater than 12.5%;
- Minimum 5.4m length, 2.4m width spaces for staff;
- Minimum 5.4m length, 2.6m width spaces for visitors;
- Minimum 5.0m length, 2.3m width spaces for small cars;
- Minimum 5.4m length, 2.4m width disabled spaces with adjacent associated 5.4m length, 2.4m width shared space;
- Minimum headroom of 2.2m for general circulation and 2.5m headroom clearance provided over disabled and adaptable parking areas;
- Motorcycle spaces with minimum dimensions of 1.2m by 2.5m;
- Minimum headroom of 3.5m for service vehicle and ambulance vehicle access.

The proposed car park layout will be required to operate under signal control to ensure the safe operation of the internal car parking areas. Vehicle access to the staff car parking area on Level 1 is provided by a single lane ramp, which is required to operate under signal control. Staff traffic is tidal in nature and as such limited queuing will occur as a result of the single lane ramp as opposing staff traffic flow is low.

In addition, due to the blind corner from the loading area and residential aged care visitor spaces on Level 3, the egress from the loading area is required to operate under signal control to ensure conflicts between vehicles exiting the site from Level 2 do not occur. The signal systems as part of the development should be designed and certified by an experienced signal manufacturer.

Whilst the plans have been assessed to comply with the relevant standards, it is usual and expected that a design certificate be required at the Construction Certificate stage to account for any changes following the development application.

3.5.1 RMS Comments

Reference is made to the RMS letter dated 11 May 2018 (ref: SYD16/00813/03) of which provides comment relating to the proposed site. It is noted that these comments were made in reference to the planning proposal, although maintain relevance to the subject development application.

The RMS outlines the requirement to minimise the number of vehicular conflict points along arterial roads in order to maintain network efficiency and road safety, citing *Section 6.2.1* of the RMS *Guide to Traffic Generating Developments 2002*. The RMS also requires that driveway with access to arterial roads be limited to left in / left out for road safety and traffic efficient reasons. Further, due to the proximity to traffic signals, the RMS outlined its preference for the access driveway to the site be at the most southern point of the site, as far away from the signals as feasibly possible.

The proposed access to the site meets the three criteria outlined with the RMS letter, being a single, consolidated, left in / left out access driveway, located toward the southern boundary of the site. It is noted that a median is proposed within the Northwood Road carriageway, such that right turn manoeuvres to and from the driveway will be physically restricted. This median extends from the southern leg of the Northwood Road / Longueville Road / Kenneth Street intersection to the proposed driveway location.

3.6 Variations from Standards

3.6.1 MRV Headroom & Grades

A minimum of 3.5m of headroom is provided on Level 3 for service vehicle and emergency service access. The on-site loading facilities allows access and egress for up to an 8.8m length Medium Rigid Vehicle (MRV), which requires 4.5m headroom under *AS2890.2:2018*. Whilst the site does not comply with this requirements, there are various private waste contractor vehicles that are of similar length to a MRV, but can operate within the provided headroom of 3.5m such that this is an acceptable variation to the standards.

The 3.5m headroom is to be appropriately sign posted at the entrance to the Level 3 Basement.

The entry ramp provides a maximum grade of 16.67%, of which is a slight variation to the allowable maximum grade of 15.4% as stipulated within *AS2890.2:2018* for an MRV. This maximum grade is located along the inside of the curved ramp, of which the wheels of any MRV entering the site would not travel upon. In addition to this, the Australian Standard requires transition lengths of 7m in length at no grade change greater than 6.25% for an MRV of which have not been provided.

In accordance with *Section 3.3.4.3* of *AS2890.2:2018*, an undercarriage clearance test has been undertaken for an MRV to determine if any scraping occurs. The undercarriage vertical clearance test is reproduced in **Annexure E** for reference, demonstrating that no scraping occurs and that 50mm clearance is provided to the slab, as such the slight variation to the ramp grades and transitions are acceptable.

4 TRAFFIC ASSESSMENT

The impact of the expected traffic generation levels associated with the subject proposal is discussed in the following sub-sections.

4.1 Future Traffic Generation

4.1.1 Planning Proposal

Reference is made to the *Traffic Impact Assessment* prepared by *Traffix* dated October 2017 (ref: 16.326r01v10) of which assessed the subject site during the planning proposal stage. The planning proposal has since been approved. This document applied traffic generation rates applicable to the proposed uses as depicted in **Table 3**.

TABLE 3: TRAFFIC GENERATION RATES FROM PLANNING PROPOSAL

Use	Referenced Document	Peak Period	Rate
Residential Aged Care	RMS Guide	AM & PM	0.1 trips per dwelling (1)
Shops	RMS Guide	AM	33% of PM rate
		PM	4.6 trips per 100m^2 GFA

Notes: (1) Assumed lower range of RMS rate as it is expected that the development is to cater for aged persons requiring a high level of care.

Application of these rates to the proposed scale of the development has been made, with the resulting traffic generation rates based on the approved planning proposal depicted in **Table 4**.

TABLE 4: FUTURE TRAFFIC GENERATION – PLANNING PROPOSAL

Use	Scale	Peak Period	Generation Rate	Trips
Aged Care	122 units	AM	0.1 per dwelling	12 (1)
		PM	0.1 per dwelling	12 (1)
Commercial (Shops)	2,051m^2 GFA	AM	33% of PM rate	31 (2)
		PM	4.6 trips per 100m^2 GFA	94 (2)
TOTAL	**-**	**AM**	**-**	**43 (32 in, 11 out)**
		PM	**-**	**106 (52 in, 54 out)**

Note: (1) Assumes 60% inbound, 40% outbound in the AM peak period. Vice versa in PM peak period.
(2) Assumes 80% inbound, 20% outbound in AM peak period. Assumes 50% inbound, 50% outbound in PM peak period.

As shown above, based upon the rates adopted within the planning proposal, the site is expected to generate **43** and **106** vehicle trips in the AM (32 in, 11 out) and PM (52 in, 54 out) peak hour periods respectively.

Whilst the above adopts the same traffic generation rates as the planning proposal it is relevant to assess the anticipated maximum peak hour traffic generation of the site which is outlined in the following section.

4.1.2 RMS Guide

Traffic generation rates for the relevant land uses are provided in the *Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (2002)* and recent supplements and are as follows:

> ***RMS Guide***
>
> ***3.3.4 Housing for aged and disabled persons.***
>
> *Evening peak hour vehicle trips = 0.1 - 0.2 per dwelling*
>
> ***3.6.1 Shopping centres***
>
> *Friday* *V(P) = 56 A(SS) per 1000m² GLFA*
>
> *Where:*
>
> *A(SS): Specialty shops, secondary retail GLFA*

The resulting traffic generation of the site is summarised in **Table 5**, based upon the above rates and the following assumptions:

- GLFA is taken as 75% of gross floor area (GFA) for commercial premises;
- The morning peak rate has been assumed to be the same as the evening peak rate for the aged care facility;
- The morning peak rate has been assumed to be 50% of the PM peak hour period.

TABLE 5: FUTURE TRAFFIC GENERATION - RMS

Use	Scale		Generation Rate	Trips
Aged Care	122 units	AM & PM	0.2 per dwelling	25 (1)
Commercial (Shops)	1,540m² GLFA	AM	50% of PM rate	43 (2)
		PM	56 per 1000m²	86 (2)
TOTAL	**-**	**AM**		**68 (26 in, 42 out)**
		PM		**111 (63 in, 48 out)**

Note: (1) Assumes 20% inbound, 80% outbound in the AM peak period. Vice versa in PM peak period.
(2) Assumes 50% inbound, 50% outbound in both AM and PM peak period.

As shown above, the site is expected to generate **68** and **111** vehicle trips in the AM (26 in, 42 out) and PM (63 in, 48 out) peak hour periods respectively. Applying the 33% generation rate in the AM peak as per the planning proposal guide, the AM traffic generation associated with the commercial premises is 28 vehicle trips and brings the overall AM traffic generation to 53 vehicle trips (18 in, 35 out).

4.2 Existing Traffic Generation

4.2.1 Planning Proposal

The *Traffix Traffic Impact Assessment* dated October 2017 (ref: 16.326r01v10) outlines an existing traffic generation of the subject site, which was accepted as part of the planning proposal, as summarised in **Table 6**. It is noted that all traffic generation rates were derived from the RMS Guide 2002 or more recent supplements as stated in the report.

TABLE 6: EXISTING TRAFFIC GENERATION – PLANNING PROPOSAL

Use	Scale	Peak Period	Generation Rate	Trips
Residential	2 x dwelling houses	AM	0.95 per dwelling	2
		PM	0.99 per dwelling	2
Service Station (Fuel and Mechanic)	1,558m^2 Site Area	AM	75% of PM rate	9
		PM	20% of 4 per 100m^2 Site Area (1)	12
Service Station (Convenience Store)	160m^2 GFA	AM	75% of PM rate	7
		PM	20% of 30 per 100m^2 GFA (1)	10
Gymnasium (Pilates Studio)	98.6m^2 GFA	AM	33% of PM rate	3
		PM	9 per 100m^2 GFA	9
Retail	522.3m^2 GFA	AM	33% of PM rate	8
		PM	4.6 per 100m^2 GLFA	24
Veterinary Hospital and Grooming	230m^2 GFA	AM	33% of PM rate	2
		PM	2.2 per 100m^2 GLFA	5
TOTAL	**-**	**AM** (3)	**-**	**31 (20 in, 11 out)**
		PM (3)	**-**	**62 (30 in, 32 out)**

Note: (1) A reduction factor of 80% was applied in the planning proposal to account for passing trade / expected local traffic generation.
(2) For uses with rates based upon GLFA, it has been assumed that GFA = GLFA.
(3) Trip distribution is as per the Planning Proposal document.

It is noted that the traffic generation associated with the three (3) shop top dwellings was not outlined. The RMS Guide 2002 outlines a traffic generation rate of 0.5 trips per dwelling for medium density dwellings equating to two (2) additional trips in the AM and PM peak hour periods. It is noted that the traffic generation associated with the shop top dwellings has been included within the combined traffic generation section of the planning proposal report.

The combined traffic generation as stated in the *Traffix* report and approved as part of the planning proposal is **33** vehicle trips (20 in, 13 out) in the AM peak hour period and **64** vehicle trips (32 in, 32 out) in the PM peak hour period.

4.2.2 MTE Assessment of Existing Traffic Generation

Traffic generation rates for the relevant land uses of the existing site are provided in the *Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (2002)* and recent supplements and are as follows:

RMS Guide 2002

3.3.2 Medium density residential flat building.

Weekday peak hour vehicle trips = 0.4-0.5 per dwelling.

3.6.1 Shopping centres

Thursday V(P) = 46 A(SS) + 22 A(OM) per 1000m^2 GLFA

Where:

A(SS): Specialty shops, secondary retail GLFA

A(OM): Office, medical GLFA

3.6.2 Service stations and convenience stores.

Evening peak hour vehicle trips = 0.04 A(S) + 0.3 A(F).

Where:

A(S) = area of site (m^2).

A(F) = gross floor area of convenience store (m^2).

3.8.2 Gymnasiums.

Evening Peak Hour Vehicle Trips = 9 trips per 100m^2 GFA.

TDT 2013/04a

Low density residential dwellings

Weekday average morning peak hour vehicle trips = 0.95 per dwelling in Sydney

Weekday average evening peak hour vehicle trips = 0.99 per dwelling in Sydney

It is noted that the following assumptions have been made for simplicity of assessment:

- The traffic generation of the veterinary clinic is similar to that of a medical facility in a retail precinct;
- The AM peak hour traffic generation of the retail and vet is assumed to be 50% of the PM peak hour rate;
- The AM peak hour traffic generation of the gymnasium is assumed to be 50% of the PM peak hour rate:

- Gymnasiums generally have a morning peak prior to the commuter peak period.

- The AM peak hour traffic generation of the service station is assumed to be the same as the PM peak hour rate:
  - Further, a 50% rate of passing trade is assumed.
- For simplicity, gross floor area is assumed to be equal to gross leasable floor area where required.

The resulting traffic generation based upon the RMS Guide rates and assumptions as outlined above is summarised in **Table 7**. It is noted that the Thursday retail rate has been applied opposed to the Friday retail rate as it provides a greater traffic generation for the proposed uses.

TABLE 7: EXISTING TRAFFIC GENERATION - RMS

Use	Scale	Peak Period	Generation Rate	Trips (2)
Residential	2 x dwelling houses	AM	0.95 per dwelling	2
		PM	0.99 per dwelling	2
	3 x shop top dwellings	AM	0.5 per dwelling	2
		PM	0.5 per dwelling	2
Service Station (Fuel and Mechanic)	1,558m^2 Site Area	AM	Equal to PM rate (1)	(62) 31 (3)
		PM	4 per 100m^2 Site Area (1)	(62) 31 (3)
Service Station (Convenience Store)	160m^2 GFA	AM	Equal to PM rate	24
		PM	30 per 100m^2 GFA	24
Gymnasium (Pilates Studio)	98.6m^2 GFA	AM	50% of PM rate	5
		PM	9 per 100m^2 GFA	9
Retail	522.3m^2 GFA	AM	50% of PM rate	13
		PM	4.6 per 100m^2 GLFA	25
Veterinary Hospital and Grooming	230m^2 GFA	AM	50% of PM rate	3
		PM	2.2 per 100m^2 GLFA	5
TOTAL	**-**	**AM**	**-**	**80 (4) (38 in, 42 out)**
		PM	**-**	**98 (4) (47 in, 51 out)**

Note: (1) A 50% passing trade reduction has been applied.
(2) Trip distribution as follows:
(a) Residential: 20% inbound, 80% outbound during AM peak period. Vice versa for PM.
(b) Service station, gymnasium, retail and veterinary: 50% inbound, 50% outbound during both AM and PM peak periods.
(3) The traffic generation associated with the service station is 62 trips in both the AM and PM peak periods, with 31 trips being new to the road network due to a 50% passing trade factor.
(4) The total does not include passing trade associated with the service station.

4.3 Cumulative Traffic Generation

Based upon **Section 4.1** and **4.2**, the net change in traffic generation from the existing land uses to the proposed land uses is summarised in **Table 8** and **Table 9**, based upon traffic generation rates in the planning proposal (*Traffix* rates) and the RMS Guide 2002 (RMS rates / **MTE** Adopted Rates) respectively. The net change in traffic generation is equal to the future traffic generation minus the existing traffic generation.

TABLE 8: NET CHANGE TRAFFIC GENERATION – PLANNING PROPOSAL

Scenario	Peak Period	Trips	Trip Distribution
Existing (1)	AM	- 33	- 20 in, - 13 out
	PM	- 64	- 32 in, - 32 out
Future(2)	AM	+ 43	+ 32 in, + 11 out
	PM	+ 106	+ 52 in, + 54 out
NET CHANGE	**AM**	**+ 10**	**+ 12 in, -2 out**
	PM	**+ 42**	**+ 20 in, + 22 out**

Note: (1) See **Table 6** for existing traffic generation breakdown based upon planning proposal rates.
(2) See **Table 4** for future traffic generation breakdown based upon planning proposal rates.

TABLE 9: NET CHANGE TRAFFIC GENERATION - RMS

Scenario	Peak Period	Trips	Trip Distribution
Existing(1)	AM	- 80	- 38 in, - 42 out
	PM	- 98	- 47 in, - 51 out
Future(2)	AM	+ 68	+ 26 in, + 42 out
	PM	+ 111	+ 63 in, + 48 out
NET CHANGE	**AM**	**- 12**	**-12 in, 0 out**
	PM	**+ 13**	**+16 in, - 3 out**

Note: (1) See **Table 7** for existing traffic generation breakdown based upon RMS rates.
(2) See **Table 5** for future traffic generation breakdown based upon RMS rates.

It can be seen that the expected net change in traffic generation associated with the subject site based on the RMS Guide 2002 results in a net decrease of **12** vehicles (- 12 in, 0 out) in the AM peak hour period and a net increase of **13** trips (16 in, - 3 out) in the PM peak hour period. It is further noted that the passing trade traffic generation associated with the service station remains within the network as through-bound traffic.

This level of net change in traffic is relatively minor and is not expected to noticeably impact the existing conditions of the surrounding road network. In any case, the changes have been assessed as outlined in the following sections of this report.

4.4 Trip Assignment

The road network surrounding the site, traffic assignment in the *Traffix* planning proposal and the traffic survey data have been assessed and the following traffic assignment has been assumed for all traffic to and from the site as shown in **Table 10** , noting the left in / left out conditions of the proposed driveway arrangement on Northwood Road.

TABLE 10: TRAFFIC ASSIGNMENT

Direction	AM Peak Period	PM Peak Period
To site:	10% from the north via Longueville Road; 50% from the west via River Road West; 30% from the east via River Road; 10% from the south via Kenneth Street.	10% from the north via Longueville Road; 20% from the west via River Road West; 60% from the east via River Road; 10% from the south via Kenneth Street.
From site:	10% to the north via Longueville Road; 20% to the west via River Road West; 60% to the east via River Road; 10% to the south via Kenneth Street.	10% to the north via Longueville Road; 40% to the west via River Road West; 40% to the east via River Road; 10% to the south via Kenneth Street.

