TRAFFIC IMPACT REPORT AND CAR PARKING CERTIFICATION

115-199 DERBY STREET, PENRITH NSW 2750

PROPOSED RESIDENTIAL FLAT BUILDING

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INDEX

Introduction **3**

Background and Existing Conditions **3**

Location and Land Use 3

Figure 1: Location of the Subject Site on a Street View 4

Figure 2: Location of the Subject Site in Aerial View 4

Figure 3: Derby Street as seen from the frontage of the subject site 5

Figure 4: Derby Street as seen from the frontage of the subject site 5

Public Transport **6**

Figure5: Local Bus Services 6

Figure6: 400-m and 800-m radius walking distance from the subject site 6

Table 1: Accessible Bus lines for the proposed development 7

Traffic Impacts of the Proposed Development **8**

Table 1: Proposed Unit Structure 8

Basement Car Parking Assessment **9**

Penrith City Council DCP 2014 - Car Parking Requirements 9

Table 2: DCP Car Parking Requirements 9

Penrith City Council DCP 2014 - Bicycle Parking Requirements 10

Table 3: DCP Bicycle Parking Requirements 10

Delivery/service/loading bay - NSW RTA Guide to Traffic Generating Development 10

Figure 7: Service bay dimensions (AS 2890.2-2002) 10

AS 2890.1-2004 Compliance 11

Car Space Dimensions 11

Table 4: Compliance of car spaces with the design standard 11

Sight Distance for Vehicles 11

Figure 8: Entering sight distance specifications (AS 2890.1:2004) 12

Sight Distance for Pedestrians 12

Figure 9: Minimum Sightlines for Pedestrian Safety (AS 2890.1:2004) 13

Disabled Car Spaces 13

Blind Aisles 13

Ramp to the Car Park 13

Column Location and Spacing 14

Figure 10: Column spacing requirements (excerpt from AS 2890.1-2004) 14

Swept Path Assessment 15

Conclusions **16**

Appendix A: Swept Path Assessment **17**

Introduction

SafeWay Traffic Management Solutions was commissioned by CK Design to prepare a Traffic Impact Report and a Car Parking Certification for the proposed residential flat building development at 115-119 Derby Street in Penrith, on a land area of 2,090 m^2.

The subject site is located with frontage to Derby Street. The proposal includes the construction of a residential flat building with 60 units (13 X 1 bedroom units + 43X 2 bedroom units + 4 X 3 bedroom unit). On-site car parking has been proposed for basement levels 1 & 2 with the following provisions:

- A total of 78 car spaces (including 7 disabled car spaces);
- A total of 11 visitor car spaces;
- 1 Car wash Bay and 2 loading bays; and
- 16 Resident bicycle bays.

This report will assess the traffic impacts of this proposed development on the surrounding environment and the compliance of the proposed car parking with the Australian Standards and relevant clauses presented in the Penrith City Council Development Control Plan 2014 (DCP 2014).

In the course of preparing this assessment, the subject site and its environment have been inspected, plans of the development examined, and all relevant traffic data collected and analysed.

Background and Existing Conditions

Location and Land Use

The subject site is currently occupied by three separate single storey residential dwellings (one at no. 115, no.117 and no.119, Derby Street). The proposal involves demolition of these three existing residential dwellings and construction of a multi-storey residential flat building over a total land area of 2,090 square metres.

Derby Street is at the front of the subject site, and this local road also provides access to nearby Colless Street and Doonmore Street. The area in the vicinity of the subject site is chiefly residential.

Figure 1 shows the site from the local road network from a street map perspective.

Figure 2 presents an aerial photograph of the subject site and the surrounding areas.

Figure 3 presents a photo of Derby Street as seen at the frontage of the subject site.

Figure 4 presents a photo of Derby Street as seen at the frontage of the subject site.

Figure 1: Location of the Subject Site on a Street View

Figure 2: Location of the Subject Site in Aerial View

Figure 3: Derby Street as seen from the frontage of the subject site

Figure 4: Derby Street as seen from the frontage of the subject site

Public Transport

The subject site has convenient access to a large number of bus services. The following table outlines the details of the bus services available in the vicinity of the site. **Figure 5** illustrates the bus route map within the area of the subject site. **Figure 6** shows the potential public transport services within the walking distance.