It is noted that all vehicles coming to the site from the east via River Road are likely to turn left onto Northwood Road, turn right onto Arabella Street, turn right onto Woodford Street, turn right onto Kenneth Street and turn right onto Northwood Road before turning left into the site.

Vehicles leaving from the site and wanting to travel north are expected to leave site onto Northwood Road, turn right onto Northwood Road, turn left onto Fleming Street, conduct a U-turn manoeuvre on Fleming Street, turn right onto Northwood Road before proceeding left onto Northwood Road (northbound). It is noted that some vehicles may choose to continue to the signals at Kenneth Street via Arabella Street and Woodford Street, but as a worst-case assessment the outlined route will be assumed.

4.5 Traffic Impact

The traffic generation outlined in **Section 4.1** & **4.4** above has been added to the existing traffic volumes recorded, existing traffic volumes associated with the existing land uses on-site have not been removed from the model and as such the assessment represents a conservative assessment. Simply, the expected traffic generated by the proposal based upon the RMS Guide 2002 as shown within **Table 9** has been added to the existing traffic survey volumes.

SIDRA INTERSECTION 9.0 was used to assess the intersections performance comparing the existing intersection operations to the future scenario under the increased traffic load, with all other elements of the intersection unchanged. The results of this assessment are shown in **Table 11**.

TABLE 11: INTERSECTION PERFORMANCE (SIDRA INTERSECTION 9.0)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Longueville Road / Northwood Road / River Road West	AM	0.68	17	**B**	Signals	T from Northwood Road
	PM	0.76	13.4	**A**		T from Northwood Road
Kenneth Street / Northwood Road	AM	0.42	9.8	**A**	Signals	RT from Kenneth Street
	PM	0.81	17.2	**B**		RT from Kenneth Street
River Road / Northwood Road	AM	0.78	4.9 (Worst: >70)	**NA** (Worst: F)	Give Way	RT from Northwood Road
	PM	0.54	3.4 (Worst: >70)	**NA** (Worst: F)		RT from Northwood Road
FUTURE PERFORMANCE						
Longueville Road / Northwood Road / River Road West	AM	0.70	17.2	**B**	Signals	T from Northwood Road
	PM	0.76	15.3	**B**		T from Northwood Road
Kenneth Street / Northwood Road	AM	0.44	9.8	**A**	Signals	RT from Kenneth Street
	PM	0.78	17.5	**B**		RT from Kenneth Street
River Road / Northwood Road	AM	0.87	6.5 (Worst: >70)	**NA** (Worst: F)	Give Way	RT from Northwood Road
	PM	0.58	3.4 (Worst: >70)	**NA** (Worst: F)		RT from Northwood Road

Notes: Refer to **Table 1** notes.

It can be seen that the three (3) relevant intersections all retain a similar degree of saturation and average delay, indicating that no noticeable change to the operation of the intersections is noticeable. The signalised intersections retain level of service 'A' or 'B' condition, demonstrating the intersection spare capacity is maintained under future conditions.

It is noted that the conditions of the give-way intersection of River Road / Northwood Road are unchanged, with a similar degree of saturation and average delay in both the AM and PM peak hour periods under the future conditions. Further, the turning movements from

each leg of the intersection are retained, with the right turn movement onto River Road from Northwood Road (south) operating at LoS “F” in both the AM and PM peak hour periods and the right turn into Northwood Road (south) from Northwood Road (west) operating at LoS “A” and “B” during the AM and PM peak hour period respectively.

It is noted that the right turn from Northwood Road (south) onto River Road does retain an average delay in excess of 70 seconds under the future traffic conditions in both AM and PM peak hour periods, but will continue to benefit from platooning affects. This is consistent with the existing conditions and is typical for minor roads connecting to busy arterial roads, in the event that the right turn movement onto River Road from Northwood Road (south) becomes a safety issue, the right turn movement should be restricted between peak traffic flow periods, the implementation of this restriction is to the discretion of Council, with the alternative route onto the arterial road being via the signalised intersection of Kenneth Street / Northwood Road, which has spare capacity for right turn movements.

Furthermore, the number of conflict points are being reduced along the western boundary of the site fronting Longueville Road / Northwood Road. Under the proposal, the following driveways are to be removed:

- Two-way driveway to 274 Longueville Road (residential);
- Access driveway to 5 Northwood Road (Service Station);
- Egress driveway from 5 Northwood Road (Service Station);
    - Reduces an effective leg of the intersection of Northwood Road / Longueville Road / Kenneth Street, thereby reducing potential conflict for vehicles using the intersection;
- Two-way driveway to 14 and 16 Northwood Road (retail);
- Two-way driveway to 18 Northwood Road (veterinary clinic).

The five (5) existing driveways are to be replaced with a single two-way access / egress driveway servicing the proposed development, restricted to left in / left out movements only, located to the southern side of the site (close to the existing 18 Northwood Road driveway).

The net removal of four (4) access points will act to reduce conflict along the site frontage, with less conflict for southbound traffic creating a more constant flow pattern for traffic (i.e. less deceleration to allow vehicles to enter / exit driveways). This reduction in traffic conflict will improve the road conditions and benefit the road network within close vicinity to the site.

It is noted that within their letter dated 11 May 2018, the RMS raise the potential for the requirement of a left-turn deceleration lane on Northwood Road in order to provide access to the site. This is an unnecessary requirement as the proposal reduces conflict along the subject road by the removal of four (4) driveways, thereby improving the efficiency of southbound traffic.

Reference is made to the *AUSTROADS Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings – Section 2.3.5* which raises considerations for the requirement of the provision of an auxiliary left turn deceleration lane. It is noted that the subject driveway does not impede through traffic to the extent that "*the operational efficiency of an intersection or intersection approach is compromised*" or "*an unacceptable level of safety would result due to turning traffic slowing or stopping in a through lane*" as evident with the minimal change in traffic and conflict points associated with the subject site and the low speed environmental, namely a sign-posted speed of 50km/h.

Further, *Section 2.3.6* of the AUSTROADS guide outlines the warrants for the provision of different turning movements at intersections. As the proposed driveway, providing access to a private development, is not an intersection of a public road, these warrants are not applicable.

The above is further supported by *Section 3.1.1* of *AS2890.1:2004* which states the following:

> *Category 5 facilities in Table 3.1 shall be provided as intersections. Category 3 and 4 facilities may also be considered for provision as intersections.*

The above, indicates that if the development is a Category 3 or 4 access driveway, the design of the driveway should be considered to be designed as a public road intersection. *Table 3.1* of *AS2890.1:2004* classifies the subject proposal driveway as a Class 2 facility and as such the proposed development driveway is not required to be designed as a public road intersection. As such the development does not require the provision of a deceleration lane.

It is also important to note that any provision of a deceleration lane at the subject site would also have an impact upon pedestrians walking along the site frontage between the subject site and adjoining buildings, such that there is a geometric constraint in providing such a facility.

5 CONSTRUCTION TRAFFIC MANAGEMENT PLAN

Typically, after the development application stage a detailed Construction Traffic Management Plan is provided at the construction certificate stage prior to construction and as part of a consent condition, to be approved by Council. Once a builder has been engaged, confirmation of the number of staff and construction vehicles can be provided and assessed (if required). Construction vehicular traffic is temporary in nature and is not expected to exceed the operating capacities of nearby intersections or be substantially greater than the assessed operation of the proposed development as detailed within this report.

Generally during construction, staff traffic will arrive to the site around 7:00am and depart the site around 5:00pm (or earlier), Monday to Saturday, with construction deliveries provided throughout the day. Considering the location and constraint of the site and surrounding environs, it is expected that all staff car parking will need to park on-street within available parking areas, whilst all construction vehicular traffic will park wholly on-site or within a Works Zone from Northwood Road. Any Works Zone will be limited to the frontage of 18 Northwood Road, in the current time restricted parking area. This Works Zone would only be able to operate between 9:30am to 3:30pm Monday to Friday and 8:30am to 12:30pm Saturdays and would be subject to approval by Council's Local Traffic Committee.

The site manager is to promote the use of carpooling amongst staff and public transport usage to reduce the construction staff on-street car parking demand. It is highly unlikely that heavy construction traffic in conjunction with staff traffic will exceed the assessed peak hour movements within this report.

Once a builder is engaged, the methodology of the build will be detailed within a detailed Construction Traffic Management Plan (CTMP), to be approved by Council. One methodology that may be adopted is to provide a Works Zone in front of 18 Northwood Road, while maintaining pedestrian access through the provision Type B Hoarding along the public verge and allow all construction vehicles to unload / load on-site. Considering the location of the site, it is not recommended to provide traffic controller to stop traffic flow along Northwood Road to allow construction vehicles to access the site. All construction vehicles will be required to enter and exit the site in a forward direction to achieve this outcome.

Based upon the above methodology there will be no impact to existing public transport facilities, namely bus facilities. Temporary loss of parking would occur along the frontage to 18 Northwood Road but is deemed acceptable.

In the event that a mobile crane / tower crane is required for the site, it is expected that this will be delivered to the site outside of peak operating hours of the town centre (i.e. after 9:00pm), such that it can be installed from Northwood Road. The delivery and approval of mobile crane / tower crane is subject to a separate application to Council and does not form part of the Construction Traffic Management Plan.

It is expected that site amenities will be located wholly on-site, with all persons entering the site reporting to the site office and be inducted into the site prior to entering the construction site as per standard OH&S requirements.

Heavy vehicles exiting the site will pass over cattle grids installed within the site and tyres will be washed down to remove any excess sediment. Roads will be swept and cleared where spoil has been tracked out as required. Silt protection and / or bund walls will be installed along the perimeter fencing and to all stormwater drains and pits.

6 Review of Bitzios Consulting Peer Review

As part of this development application a review has been undertaken of the comments made by *Bitzios Consulting* within their *Peer Review* dated 13th July 2017 in regards to the planning proposal prepared by *Traffix Report*.

The peer review undertaken by *Bitzios Consulting* relates to an alternative design than that proposed which provided access into the development through a fourth leg in the existing signalised intersection with Northwood Road / Kenneth Street which has not been proposed as part of the development application. As such some of the comments made within the *Bitzios Peer Review* are not relevant. The comments made within the *Bitzios Peer Review* that are relevant to respond to within this report are shown *italicised* below, with a response provided thereafter:

> *It would be useful to have survey data of existing traffic entering and exiting the site I the peak hours to compare with the assumptions made for traffic generation*

MTE Response: At the time of preparation of this report, some of the existing sites were unoccupied and as such it was deemed unnecessary to undertake this considering some shops were unoccupied. In addition to this, future traffic modelling did not discount any existing vehicle traffic from the surveyed road network to ensure a conservative assessment.

> *The traffic generation of the proposed development was compared to the permissible development, whereas it should have been compared to the existing site traffic generation to give a clearer comparison*

MTE Response: Refer to **Table 8** and **Table 9** for a comparison between existing and future traffic flows.

> *For the proposed development, the study mentioned the assumed redirection of northbound and southbound traffic through the unsignalized intersection south of the site, Arabella Street and Woodford Street and returning to Northwood Road via Kenneth Street where a no right turn would be enforced from Northwood Road into the site. Through the study provided an assumed route, it did not provide any detail of the impact on these routes on the intersections and roads*

MTE Response: The signalised intersections of Longueville Road / River Road West, Northwood Road / Longueville Road / Kenneth Street and Northwood Road / River Road have been assessed as part of this report. An assessment of intersection performance along the redirected route is not considered necessary considering peak period two-way traffic flows. The existing two-way traffic flows south of Northwood Road / Longueville Road along Kenneth Street and south of Northwood Road / River Road along Northwood Road are the following:

- Kenneth Street south of Northwood Road / Longueville Road
  - AM Peak – 359 vehicle trips;
  - PM Peak – 378 vehicle trips.

- Northwood Road south of Northwood Road / River Road
    - AM Peak – 232 vehicle trips;
    - PM Peak – 250 vehicle trips.

Considering the above volumes, left and right turns from Woodford Street and Arabella Street would experience little impact in regards to the ability of vehicles to turn left or right onto either Kenneth Street or Northwood Road as such does not require traffic modelling of intersections.

7 CONCLUSION

In view of the foregoing, the subject Mixed Use Development proposal at 4-18 Northwood Road & 274-274A Longueville Road, Lane Cove (as depicted in **Annexure A**) is fully supportable in terms of its traffic and parking impacts. The following outcomes of this traffic impact assessment are relevant to note:

- The proposal includes the provision of **86** car parking spaces, comprised of **51** for commercial use, **15** for residential aged care use and **20** for aged care staff use, satisfying the relevant controls applicable to the development.

- Council's DCP requires the provision of **53** bicycle parking spaces and six (**6**) motorcycle parking spaces. The proposed plans detail the provision of six (**6**) motorcycle spaces, meeting DCP requirements with ample space within the basement area to accommodate the required **53** bicycle spaces.

- Servicing and loading, including waste collection, associated with the proposal can be conducted by up to an 8.8m length Medium Rigid Vehicle via the proposed loading zone located on Level 3, with vehicles being restricted to operate within a headroom of 3.5m

- Adequate provision for ambulance access has been provided, with an ambulance able to use the loading bay or the drop-off / pick-up area provided on site if required.

- The parking areas of the site have been assessed against the relevant sections of *AS2890.1:2004*, *AS2890.2:2018* and *AS2890.6:2009* and have been found to satisfy the objectives of each standard with any acceptable variances have been outlined in **Section 3.6** and required changes detailed in **Annexure E**. Swept path testing has been undertaken and is reproduced within **Annexure E**.

- The net change in traffic generation to the road network as a result of the removal of the existing developments and addition of the proposed development has been estimated at some **-12** trips (-12 in, 0 out) and **+ 13** trips (+16 in, - 3 out) in the AM and PM peak hour periods respectively.

- The impacts of the future traffic generation associated with the proposed development have been added to the existing traffic volumes, without a reduction to existing traffic volumes as a result of the existing uses of the subject site, providing for a conservative assessment. Using SIDRA INTERSECTION 9.0, there will be no detrimental or noticeable impact to the performance of the intersections surrounding the site. As such the proposed development is supportable without any infrastructure upgrades.

ANNEXURE A: PROPOSED PLANS

(4 SHEETS)

SITE AREA	5003 m²

- AMENITIES
- BEDS
- BOH
- CARPARK
- CIRCULATION
- COMMUNAL
- EXTERNAL
- MULTI-PURPOSE
- NONE
- RETAIL
- SPECIALTY
- STAFF FACILITIES

1 FLOOR PLAN - LEVEL 01 - BASEMENT
SCALE 1 : 200

1

architecture
interior design
project management

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CLIENT

PATHWAYS
RESIDENCES

PROJECT
LONGUEVILLE
4 - 18 NORTHWOOD RD, 274 & 274A LONGUEVILLE RD
LANE COVE
NSW 2066

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DRAWING TITLE
LEVEL 1 BASEMENT PARKING FLOOR PLAN

REV	DATE	AMENDMENT	INITIALS	CHECK
DA1	20-08-07	DA ISUUE	MDP	MR

PROJECT NO.	DRAWING NO.	REVISION
2924	DA101	DA1
SCALE	As indicated @ A1	
DRAWN	Author	
PROJECT PRINCIPLE	M. RALPH	
DATE	31.07.2020	

Morrison Design Partnership
ARCHITECTS
Since 1969

SITE AREA	5003 m²

- AMENITIES
- BEDS
- BOH
- CARPARK
- CIRCULATION
- COMMUNAL
- EXTERNAL
- MULTI-PURPOSE
- NONE
- RETAIL
- SPECIALTY
- STAFF FACILITIES

1 FLOOR PLAN - LEVEL 02
SCALE 1 : 200

2

architecture
interior design
project management

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CLIENT

PATHWAYS
RESIDENCES

PROJECT

LONGUEVILLE

4 - 18 NORTHWOOD RD, 274 & 274A LONGUEVILLE RD
LANE COVE
NSW 2066

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C:\Users\Jason\Documents\2924 - Longueville CENTRAL(V20)_jason3NHV5.rvt

DRAWING TITLE

LEVEL 2 FLOOR PLAN

REV	DATE	AMENDMENT	INITIALS	CHECK
DA1	20-08-07	DA ISUUE	MDP	MR

PROJECT NO.	2924
DRAWING NO.	DA102
REVISION	DA1
SCALE	As indicated @ A1
DRAWN	
PROJECT PRINCIPLE	M. RALPH
DATE	31.07.2020

Morrison Design Partnership
ARCHITECTS
Since 1969

SITE AREA	5003 m²

AMENITIES
BEDS
BOH
CARPARK
CIRCULATION
COMMUNAL
EXTERNAL
MULTI-PURPOSE
NONE
RETAIL
SPECIALTY
STAFF FACILITIES

1 FLOOR PLAN - LEVEL 03
SCALE 1 : 200

3

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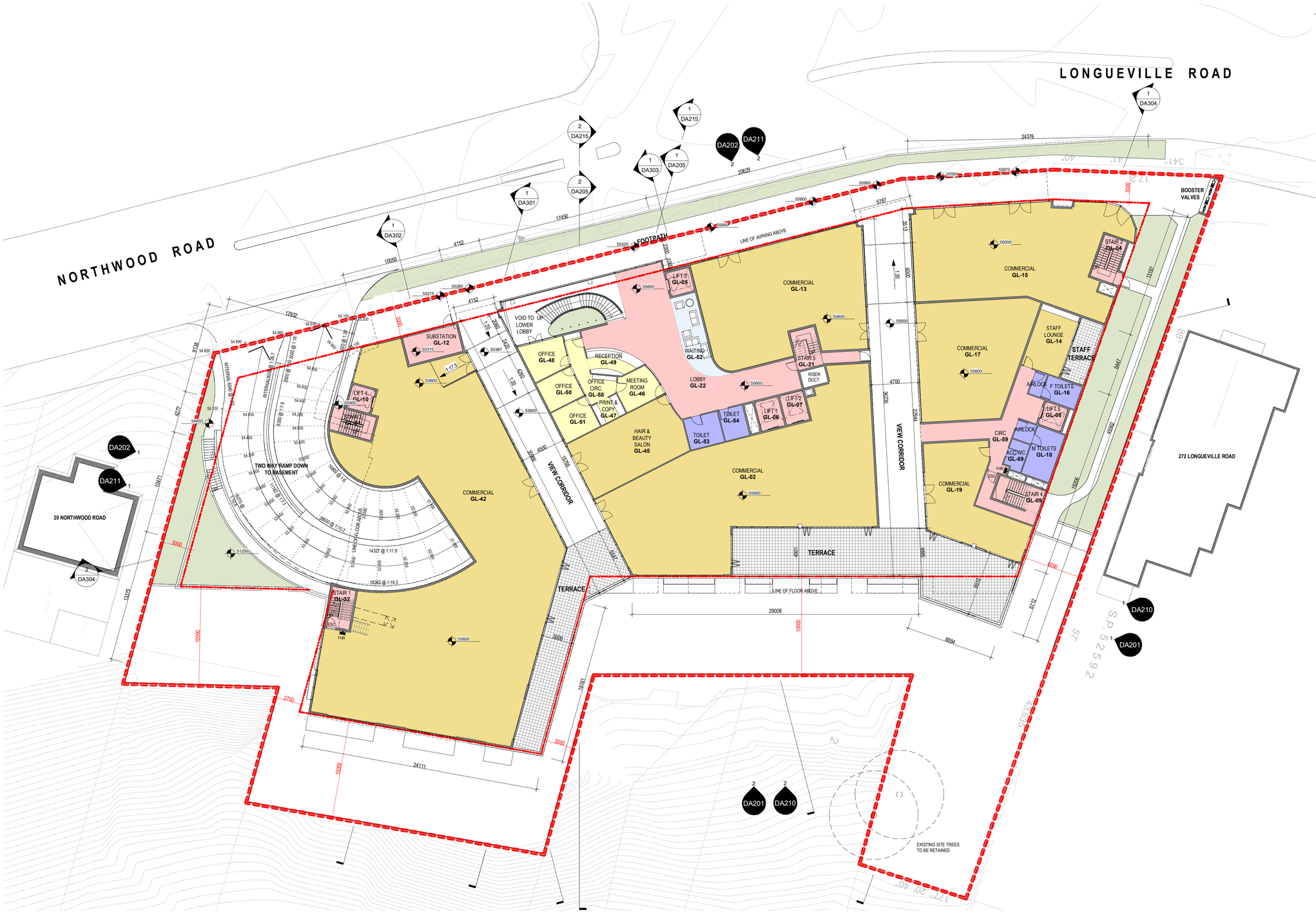
DRAWING TITLE
LEVEL 3 FLOOR PLAN

REV	DATE	AMENDMENT	INITIALS	CHECK
DA1	20-08-07	DA ISUUE	MDP	MR

PROJECT NO.	DRAWING NO.	REVISION
2924	DA103	DA1
SCALE	As indicated @ A1	
DRAWN	Author	
PROJECT PRINCIPLE	M. RALPH	
DATE	31.07.2020	

Morrison Design Partnership ARCHITECTS Since 1969

SITE AREA	5003 m²



- AMENITIES
- BEDS
- BOH
- CARPARK
- CIRCULATION
- COMMUNAL
- EXTERNAL
- MULTI-PURPOSE
- NONE
- RETAIL
- SPECIALTY
- STAFF FACILITIES

1 FLOOR PLAN - LEVEL 04 - GROUND FLOOR
SCALE 1 : 200

4

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PROJECT
LONGUEVILLE
4 - 18 NORTHWOOD RD, 274 & 274A LONGUEVILLE RD
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DRAWING TITLE
LEVEL 4 GROUND FLOOR PLAN

REV	DATE	AMENDMENT	INITIALS	CHECK
DA1	20-08-07	DA ISUUE	MDP	MR

PROJECT NO.	DRAWING NO.	REVISION
2924	DA104	DA1
SCALE	As indicated @ A1	
DRAWN		
PROJECT PRINCIPLE	M. RALPH	
DATE	31.07.2020	

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ANNEXURE B: TRAFFIC SURVEY DATA
(2 SHEETS)

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Petrol Station and Longueville Rd, Lane Cove

GPS	-33.823749, 151.172323
Date:	Wed 01/07/20
Weather:	Overcast
Suburban:	Lane Cove
Customer:	McLaren

North:	Longueville Rd
East:	Petrol Station
South:	Longueville Rd
West:	Kenneth St

Survey Period	AM:	7:00 AM-9:00 AM
	PM:	4:00 PM-6:00 PM
Traffic Peak	AM:	7:45 AM-8:45 AM
	PM:	4:45 PM-5:45 PM

All Vehicles

Time		North Approach Longueville Rd				East Approach Petrol Station				South Approach Longueville Rd				West Approach Kenneth St				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
7:00	7:15	0	31	176	2	0	0	0	1	0	0	78	3	0	11	1	32	1566	
7:15	7:30	0	16	195	3	0	1	0	3	0	0	99	3	0	11	0	21	1705	
7:30	7:45	0	23	210	8	0	1	0	6	0	0	108	2	0	21	0	23	1828	
7:45	8:00	0	25	245	2	0	1	0	3	0	0	141	1	0	23	0	36	1947	Peak
8:00	8:15	0	22	247	3	0	0	0	3	0	0	141	2	0	17	1	38	1938	
8:15	8:30	0	29	233	3	0	0	0	4	0	0	146	8	0	20	1	31		
8:30	8:45	0	35	248	6	0	0	0	5	0	0	157	4	0	23	0	43		
8:45	9:00	0	29	227	3	0	0	0	5	0	0	147	8	0	12	0	37		
16:00	16:15	0	33	103	1	0	0	0	3	0	0	218	10	0	14	1	32	1885	
16:15	16:30	0	53	99	1	0	1	0	0	0	0	279	9	0	10	0	29	1985	
16:30	16:45	0	44	127	4	0	1	0	3	0	0	240	10	0	10	0	34	2066	
16:45	17:00	0	44	128	5	0	0	0	4	0	1	274	4	0	18	0	38	2101	Peak
17:00	17:15	0	36	138	2	0	1	0	3	0	0	276	8	0	17	0	34	2087	
17:15	17:30	0	44	161	1	0	1	0	2	0	0	301	8	0	16	0	28		
17:30	17:45	0	28	121	5	0	0	0	4	0	0	295	9	0	20	1	25		
17:45	18:00	0	41	130	2	0	0	0	3	0	0	273	7	0	9	0	37		

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of River Rd W and Longueville Rd, Lane

GPS	-33.823269, 151.172039
Date:	Wed 01/07/20
Weather:	Overcast
Suburban:	Lane Cove
Customer:	McLaren

North:	Longueville Rd
East:	N/A
South:	Longueville Rd
West:	River Rd W

Survey Period	AM:	7:00 AM-9:00 AM
	PM:	4:00 PM-6:00 PM
Traffic Peak	AM:	8:00 AM-9:00 AM
	PM:	4:45 PM-5:45 PM

All Vehicles

Time		rth Approach Longueville			uth Approach Longueville			West Approach River Rd W			Hourly Total	
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	Hour	Peak
7:00	7:15	0	4	29	0	27	83	0	180	16	1565	
7:15	7:30	0	1	28	0	34	87	0	186	17	1705	
7:30	7:45	0	1	32	0	33	99	0	209	21	1842	
7:45	8:00	0	0	36	0	45	133	0	236	28	1991	
8:00	8:15	0	1	37	0	66	113	0	235	27	1995	Peak
8:15	8:30	0	1	44	0	57	120	0	221	47		
8:30	8:45	0	2	53	0	73	127	0	236	53		
8:45	9:00	0	0	75	0	66	118	0	184	39		
16:00	16:15	0	4	53	0	36	214	0	84	10	1848	
16:15	16:30	0	1	53	0	43	266	0	100	17	1952	
16:30	16:45	0	2	70	0	57	218	0	105	13	2035	
16:45	17:00	0	0	65	0	53	259	0	112	13	2061	Peak
17:00	17:15	0	2	54	0	60	251	0	122	16	2052	
17:15	17:30	0	1	64	0	41	289	0	142	26		
17:30	17:45	0	2	52	0	45	275	0	102	15		
17:45	18:00	0	2	56	0	44	266	0	117	8		

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of River Rd and Northwood Rd, Lane Co

GPS	*-33.825405, 151.174739*					
Date:	Wed 01/07/20	***North:***	N/A	***Survey Period***	AM:	7:00 AM-9:00 AM
Weather:	Overcast	***East:***	River Rd		PM:	4:00 PM-6:00 PM
Suburban:	Lane Cove	***South:***	Northwood Rd	***Traffic Peak***	AM:	7:45 AM-8:45 AM
Customer:	McLaren	***West:***	Northwood Rd		PM:	4:45 PM-5:45 PM

All Vehicles

Time		East Approach River Rd			uth Approach Northwood			est Approach Northwood R			Hourly Total	
Period Star	Period End	U	WB	L	U	R	L	U	R	EB	Hour	Peak
7:00	7:15	0	73	9	0	9	10	0	8	180	1437	
7:15	7:30	0	95	13	0	12	7	0	11	199	1594	
7:30	7:45	0	98	11	0	12	12	0	6	230	1693	
7:45	8:00	0	129	9	0	19	13	1	13	258	1795	Peak
8:00	8:15	0	131	14	0	19	14	0	14	254	1779	
8:15	8:30	0	136	8	0	19	18	0	15	240		
8:30	8:45	0	148	13	0	17	14	0	12	267		
8:45	9:00	0	145	15	0	13	9	0	14	230		
16:00	16:15	0	213	31	0	11	15	0	14	107	1712	
16:15	16:30	0	272	20	0	11	19	0	10	99	1800	
16:30	16:45	0	235	21	0	11	15	0	20	120	1910	
16:45	17:00	0	269	24	0	9	14	3	8	141	1972	Peak
17:00	17:15	0	277	25	0	8	8	0	16	145	1958	
17:15	17:30	0	304	40	0	11	6	0	18	162		
17:30	17:45	0	294	30	0	3	12	0	15	130		
17:45	18:00	0	271	24	0	6	10	0	14	129		

Queue

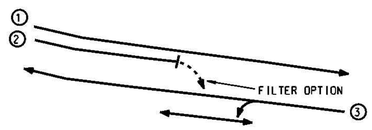
Time		South Approach	
Period Sta	Period End	East Lane	West Lane
7:00	7:05	1	
7:05	7:10	1	
7:10	7:15	2	
7:15	7:20	1	
7:20	7:25	1	
7:25	7:30	1	
7:30	7:35	1	
7:35	7:40	1	
7:40	7:45	1	
7:45	7:50	1	
7:50	7:55	4	
7:55	8:00	2	
8:00	8:05	2	
8:05	8:10	3	
8:10	8:15	3	
8:15	8:20	3	
8:20	8:25	1	
8:25	8:30	5	
8:30	8:35	2	
8:35	8:40	2	
8:40	8:45	3	
8:45	8:50	1	
8:50	8:55	3	
8:55	9:00	4	
16:00	16:05	2	
16:05	16:10	1	
16:10	16:15	1	
16:15	16:20	3	
16:20	16:25	5	
16:25	16:30	2	
16:30	16:35	2	
16:35	16:40	2	
16:40	16:45	1	
16:45	16:50	1	
16:50	16:55		
16:55	17:00	2	
17:00	17:05	1	
17:05	17:10	1	
17:10	17:15	1	
17:15	17:20	6	
17:20	17:25	4	
17:25	17:30	3	
17:30	17:35		
17:35	17:40	1	
17:40	17:45	1	
17:45	17:50		
17:50	17:55		
17:55	18:00	2	

ANNEXURE C: TCS PLANS

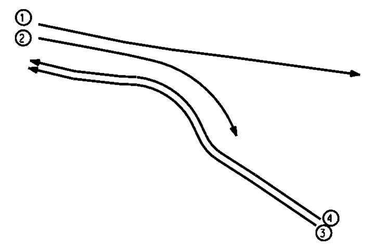
(2 SHEETS)

2070.254.VV.0936

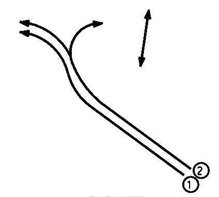
Date in Service 23/09/76



A PHASE

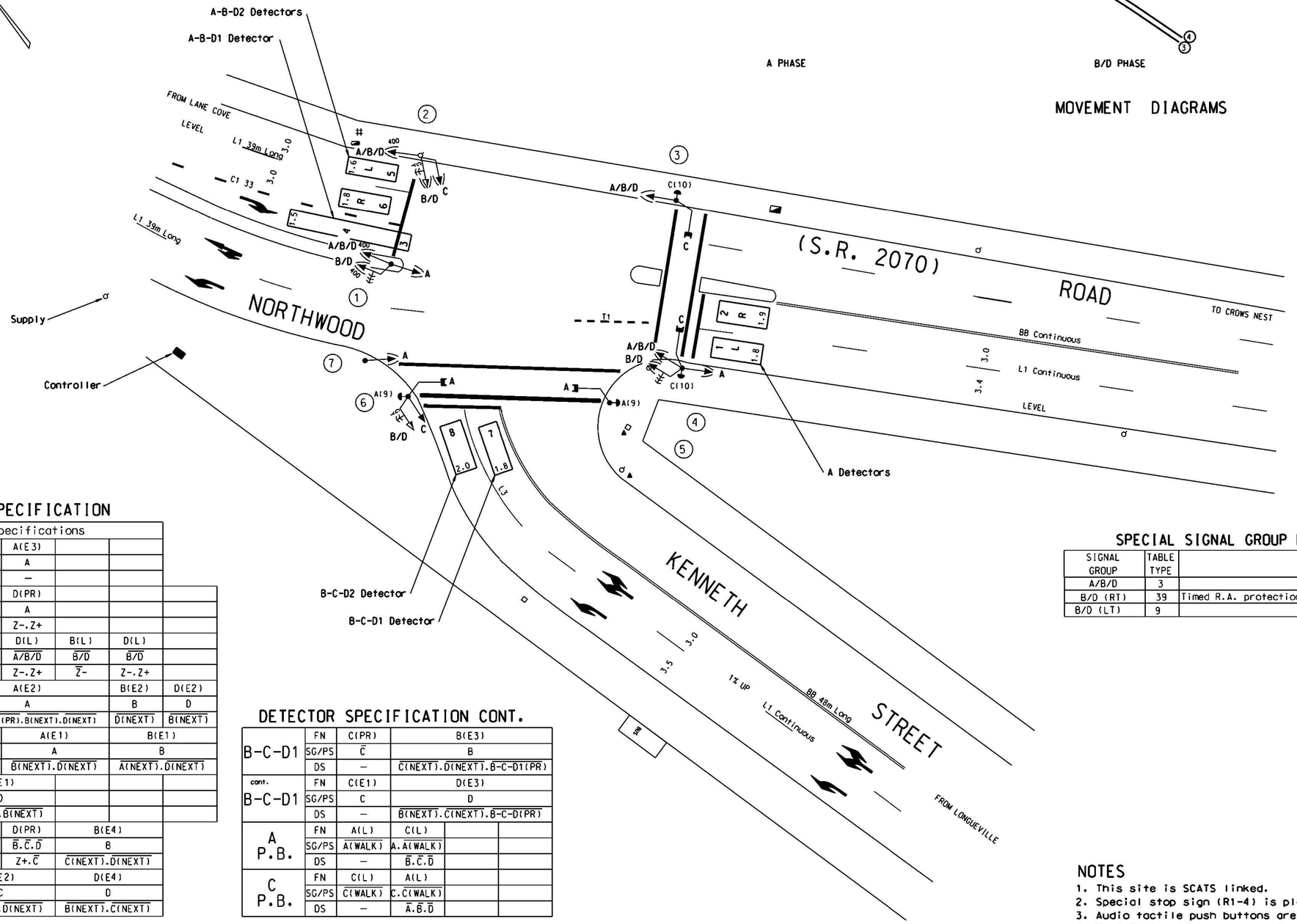


B/D PHASE



C PHASE

MOVEMENT DIAGRAMS



DETECTOR SPECIFICATION

Detector		Specifications				
A	FN	A(L)	A(E3)			
	SG/PS	$\overline{A}$	A			
	DS	–	–			
A-B-D1 Depart. & Approach	FN	B(PR)	D(PR)			
	SG/PS	A	A			
	DS	Z-	Z-.Z+			
A-B-D1 Approach	FN	A(L).B(L)	D(L)	B(L)	D(L)	
	SG/PS	$\overline{A/B/D}$	$\overline{A/B/D}$	$\overline{B/D}$	$\overline{B/D}$	
	DS	Z-	Z-.Z+	$\overline{Z}$-	Z-.Z+	
cont. A-B-D1 Approach	FN	A(E2)			B(E2)	D(E2)
	SG/PS	A			B	D
	DS	Z-.A-B-D1(PR).B(NEXT).D(NEXT)			$\overline{D(NEXT)}$	$\overline{B(NEXT)}$
A-B-D2	FN	A(L)	A(E1)		B(E1)	
	SG/PS	$\overline{A/B/D}$	A		B	
	DS	$\overline{B.D}$	$\overline{B(NEXT).D(NEXT)}$		$\overline{A(NEXT).D(NEXT)}$	
cont. A-B-D2	FN	D(E1)				
	SG/PS	D				
	DS	$\overline{A(NEXT).B(NEXT)}$				
B-C-D2	FN	B(PR)	D(PR)	B(E4)		
	SG/PS	$\overline{B.C.D}$	$\overline{B.C.D}$	B		
	DS	$\overline{C}$	Z+.$\overline{C}$	$\overline{C(NEXT).D(NEXT)}$		
cont. B-C-D2	FN	C(E2)		D(E4)		
	SG/PS	C		D		
	DS	$\overline{B(NEXT).D(NEXT)}$		$\overline{B(NEXT).C(NEXT)}$		

DETECTOR SPECIFICATION CONT.

B-C-D1	FN	C(PR)	B(E3)		
	SG/PS	$\overline{C}$	B		
	DS	–	$\overline{C(NEXT).D(NEXT).B-C-D1(PR)}$		
cont. B-C-D1	FN	C(E1)	D(E3)		
	SG/PS	C	D		
	DS	–	$\overline{B(NEXT).C(NEXT).B-C-D(PR)}$		
A P.B.	FN	A(L)	C(L)		
	SG/PS	$\overline{A(WALK)}$	A.$\overline{A(WALK)}$		
	DS	–	$\overline{B.C.D}$		
C P.B.	FN	C(L)	A(L)		
	SG/PS	$\overline{C(WALK)}$	C.$\overline{C(WALK)}$		
	DS	–	$\overline{A.B.D}$		

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE

SIGNAL GROUP	TABLE TYPE	REMARKS
A/B/D	3	—
B/D (RT)	39	Timed R.A. protection for 'A' pedestrians. Z-filter option.
B/D (LT)	9	—

POST CHART

POST	TYPE	LENGTH	REMARKS
1	2	4.1	EXISTING
2	ELP	-	EXISTING
3	2	3.2	EXISTING
4	2	4.1	EXISTING
5	2	3.2	EXISTING
6	2	4.1	EXISTING
7	2	4.1	EXISTING

NOTES

1. This site is SCATS linked.
2. Special stop sign (R1-4) is placed on post 6.
3. Audio tactile push buttons are provided on posts 3.4.5 and 6.
4. West facing lanterns on posts 1.2.3 and 4 to be focused so as not to be visible from the stop line at TCS site NO. 708.

A ORIGINAL ISSUE
J1 SYN 4603 28-3-91
300mm 'A' phase
lantren installed
and mast arm
removed on post 4.

B ISSUE J/1 EDCR 30
Controller modernisation.
JH 3/5/93

C ISSUE SS 366 24/02/05
ADDED: AUDIO TACTILE PB'S ON
POSTS 3.4.5 AND 6.
UPDATED DRAWING
BM 12/05/05

D ISSUE:- WAE COMPLETED.
DET.SPES ALTERED.SIGNAL
GROUPS RENAMED.
S.T 25/11/2011 M.M

REFERENCE PLANS	
Specification	S1/TCS/7
Det. Sched. Exp.	VD018-10
SSG Dis. Seq.	VD018-8

U.B.D.REF. MAP 215 E6
I.S.G. E 315 840
CO-ORDS N 1 255 938

JUSTINE HOPKINS
DESIGNED
PASSED
RECOMMENDED

APPROVED
A.J. WESLEY
DESIGN ENGINEER
DATE 23/7/92

ROADS AND TRAFFIC AUTHORITY OF NSW
MUNICIPALITY OF LANE COVE
NORTHWOOD ROAD (S.R. 2070)
AND
KENNETH STREET
NORTHWOOD
DESIGN LAYOUT

DRAWING FILE : VV0936_5D.dgn
SYDNEY REGION
SCALE 5 0 5 10
SHEET 5
FILE 254 TS 105
SUPERSEDES SHEET 5C
ISSUE A B C D
REGN. 2070.254.VV.0936

$DATE$ $TIME$ $FILEABBREV$

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VV0936_5D.dgn Default 28/11/2017 11:57:32 AM

DRAWN BY CADD
DO NOT AMEND MANUALLY

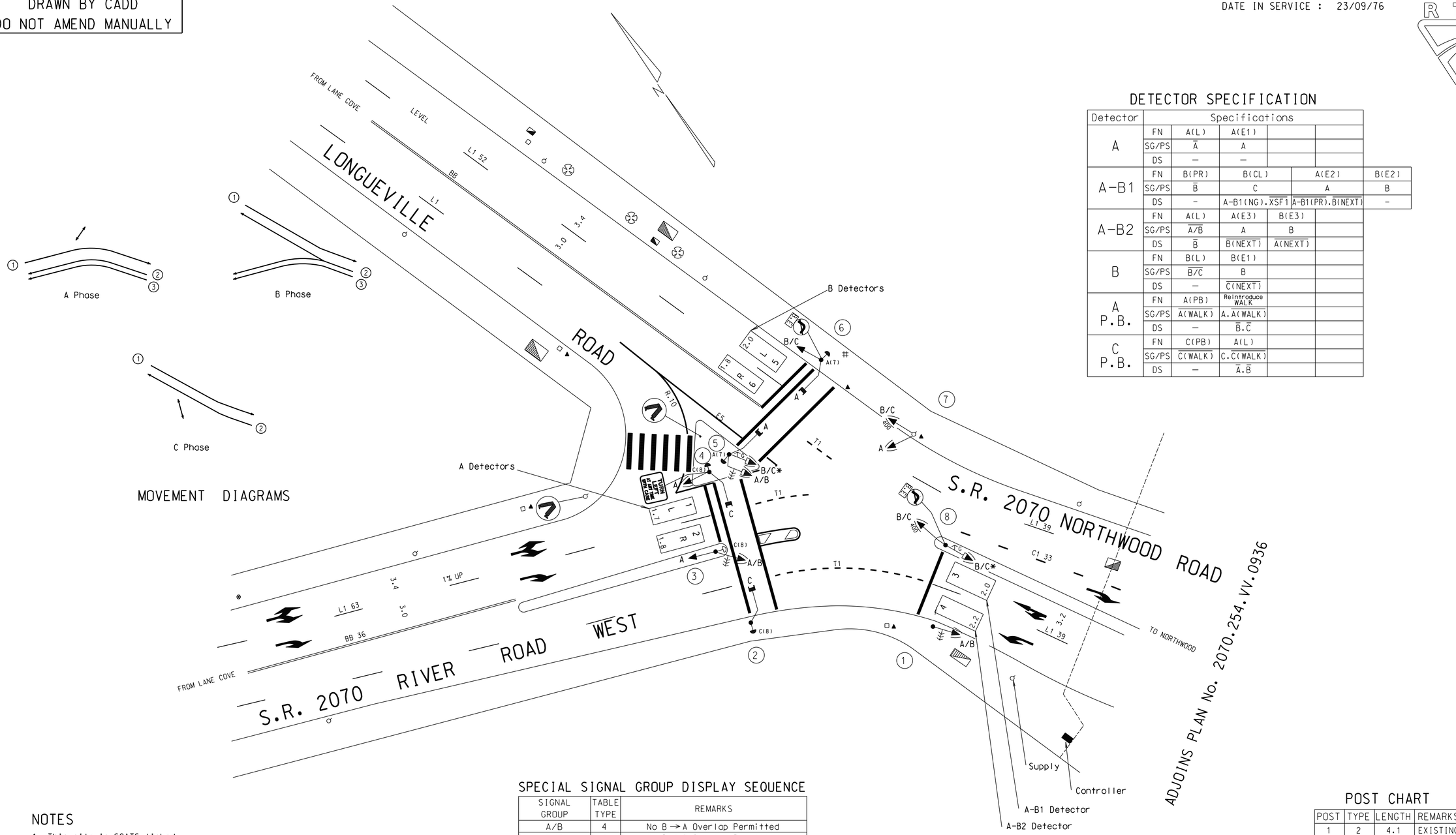
DATE IN SERVICE : 23/09/76

R T A

2070.254.VV.0708

DETECTOR SPECIFICATION

Detector		Specifications				
A	FN	A(L)	A(E1)			
	SG/PS	$\overline{A}$	A			
	DS	–	–			
A–B1	FN	B(PR)	B(CL)		A(E2)	B(E2)
	SG/PS	$\overline{B}$	C		A	B
	DS	–	A-B1(NG).$\overline{XSF1}$		$\overline{A\text{-}B1(PR)}$.$\overline{B(NEXT)}$	–
A–B2	FN	A(L)	A(E3)	B(E3)		
	SG/PS	$\overline{A/B}$	A	B		
	DS	$\overline{B}$	$\overline{B(NEXT)}$	$\overline{A(NEXT)}$		
B	FN	B(L)	B(E1)			
	SG/PS	$\overline{B/C}$	B			
	DS	–	$\overline{C(NEXT)}$			
A P.B.	FN	A(PB)	Reintroduce WALK			
	SG/PS	$\overline{A}$(WALK)	A.$\overline{A(WALK)}$			
	DS	–	$\overline{B}$.$\overline{C}$			
C P.B.	FN	C(PB)	A(L)			
	SG/PS	$\overline{C(WALK)}$	C.$\overline{C(WALK)}$			
	DS	–	$\overline{A}$.$\overline{B}$			



SPECIAL SIGNAL GROUP DISPLAY SEQUENCE

SIGNAL GROUP	TABLE TYPE	REMARKS
A/B	4	No B → A Overlap Permitted
B/C	4	No B → C Overlap Permitted
B/C*	4	No B → C Overlap Permitted

POST CHART

POST	TYPE	LENGTH	REMARKS
1	2	4.1	EXISTING
2	2	3.2	EXISTING
3	2	4.1	EXISTING
4	2	4.1	EXISTING
5	2	4.1	EXISTING
6	2	4.1	EXISTING
7	ELP	–	EXISTING
8	2	4.1	EXISTING

NOTES

1. This site is SCATS linked.
2. Special stop sign (R1-202) is placed on posts 5 and 6.
3. Audio-tactile push buttons are provided on posts 2,4,5 and 6.
4. Lanterns on posts 1,3,5 and 8 are focused so they are not visible at adjacent signal site No. 936.
5. For details of the Automatic Network Travel Time System (Antts) installed at this site, refer to plan No. VE542-13. The ANTTS antenna is mounted on post 1.
6. Lanterns denoted by an asterisk (*) are wired to a seperate Signal Group.

DESIGN LAYOUT

A	ORIGINAL ISSUE	BWT
B	ISSUE 7-06-94 J/I TC 2502 NOTE 4 RE ANTTS. FACILITIES ADDED. EB	
C	ISSUE J1 SE 1508 29/6/98 UPDATED PLAN TO W.A.E. N.L. 26/8/98	
D	ISSUE J1 SS212 14/01/02 ADDED NO B -> A O/L NO B -> C O/L TO C/B SIGNAL GROUP; A PED RE-INTRODUCTION. AMENDED DET SPEC. SSODS; NOTES; MOVEMENTS. WAE	
E	ADDED: AUDIO-TACTILE PBS; PAVEMENT MARKING RIVER RD WEST; GA POST 8 AMENDED: ALIGNT A/B S/G POST 1. J1 14 UPDATED DRAWING 18/03/02 T.K.	
'E'	ISSUE:- WAE 07/04/14 SIGNAL GROUP B/C* WAS 'B/C'. NOTE 6 ADDED. DTECTOR LOGIC REVISED. LH/LC 11/08/2017.	

PUBLIC UTILITY LEGEND	
HYDRANT	□
STOP VALVE	▲
GAS VALVE	#
SEWER MANHOLE	⊗
TELECOM PIT	◪
ELECT LIGHT POLE	☼
POWER POLE	○
STAY POLE	⊘
TELEPHONE BOX	T
TELECOM PILLAR	◍

REFERENCE PLANS	
SYMBOLS/ABBS.	VD003-6
STD POSIT	VD001-5
DET SCHED EXP	VD018-10
PRES. DETECT	VC005-17
SSG DIS. SEQ.	VD018-8
SURVEYOR : N/A	
DATE : N/A	

U.B.D. Ref. Map 215 E5
I.S.G. E: 315 800
CO-ORDS N: 1 255 990

DESIGNED J HOPKINS
CHECKED J.J. ZOUTENDYK
DATE CHECKED
RECOMMENDED

DESIGN APPROVAL
APPROVED
POSITION DESIGN ENGINEER
DATE 23/1/92
DESIGN PREPARED BY
PROJECT DESIGN SERVICES
RTA OPERATIONS

Roads and Traffic Authority, N.S.W

MUNICIPALITY OF LANE COVE
TRAFFIC SIGNALS AT
S.R.2070 RIVER ROAD WEST, NORTHWOOD ROAD
AND LONGUEVILLE ROAD
LONGUEVILLE

DESIGN LAYOUT TCS No 0708

EXISTING ☒ PROPOSED ☐

CADD FILE: K:/SIGNALS/TCS/VV0700-VV0799/VV0708_17E.DGN

SCALE 5 0 (1:200) 5 10

ISSUE E

FILE 254 TS 105

SUPERSEDES SHEET/ISSUE 17/D

REGN. 2070.254.VV.0708

SHEET 17

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11/08/2017 11:01:10 AM .*vv0708*vv0708_17E.dgn

ANNEXURE D: SIDRA RESULTS

(12 SHEETS)

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [1]

Network: N101 [EX AM Signals (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 74 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 101 [AM - EX - Longueville / Northwood / River Road West]														
South: Northwood Road														
1a	L1	519	0.0	519	0.0	0.379	4.6	LOS A	3.4	23.9	0.20	0.58	0.20	50.1
2	T1	254	0.0	254	0.0	0.401	30.7	LOS C	8.2	57.1	1.00	0.84	1.00	31.0
Approach		773	0.0	773	0.0	0.401	13.2	LOS A	8.2	57.1	0.46	0.66	0.46	41.7
North: Longueville Road														
8	T1	183	0.0	183	0.0	0.161	19.4	LOS B	2.6	18.5	0.75	0.59	0.75	36.8
Approach		183	0.0	183	0.0	0.161	19.4	LOS B	2.6	18.5	0.75	0.59	0.75	36.8
NorthWest: River Road West														
27b	L3	163	0.0	163	0.0	0.680	20.9	LOS B	12.0	83.9	0.79	0.85	0.79	45.5
29a	R1	977	0.0	977	0.0	* 0.680	19.0	LOS B	18.1	126.5	0.80	0.84	0.80	37.0
Approach		1140	0.0	1140	0.0	0.680	19.3	LOS B	18.1	126.5	0.80	0.84	0.80	38.8
All Vehicles		2096	0.0	2096	0.0	0.680	17.0	LOS B	18.1	126.5	0.67	0.75	0.67	39.6
Site: 101 [AM - EX - Northwood / Kenneth]														
SouthEast: Northwood Road														
21	L2	16	0.0	16	0.0	0.421	17.7	LOS B	9.4	66.0	0.66	0.59	0.66	48.8
22	T1	616	0.0	616	0.0	0.421	12.1	LOS A	9.4	66.0	0.66	0.58	0.66	43.0
Approach		632	0.0	632	0.0	0.421	12.3	LOS A	9.4	66.0	0.66	0.58	0.66	43.2
NorthEast: Petrol Station Access														
24	L2	17	0.0	17	0.0	0.029	7.3	LOS A	0.1	0.9	0.29	0.62	0.29	52.2
26	R2	1	0.0	1	0.0	0.029	7.3	LOS A	0.1	0.9	0.29	0.62	0.29	48.4
Approach		18	0.0	18	0.0	0.029	7.3	LOS A	0.1	0.9	0.29	0.62	0.29	52.1
NorthWest: Northwood Road														
27	L2	15	0.0	15	0.0	0.372	7.5	LOS A	5.9	41.4	0.35	0.32	0.35	50.8
28	T1	1024	0.0	1024	0.0	0.372	3.5	LOS A	5.9	41.4	0.30	0.27	0.30	54.1
29	R2	117	0.0	117	0.0	* 0.205	7.3	LOS A	0.9	6.2	0.37	0.64	0.37	47.1
Approach		1156	0.0	1156	0.0	0.372	4.0	LOS A	5.9	41.4	0.31	0.31	0.31	53.3
SouthWest: Kenneth Street														
30	L2	158	0.0	158	0.0	0.262	25.6	LOS B	4.3	29.8	0.78	0.76	0.78	32.8
32	R2	87	0.0	87	0.0	* 0.387	39.6	LOS C	3.1	21.5	0.96	0.77	0.96	35.8
Approach		245	0.0	245	0.0	0.387	30.6	LOS C	4.3	29.8	0.84	0.76	0.84	34.3
All Vehicles		2051	0.0	2051	0.0	0.421	9.8	LOS A	9.4	66.0	0.48	0.45	0.48	46.4

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped	Dist]	Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 101 [AM - EX - Longueville / Northwood / River Road West]											
North: Longueville Road											
P3	Full	53	31.3	LOS D	0.1	0.1	0.92	0.92	194.3	211.9	1.09
NorthWest: River Road West											
P7	Full	53	31.3	LOS D	0.1	0.1	0.92	0.92	197.6	216.2	1.09
All Pedestrians		105	31.3	LOS D	0.1	0.1	0.92	0.92	196.0	214.1	1.09
Site: 101 [AM - EX - Northwood / Kenneth]											
SouthEast: Northwood Road											
P5	Full	53	31.3	LOS D	0.1	0.1	0.92	0.92	197.6	216.2	1.09
SouthWest: Kenneth Street											
P8	Full	53	31.3	LOS D	0.1	0.1	0.92	0.92	196.9	215.2	1.09
All Pedestrians		105	31.3	LOS D	0.1	0.1	0.92	0.92	197.2	215.7	1.09

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

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CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [1]

Network: N101 [EX PM Signals (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 76 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 101 [PM - EX - Longueville / Northwood / River Road West]														
South: Northwood Road														
1a	L1	1131	0.0	1131	0.0	0.764	5.9	LOS A	8.2	57.1	0.19	0.58	0.19	48.7
2	T1	209	0.0	209	0.0	0.764	40.5	LOS C	8.2	57.1	1.00	0.87	1.07	26.6
Approach		1340	0.0	1340	0.0	0.764	11.3	LOS A	8.2	57.1	0.32	0.63	0.33	43.1
North: Longueville Road														
8	T1	253	0.0	253	0.0	0.215	20.7	LOS B	3.6	25.4	0.77	0.62	0.77	35.8
Approach		253	0.0	253	0.0	0.215	20.7	LOS B	3.6	25.4	0.77	0.62	0.77	35.8
NorthWest: River Road West														
27b	L3	74	0.0	74	0.0	0.330	16.3	LOS B	4.4	31.0	0.59	0.75	0.59	48.3
29a	R1	503	0.0	503	0.0	0.330	15.1	LOS B	7.0	49.2	0.61	0.74	0.61	40.1
Approach		577	0.0	577	0.0	0.330	15.3	LOS B	7.0	49.2	0.60	0.75	0.60	41.7
All Vehicles		2169	0.0	2169	0.0	0.764	13.4	LOS A	8.2	57.1	0.45	0.66	0.45	41.8
Site: 101 [PM - EX - Northwood / Kenneth]														
SouthEast: Northwood Road														
21	L2	31	0.0	31	0.0	0.807	24.6	LOS B	27.2	190.6	0.89	0.86	0.95	44.8
22	T1	1206	0.0	1206	0.0	* 0.807	20.7	LOS B	27.2	190.6	0.89	0.88	0.99	35.9
Approach		1237	0.0	1237	0.0	0.807	20.8	LOS B	27.2	190.6	0.89	0.88	0.99	36.2
NorthEast: Petrol Station Access														
24	L2	16	0.0	16	0.0	0.031	10.6	LOS A	0.2	1.4	0.50	0.65	0.50	49.9
26	R2	2	0.0	2	0.0	0.031	10.6	LOS A	0.2	1.4	0.50	0.65	0.50	44.7
Approach		18	0.0	18	0.0	0.031	10.6	LOS A	0.2	1.4	0.50	0.65	0.50	49.6
NorthWest: Northwood Road														
27	L2	14	0.0	14	0.0	0.209	8.8	LOS A	5.2	36.6	0.53	0.47	0.53	49.1
28	T1	577	0.0	577	0.0	0.209	4.5	LOS A	5.2	36.6	0.43	0.38	0.43	52.7
29	R2	160	0.0	160	0.0	* 0.444	18.7	LOS B	3.9	27.6	0.98	0.82	0.98	37.1
Approach		751	0.0	751	0.0	0.444	7.6	LOS A	5.2	36.6	0.55	0.48	0.55	48.3
SouthWest: Kenneth Street														
30	L2	133	0.0	133	0.0	0.227	26.4	LOS B	3.7	25.6	0.78	0.76	0.78	32.4
32	R2	75	0.0	75	0.0	* 0.340	40.5	LOS C	2.7	18.8	0.96	0.76	0.96	35.5
Approach		207	0.0	207	0.0	0.340	31.5	LOS C	3.7	25.6	0.84	0.76	0.84	33.9
All Vehicles		2213	0.0	2213	0.0	0.807	17.2	LOS B	27.2	190.6	0.77	0.73	0.83	39.4

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped	Dist]	Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 101 [PM - EX - Longueville / Northwood / River Road West]											
North: Longueville Road											
P3	Full	53	32.3	LOS D	0.1	0.1	0.92	0.92	195.3	211.9	1.08
NorthWest: River Road West											
P7	Full	53	32.3	LOS D	0.1	0.1	0.92	0.92	198.6	216.2	1.09
All Pedestrians		105	32.3	LOS D	0.1	0.1	0.92	0.92	197.0	214.1	1.09
Site: 101 [PM - EX - Northwood / Kenneth]											
SouthEast: Northwood Road											
P5	Full	53	32.3	LOS D	0.1	0.1	0.92	0.92	198.6	216.2	1.09
SouthWest: Kenneth Street											
P8	Full	53	32.3	LOS D	0.1	0.1	0.92	0.92	197.8	215.2	1.09
All Pedestrians		105	32.3	LOS D	0.1	0.1	0.92	0.92	198.2	215.7	1.09

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

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CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [1]

Network: N101 [FU AM Signals (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 72 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 101 [AM - FU - Longueville / Northwood / River Road West]														
South: Northwood Road														
1a	L1	527	0.0	527	0.0	0.389	4.6	LOS A	3.4	24.0	0.20	0.58	0.20	50.1
2	T1	258	0.0	258	0.0	0.397	29.6	LOS C	8.2	57.1	1.00	0.84	1.00	31.6
Approach		785	0.0	785	0.0	0.397	12.8	LOS B	8.2	57.1	0.46	0.67	0.46	42.0
North: Longueville Road														
8	T1	186	0.0	186	0.0	0.157	18.3	LOS B	2.5	17.8	0.74	0.59	0.74	37.6
Approach		186	0.0	186	0.0	0.157	18.3	LOS B	2.5	17.8	0.74	0.59	0.74	37.6
NorthWest: River Road West														
27b	L3	163	0.0	163	0.0	0.699	22.0	LOS C	12.7	88.6	0.81	0.87	0.83	44.9
29a	R1	991	0.0	991	0.0	* 0.699	19.6	LOS B	18.2	127.1	0.82	0.85	0.83	36.5
Approach		1154	0.0	1154	0.0	0.699	20.0	LOS B	18.2	127.1	0.82	0.85	0.83	38.2
All Vehicles		2125	0.0	2125	0.0	0.699	17.2	LOS B	18.2	127.1	0.68	0.76	0.69	39.4
Site: 101 [AM - FU - Northwood / Kenneth]														
SouthEast: Northwood Road														
21	L2	16	0.0	16	0.0	0.442	18.2	LOS B	9.7	67.9	0.69	0.61	0.69	48.6
22	T1	629	0.0	629	0.0	0.442	12.6	LOS B	9.7	67.9	0.69	0.60	0.69	42.5
Approach		645	0.0	645	0.0	0.442	12.7	LOS B	9.7	67.9	0.69	0.60	0.69	42.8
NorthWest: Northwood Road														
28	T1	1056	0.0	1056	0.0	0.382	3.4	LOS A	5.7	40.2	0.30	0.27	0.30	54.4
29	R2	117	0.0	117	0.0	* 0.209	7.9	LOS A	0.9	6.6	0.41	0.65	0.41	46.4
Approach		1173	0.0	1173	0.0	0.382	3.9	LOS A	5.7	40.2	0.31	0.30	0.31	53.5
SouthWest: Kenneth Street														
30	L2	158	0.0	158	0.0	0.255	24.6	LOS C	4.1	28.6	0.77	0.76	0.77	33.4
32	R2	98	0.0	98	0.0	* 0.422	38.7	LOS D	3.4	23.5	0.97	0.77	0.97	36.1
Approach		256	0.0	256	0.0	0.422	30.0	LOS C	4.1	28.6	0.84	0.76	0.84	34.8
All Vehicles		2074	0.0	2074	0.0	0.442	9.8	LOS A	9.7	67.9	0.49	0.45	0.49	46.3

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 101 [AM - FU - Longueville / Northwood / River Road West]											

North: Longueville Road											
P3	Full	53	30.3	LOS D	0.1	0.1	0.92	0.92	193.3	211.9	1.10
NorthWest: River Road West											
P7	Full	53	30.3	LOS D	0.1	0.1	0.92	0.92	196.6	216.2	1.10
All Pedestrians		105	30.3	LOS D	0.1	0.1	0.92	0.92	195.0	214.1	1.10
Site: 101 [AM - FU - Northwood / Kenneth]											
SouthEast: Northwood Road											
P5	Full	53	30.3	LOS D	0.1	0.1	0.92	0.92	196.6	216.2	1.10
SouthWest: Kenneth Street											
P8	Full	53	30.3	LOS D	0.1	0.1	0.92	0.92	195.9	215.2	1.10
All Pedestrians		105	30.3	LOS D	0.1	0.1	0.92	0.92	196.2	215.7	1.10

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

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CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [1]

Network: N101 [FU PM Signals (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 96 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 101 [PM - FU - Longueville / Northwood / River Road West]														
South: Northwood Road														
1a	L1	1156	0.0	1156	0.0	0.756	5.7	LOS A	8.2	57.1	0.15	0.57	0.16	48.9
2	T1	215	0.0	215	0.0	0.756	50.2	LOS D	8.2	57.1	1.00	0.87	1.05	23.6
Approach		1371	0.0	1371	0.0	0.756	12.7	LOS B	8.2	57.1	0.29	0.61	0.30	41.8
North: Longueville Road														
8	T1	259	0.0	259	0.0	0.280	28.5	LOS C	5.2	36.7	0.81	0.66	0.81	31.1
Approach		259	0.0	259	0.0	0.280	28.5	LOS C	5.2	36.7	0.81	0.66	0.81	31.1
NorthWest: River Road West														
27b	L3	74	0.0	74	0.0	0.352	17.2	LOS B	5.0	35.1	0.55	0.75	0.55	47.7
29a	R1	517	0.0	517	0.0	0.352	15.5	LOS B	8.7	60.6	0.56	0.74	0.56	39.7
Approach		591	0.0	591	0.0	0.352	15.7	LOS B	8.7	60.6	0.56	0.74	0.56	41.3
All Vehicles		2220	0.0	2220	0.0	0.756	15.3	LOS B	8.7	60.6	0.42	0.65	0.43	40.2
Site: 101 [PM - FU - Northwood / Kenneth]														
SouthEast: Northwood Road														
21	L2	31	0.0	31	0.0	0.779	22.1	LOS C	29.3	205.1	0.83	0.76	0.83	46.2
22	T1	1237	0.0	1237	0.0	* 0.779	18.2	LOS B	29.3	205.1	0.83	0.78	0.86	37.7
Approach		1267	0.0	1267	0.0	0.779	18.3	LOS B	29.3	205.1	0.83	0.78	0.86	38.0
NorthWest: Northwood Road														
28	T1	613	0.0	613	0.0	0.207	4.4	LOS A	6.4	45.0	0.40	0.34	0.40	53.0
29	R2	160	0.0	160	0.0	* 0.462	22.3	LOS C	5.4	37.5	1.00	0.84	1.00	34.7
Approach		773	0.0	773	0.0	0.462	8.1	LOS A	6.4	45.0	0.52	0.45	0.52	47.8
SouthWest: Kenneth Street														
30	L2	133	0.0	133	0.0	0.263	33.8	LOS C	4.8	33.6	0.81	0.77	0.81	28.7
32	R2	121	0.0	121	0.0	* 0.569	51.0	LOS D	5.6	39.4	0.99	0.79	0.99	32.2
Approach		254	0.0	254	0.0	0.569	42.0	LOS D	5.6	39.4	0.90	0.78	0.90	30.8
All Vehicles		2294	0.0	2294	0.0	0.779	17.5	LOS B	29.3	205.1	0.73	0.67	0.75	39.3

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 101 [PM - FU - Longueville / Northwood / River Road West]											

North: Longueville Road										
P3 Full	53	42.3	LOS E	0.1	0.1	0.94	0.94	205.3	211.9	1.03
NorthWest: River Road West										
P7 Full	53	42.3	LOS E	0.1	0.1	0.94	0.94	208.6	216.2	1.04
All Pedestrians	105	42.3	LOS E	0.1	0.1	0.94	0.94	206.9	214.1	1.03
Site: 101 [PM - FU - Northwood / Kenneth]										
SouthEast: Northwood Road										
P5 Full	53	42.3	LOS E	0.1	0.1	0.94	0.94	208.6	216.2	1.04
SouthWest: Kenneth Street										
P8 Full	53	42.3	LOS E	0.1	0.1	0.94	0.94	207.8	215.2	1.04
All Pedestrians	105	42.3	LOS E	0.1	0.1	0.94	0.94	208.2	215.7	1.04

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

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MOVEMENT SUMMARY

Site: 101 [AM - EX - Northwood / River (Site Folder: Exisitng)]

Give-Way Intersection of Northwood Road / River Road
AM Peak Period
Existing Conditions
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Northwood Road (S)														
1	L2	59	0.0	59	0.0	0.056	6.6	LOS A	0.2	1.4	0.33	0.58	0.33	53.1
3	R2	74	0.0	74	0.0	0.782	95.3	LOS F	3.5	24.6	0.98	1.20	1.85	23.1
Approach		133	0.0	133	0.0	0.782	56.0	LOS D	3.5	24.6	0.69	0.92	1.17	30.9
East: River Road														
4	L2	44	0.0	44	0.0	0.151	5.6	LOS A	0.0	0.0	0.00	0.09	0.00	57.5
5	T1	544	0.0	544	0.0	0.151	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.6
Approach		588	0.0	588	0.0	0.151	0.5	NA	0.0	0.0	0.00	0.04	0.00	59.4
West: Northwood Road (W)														
11	T1	1019	0.0	1019	0.0	0.297	0.5	LOS A	0.9	6.3	0.08	0.03	0.09	59.1
12	R2	55	0.0	55	0.0	0.297	9.7	LOS A	0.9	6.3	0.20	0.08	0.22	56.6
Approach		1074	0.0	1074	0.0	0.297	1.0	NA	0.9	6.3	0.09	0.03	0.10	59.0
All Vehicles		1795	0.0	1795	0.0	0.782	4.9	NA	3.5	24.6	0.11	0.10	0.15	55.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM - EX - Northwood / River (Site Folder: Exisitng)]

Give-Way Intersection of Northwood Road / River Road
PM Peak Period
Existing Conditions
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Northwood Road (S)														
1	L2	40	0.0	40	0.0	0.052	8.2	LOS A	0.2	1.3	0.48	0.69	0.48	52.3
3	R2	31	0.0	31	0.0	0.541	100.1	LOS F	1.7	12.1	0.97	1.05	1.23	22.4
Approach		71	0.0	71	0.0	0.541	48.3	LOS D	1.7	12.1	0.70	0.84	0.81	33.1
East: River Road														
4	L2	119	0.0	119	0.0	0.325	5.6	LOS A	0.0	0.0	0.00	0.11	0.00	57.2
5	T1	1144	0.0	1144	0.0	0.325	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	59.4
Approach		1263	0.0	1263	0.0	0.325	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.1
West: Northwood Road (W)														
11	T1	578	0.0	578	0.0	0.245	2.2	LOS A	1.7	11.6	0.14	0.06	0.15	57.5
12	R2	60	0.0	60	0.0	0.245	19.6	LOS B	1.7	11.6	0.81	0.36	0.90	47.1
Approach		638	0.0	638	0.0	0.245	3.8	NA	1.7	11.6	0.20	0.09	0.22	56.3
All Vehicles		1972	0.0	1972	0.0	0.541	3.4	NA	1.7	12.1	0.09	0.10	0.10	56.6

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [AM - FU - Northwood / River (Site Folder: Future - UTurn (New))]

Give-Way Intersection of Northwood Road / River Road
AM Peak Period
Future Conditions
Site Category: Base Year
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Northwood Road (S)														
1	L2	72	0.0	72	0.0	0.068	6.6	LOS A	0.2	1.7	0.33	0.58	0.33	53.1
3	R2	74	0.0	74	0.0	0.870	134.0	LOS F	4.5	31.4	0.99	1.30	2.30	18.5
Approach		146	0.0	146	0.0	0.870	71.2	LOS F	4.5	31.4	0.66	0.94	1.33	27.4
East: River Road														
4	L2	52	0.0	52	0.0	0.153	5.6	LOS A	0.0	0.0	0.00	0.10	0.00	57.4
5	T1	544	0.0	544	0.0	0.153	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.5
Approach		596	0.0	596	0.0	0.153	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.3
West: Northwood Road (W)														
11	T1	1044	0.0	1044	0.0	0.315	0.6	LOS A	1.2	8.5	0.10	0.04	0.12	58.9
12	R2	72	0.0	72	0.0	0.315	9.9	LOS A	1.2	8.5	0.25	0.10	0.29	56.0
Approach		1116	0.0	1116	0.0	0.315	1.2	NA	1.2	8.5	0.11	0.05	0.13	58.7
All Vehicles		1858	0.0	1858	0.0	0.870	6.5	NA	4.5	31.4	0.12	0.12	0.18	54.0

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

MOVEMENT SUMMARY

Site: 101 [PM - FU - Northwood / River (Site Folder: Future - UTurn (New))]

Give-Way Intersection of Northwood Road / River Road
PM Peak Period
Future Conditions
Site Category: Base Year
Give-Way (Two-Way)

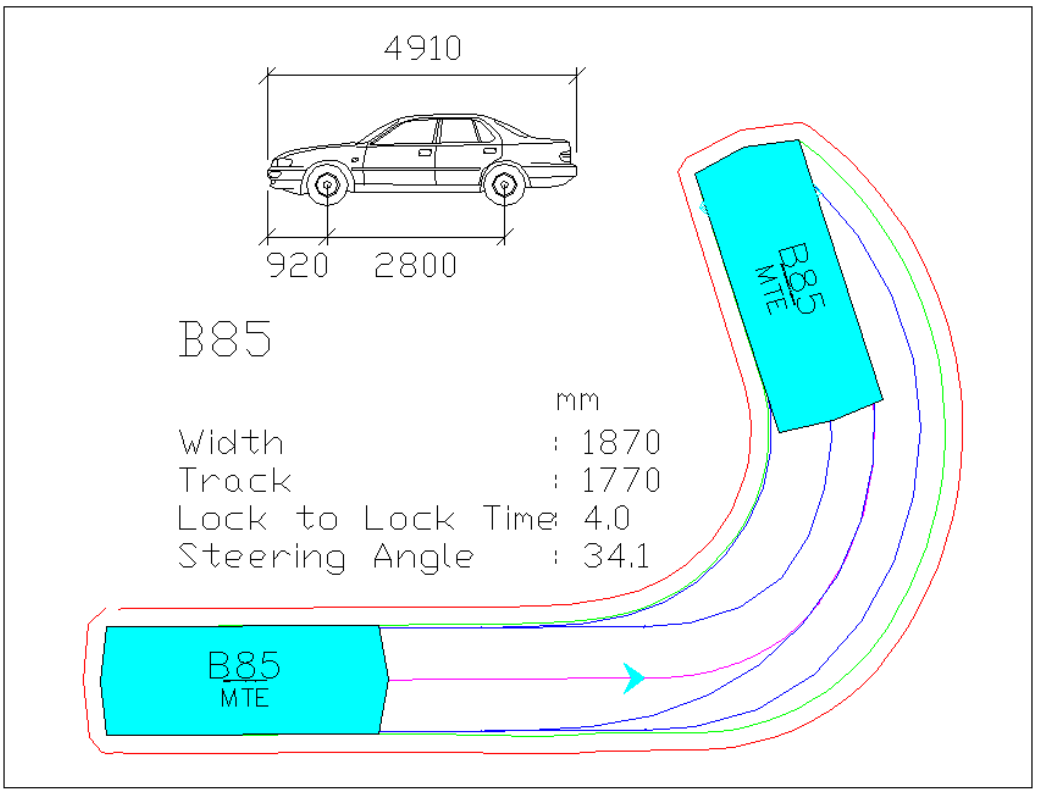
Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Northwood Road (S)														
1	L2	64	0.0	64	0.0	0.081	8.1	LOS A	0.3	2.0	0.48	0.70	0.48	52.4
3	R2	31	0.0	31	0.0	0.578	112.0	LOS F	1.9	13.0	0.98	1.05	1.26	20.9
Approach		95	0.0	95	0.0	0.578	42.0	LOS C	1.9	13.0	0.64	0.81	0.73	35.2
East: River Road														
4	L2	157	0.0	157	0.0	0.336	5.6	LOS A	0.0	0.0	0.00	0.14	0.00	57.0
5	T1	1144	0.0	1144	0.0	0.336	0.1	LOS A	0.0	0.0	0.00	0.06	0.00	59.2
Approach		1301	0.0	1301	0.0	0.336	0.8	NA	0.0	0.0	0.00	0.07	0.00	59.0
West: Northwood Road (W)														
11	T1	582	0.0	582	0.0	0.295	0.2	LOS A	1.1	8.0	0.01	0.01	0.01	59.7
12	R2	89	0.0	89	0.0	0.295	20.9	LOS B	1.1	8.0	0.87	0.92	1.00	43.9
Approach		671	0.0	671	0.0	0.295	3.0	NA	1.1	8.0	0.12	0.13	0.14	57.0
All Vehicles		2067	0.0	2067	0.0	0.578	3.4	NA	1.9	13.0	0.07	0.12	0.08	56.6

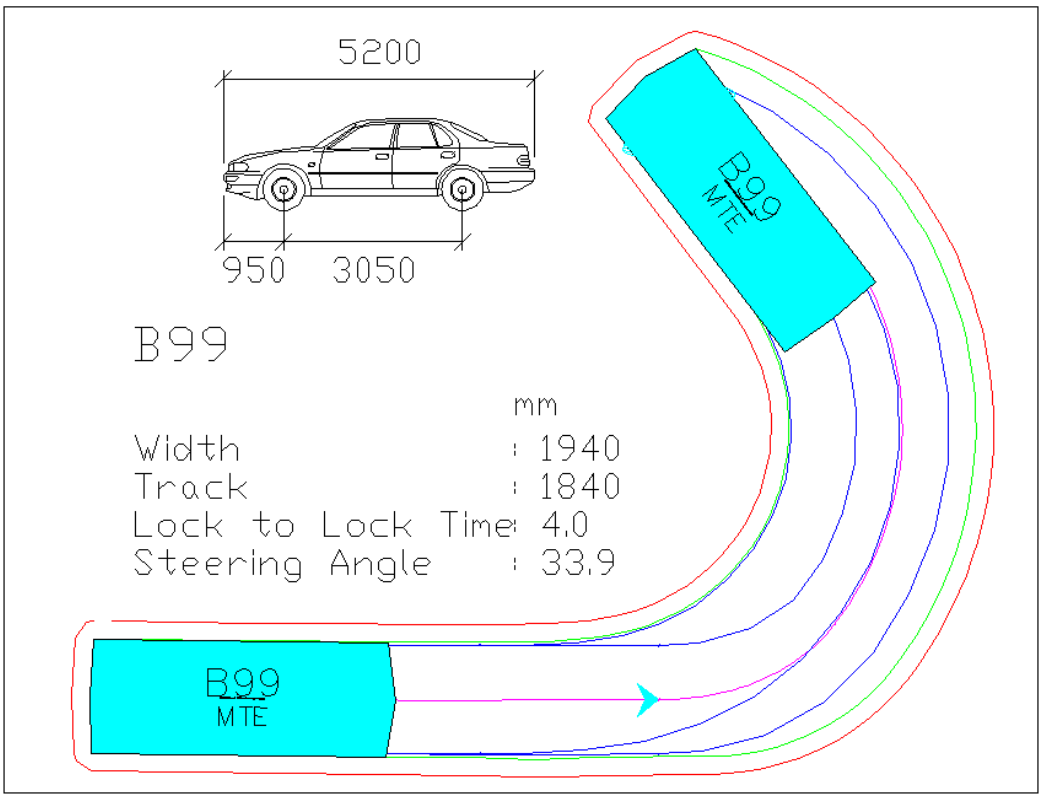
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS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

ANNEXURE E: SWEPT PATH TESTING AND REQUIRED CHANGES

(11 SHEETS)



AUSTRALIAN STANDARD 85TH PERCENTILE SIZE VEHICLE (B85)

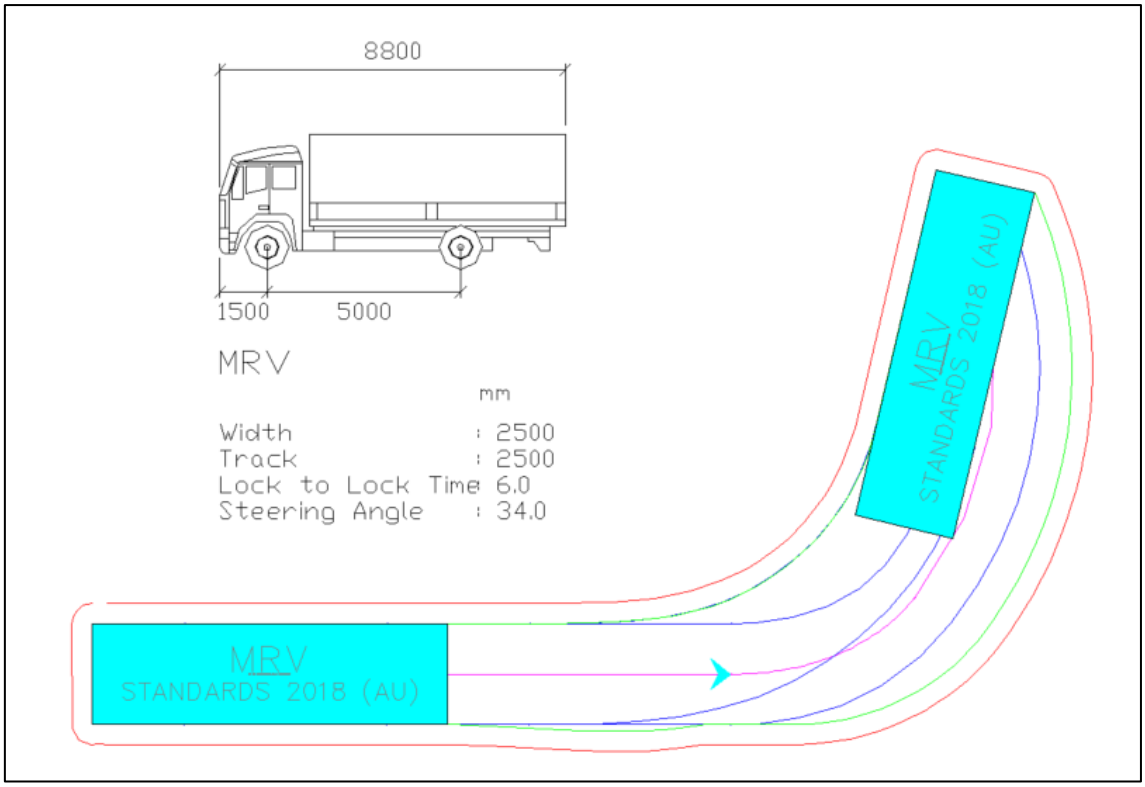


AUSTRALIAN STANDARD 99.8TH PERCENTILE SIZE VEHICLE (B99)

Blue – Tyre Path

Green – Vehicle Body

Red – 300mm Clearance

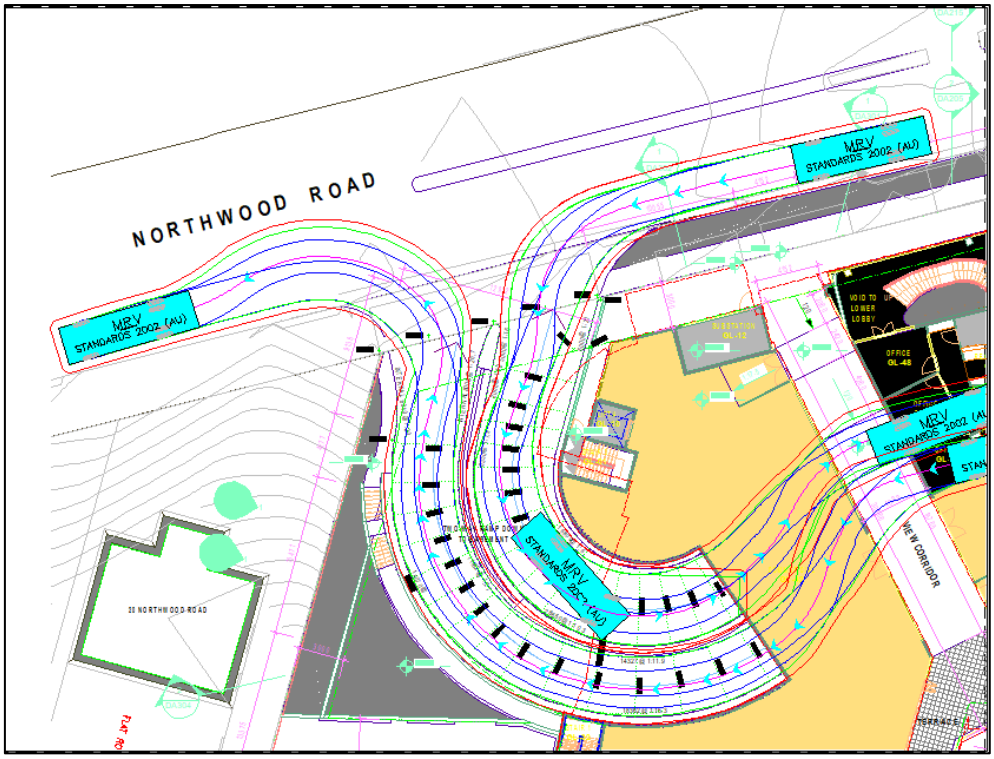


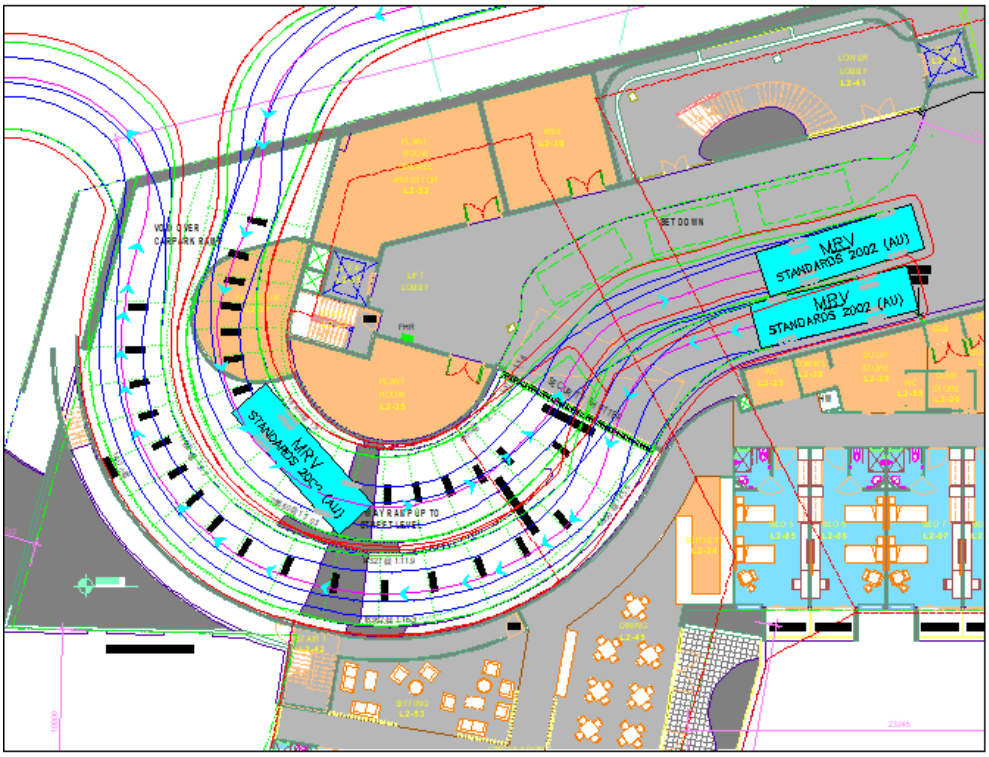
AUSTRALIAN STANDARD MEDIUM RIGID VEHICLE (MRV)

Blue – Tyre Path

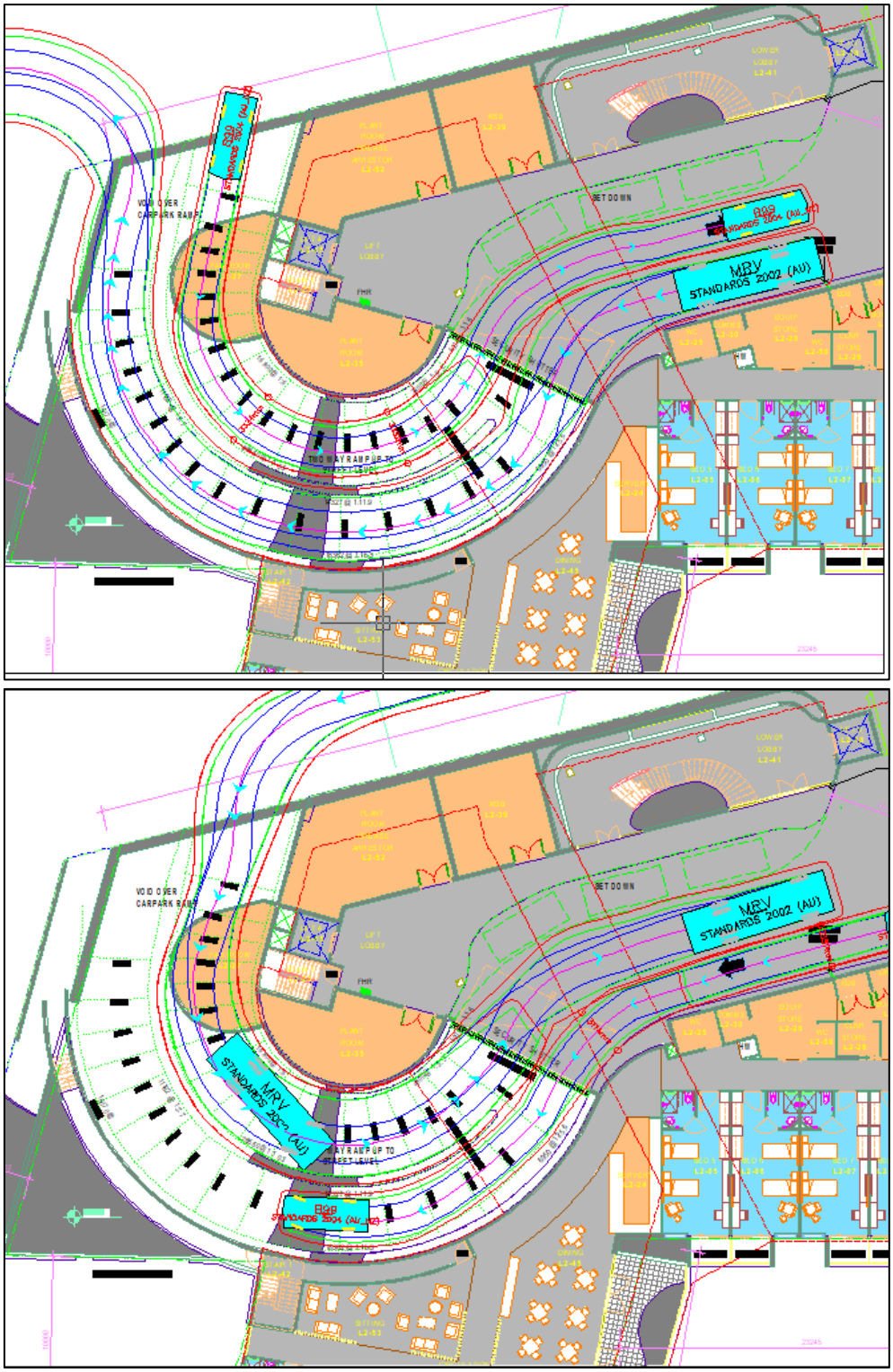
Green – Vehicle Body

Red – 500mm Clearance

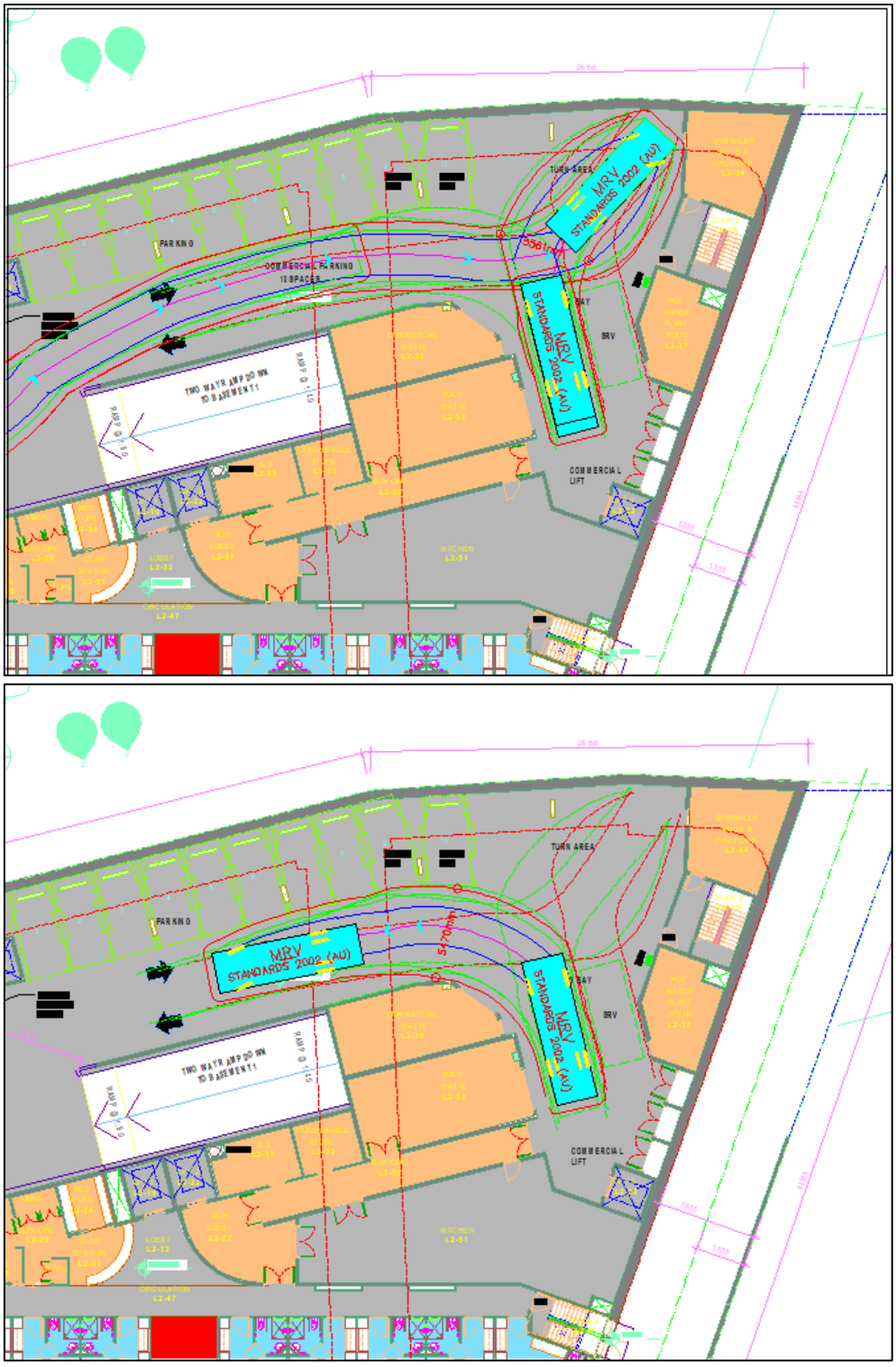




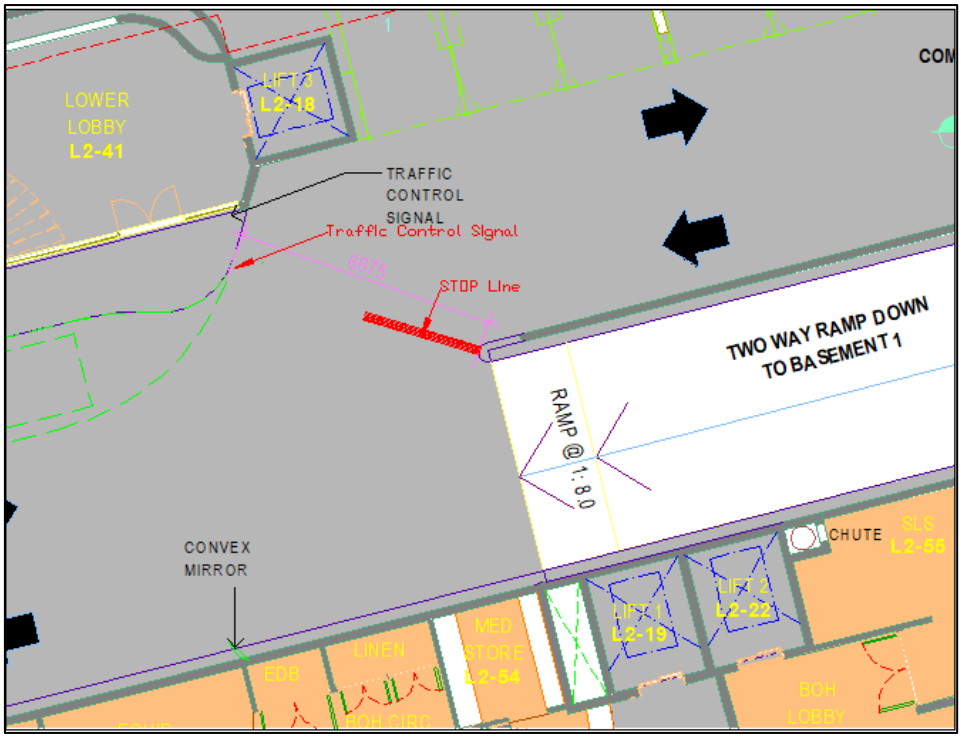
8.8m MRV into and out of the site and circulation along the access ramp
Tested @ 5km/h
Successful



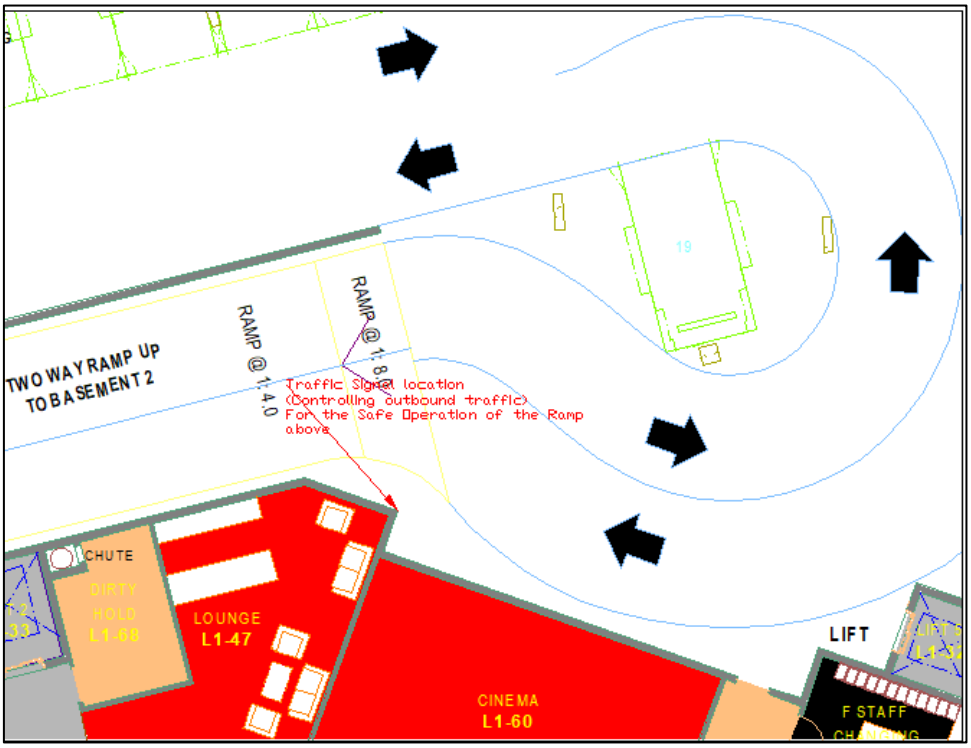
B99 passing 8.8m MRV at the bottom of the ramp
Tested @ 5km/h
Successful



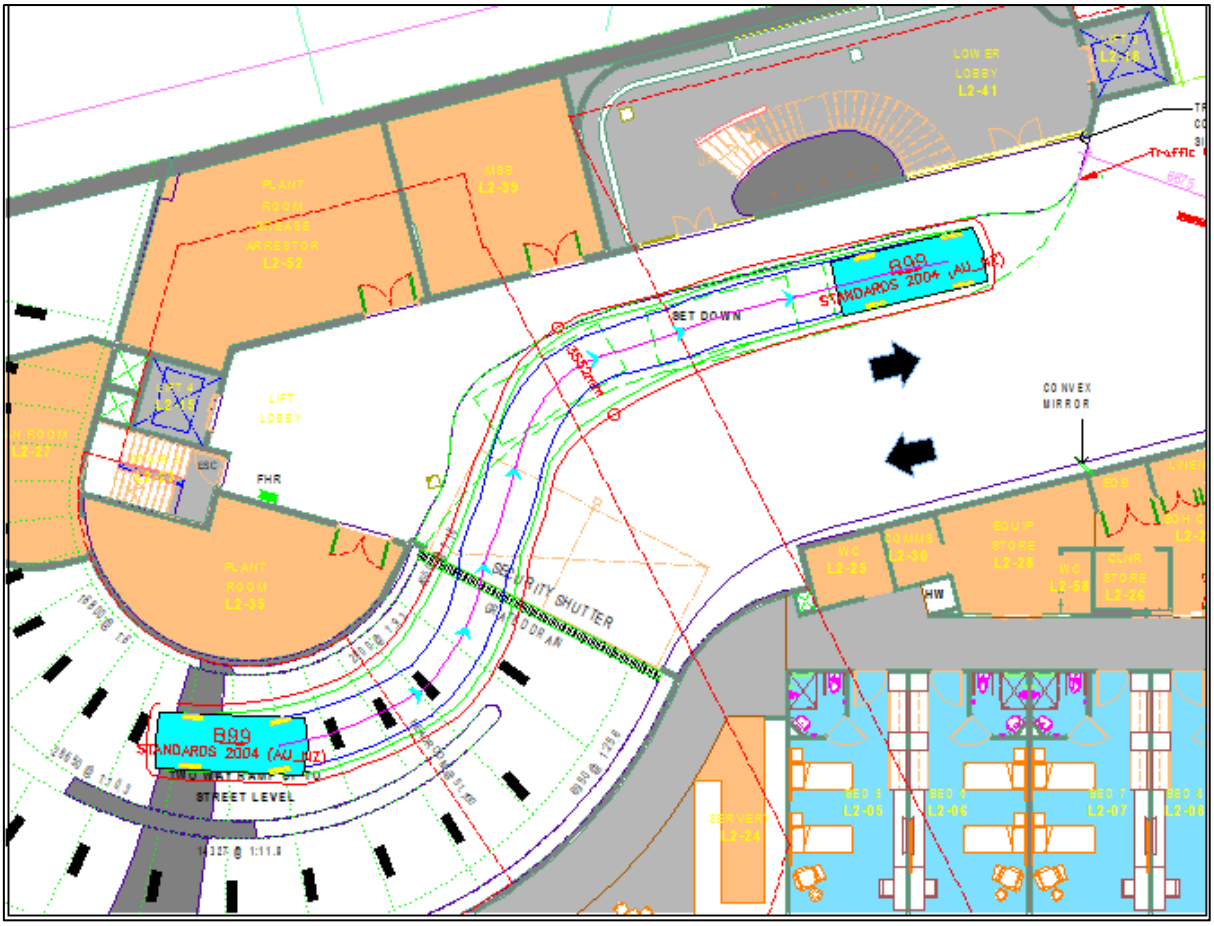
8.8m length MRV into and out of loading area
Tested @ 5km/h
Successful



Parking Spaces are to be allocated to aged care facility visitors only and the operation is to operate under signal control to ensure the safe operation of the ramp. As such the internal layout requires the provision of a “Stop Line”, “*Stop*” signage and “*Residential Aged Care Visitor Car Parking Only*” Signage.



Signal control required to ensure safe operation of the above parking / loading area.

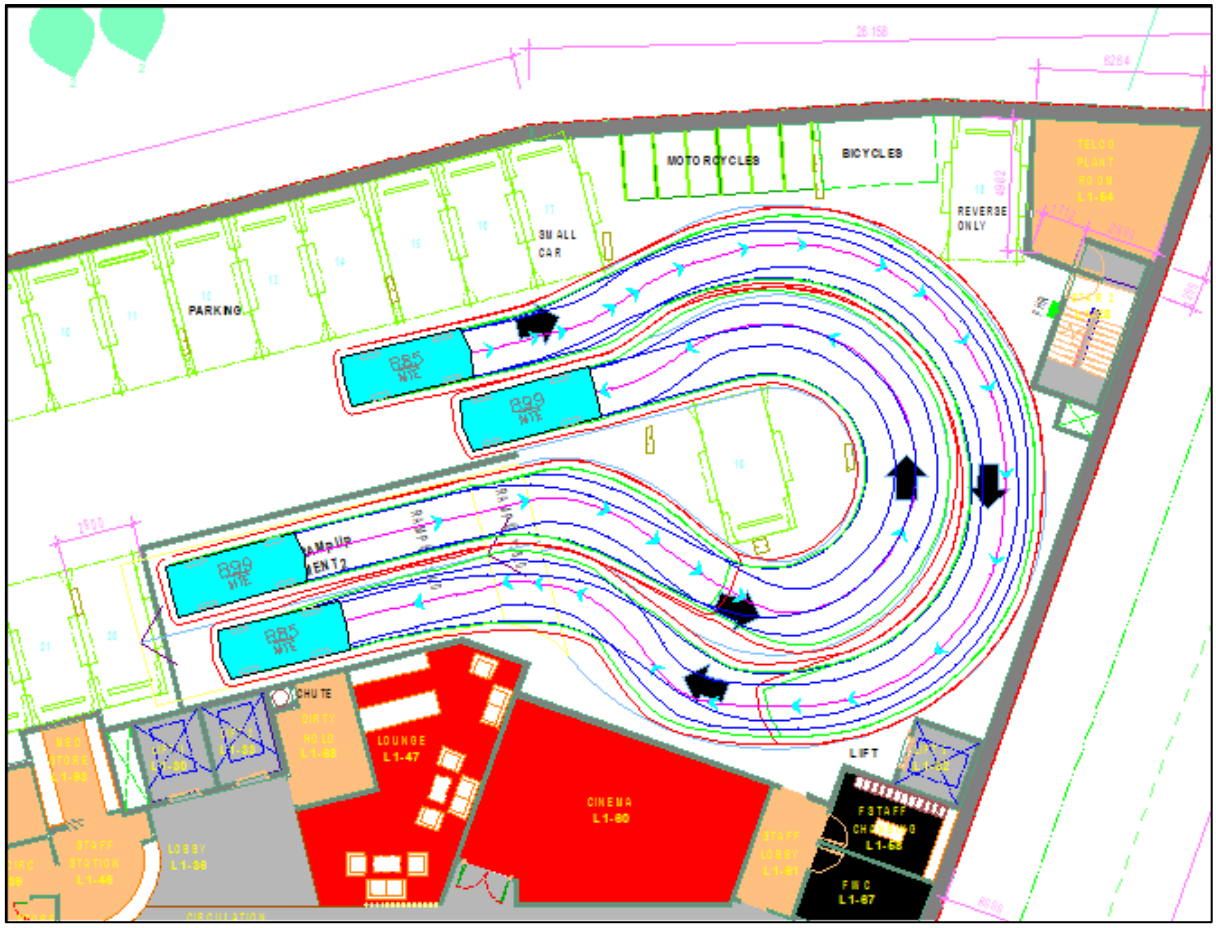


B99 into drop-off area

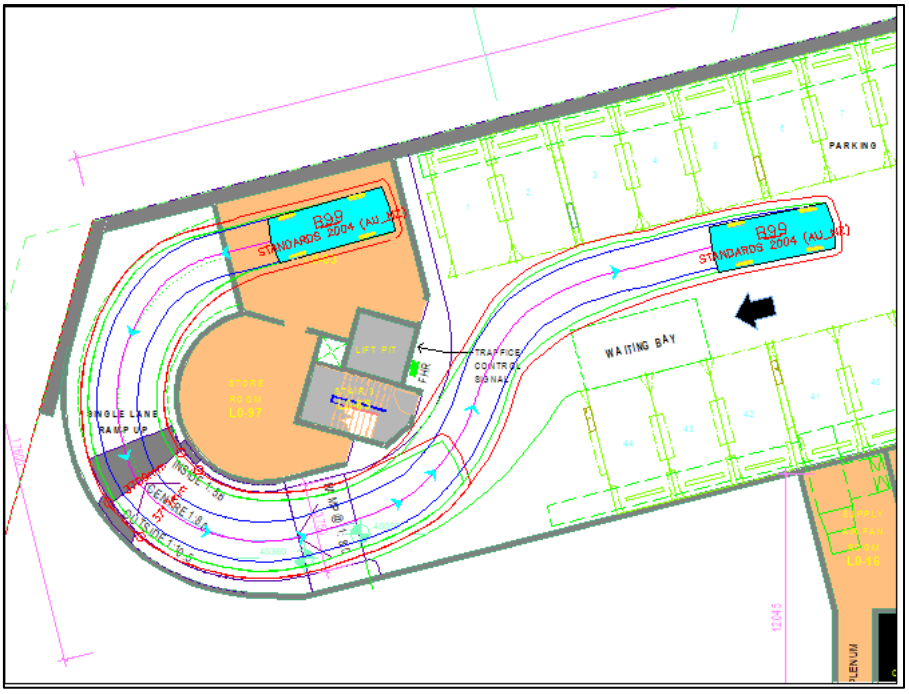
Tested @ 5km/h

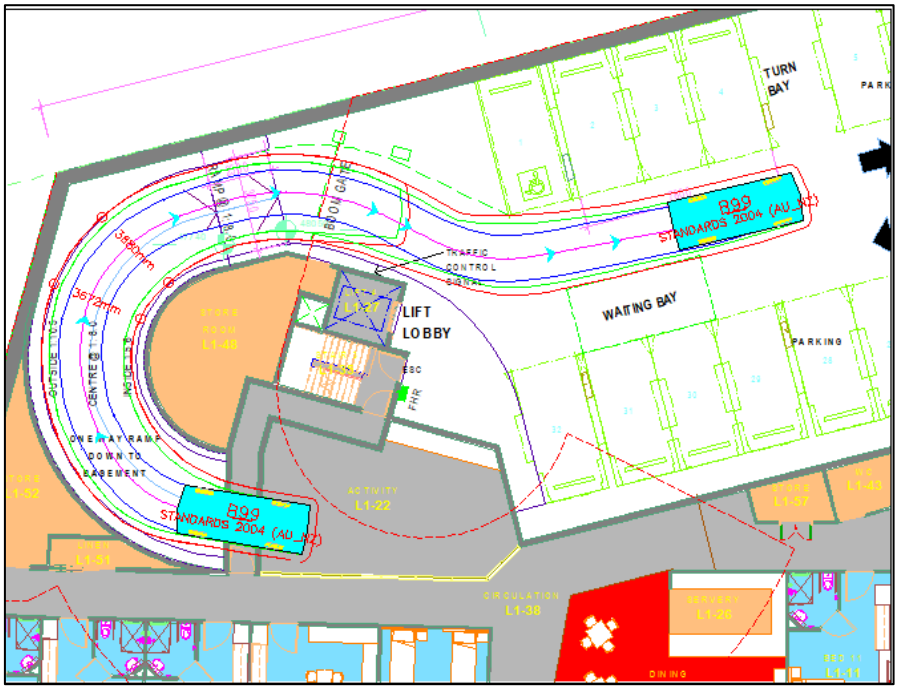
Successful – It is recommended that speed humps are provided at the bottom of the entry ramp to slow vehicles to ensure the safe operation of the pick-up and drop-off area.

It is expected that vehicles will undertake a U-turn within the available aisle to leave the site



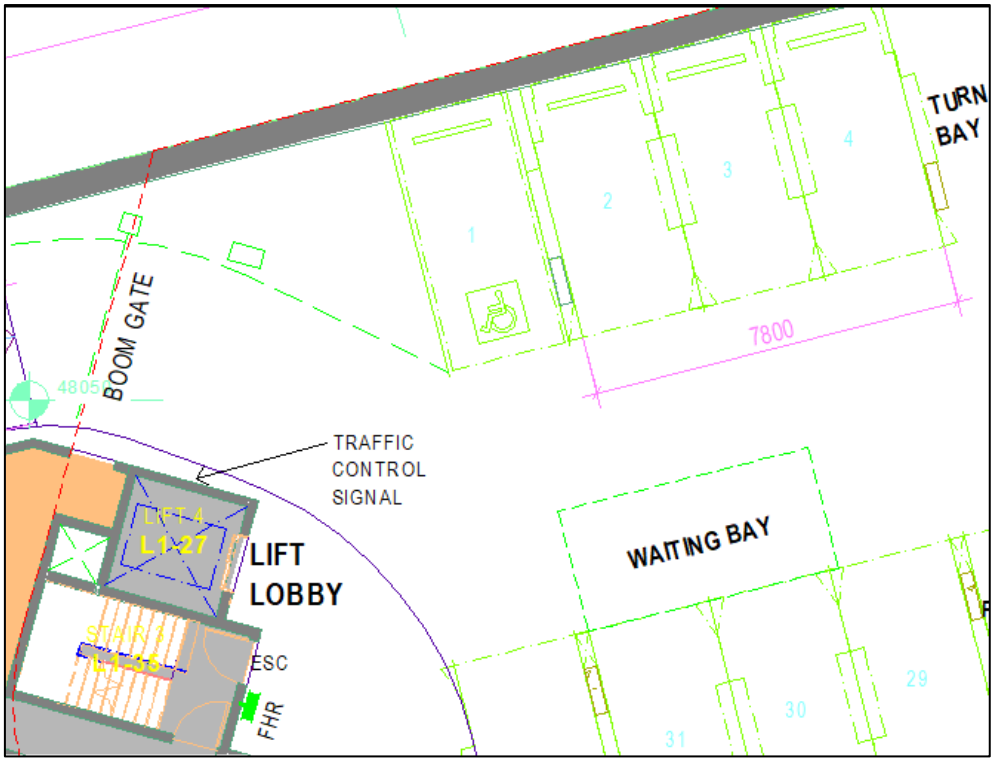
B99 passing B85 along ramp
Tested @ 5km/h
Successful



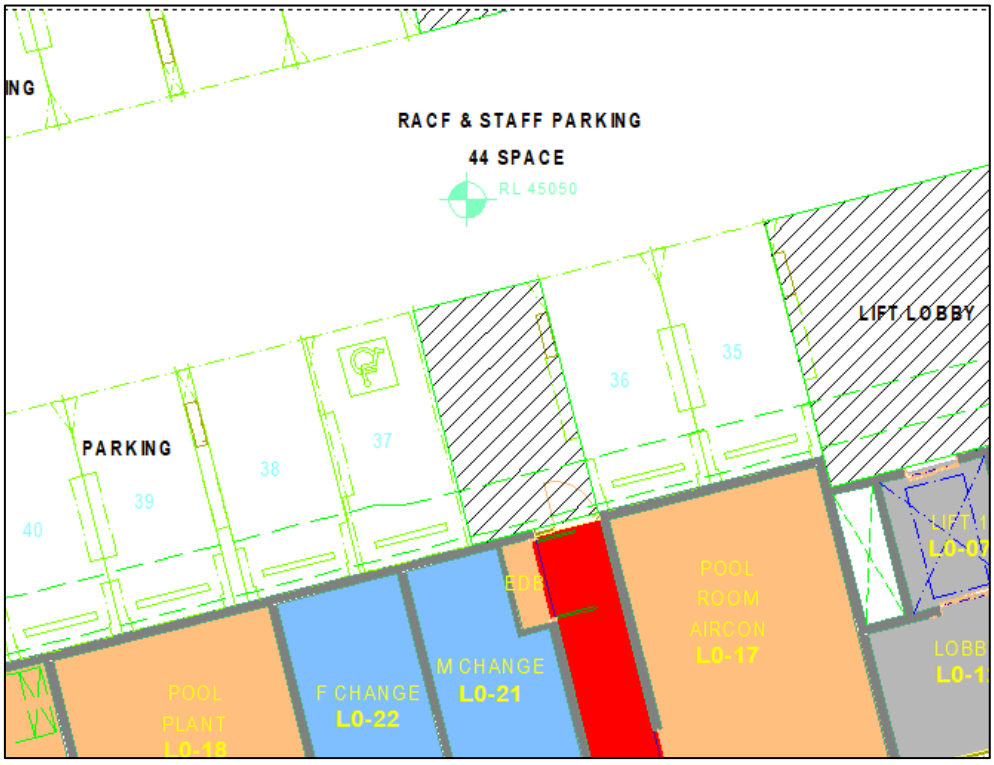


B99 Circulation along ramp
Tested @ 5km/h
Successful – Ramp to operate under signal control

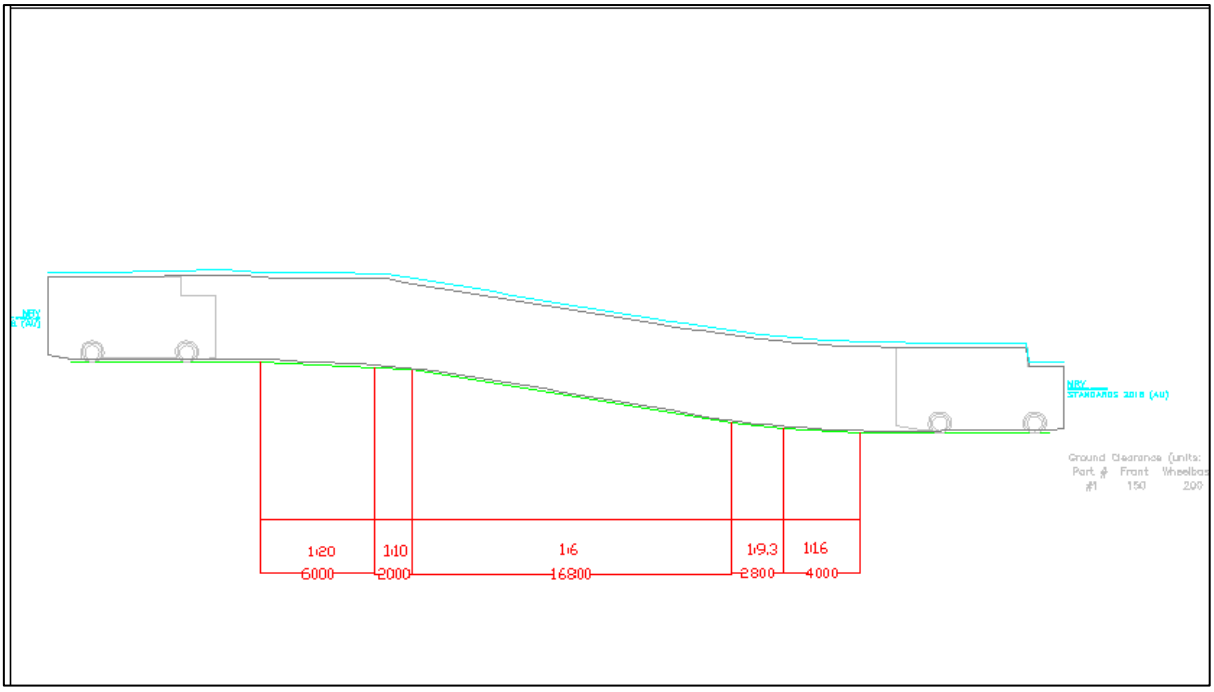
Blue – Vehicle Tyres
Green – Vehicle Body
Red – 300mm Clearance



Disabled space subject to approval by access consultant



Bollard to be provided in shared space in accordance with AS2890.6:2009 requirements



Undercarriage vertical clearance testing for an 8.8m length MRV
Successful

Note – 50mm clearance is provided from the undercarriage of the vehicle.