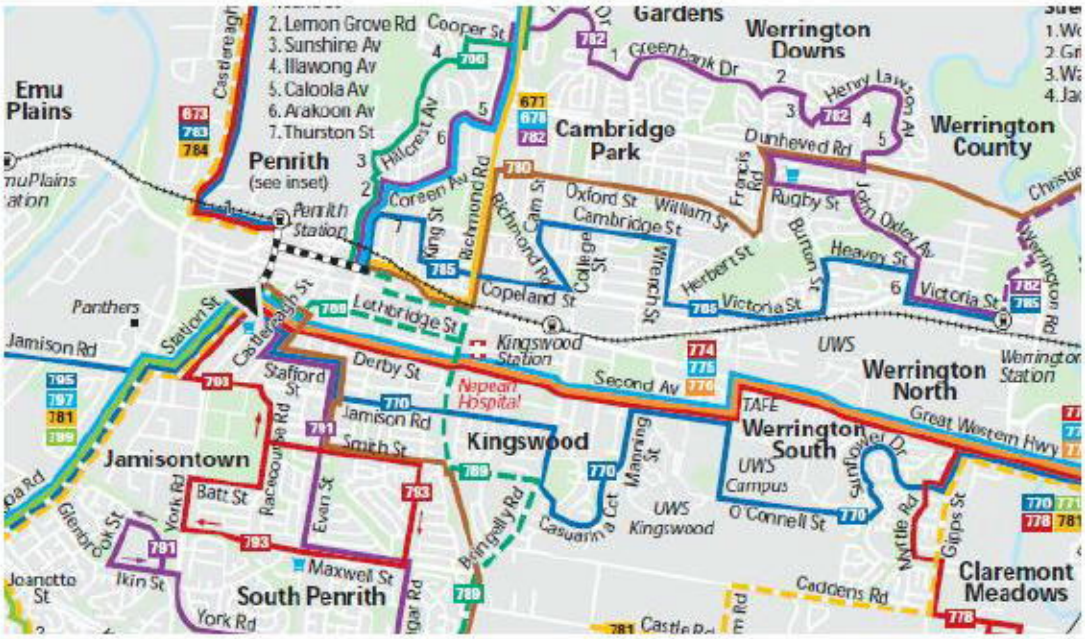


Figure5: Local Bus Services

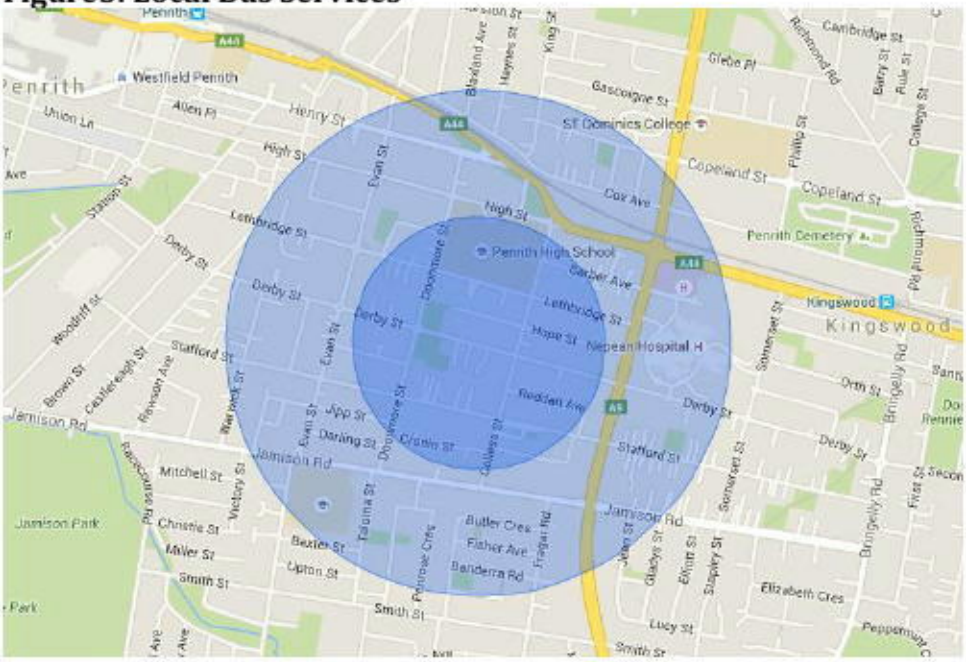


Figure6: 400-m and 800-m radius walking distance from the subject site

Six different bus routes serve the region frequently and it is an outstanding advantage of this site.

Table 1: Accessible Bus lines for the proposed development

Service	Location	Distance [m]	Walking Time [min]	Origin	Destination	Route Description	Number of Service		
							AM Peak (7-9 am)	Pm Peak (4-6 pm)	Off peak
677	High street near Parker street Bus stop: 2750439	205	6	Richmond	Penrith	via Londonderry	2	2	1 bus/h
		143	5	Penrith	Richmond	via Londonderry	2	2	1 bus/h
780		205	6	Mt Druitt	Penrith	via Cambridge Park	6	6	3 bus/h
		143	5	Penrith	Mt Druitt	via Cambridge Park	6	6	3 bus/h
774	Derby St Near Colless St Bus stop : 2750244	364	5	Mt Druitt	Penrith	Via St. Marys stn	4	4	2 bus/h
		388	5	Penrith	Mt Druitt	Via St. Marys stn	4	4	2 bus/h
775		364	5	Mt Druitt	Penrith	Via St. Marys	4	4	2 bus/h
		388	5	Penrith	Mt Druitt	Via St. Marys	4	4	2 bus/h
776		364	5	Mt Druitt	Penrith	Via UWS	4	4	2 bus/h
		388	5	Penrith	Mt Druitt	Via UWS	4	4	2 bus/h
789		364	4	Penrith	Luddenham	via The Northern Rd service	1	-	1 bus/ day

As per the details presented in the section above, it is clear that the subject site is serviced by frequent bus services which are also easily accessible from the subject site. Therefore, this site has good access to the public transport services.

Traffic Impacts of the Proposed Development

The proposed development of the subject site includes construction of a residential flat building with 62 units, on a land area of approximately 2,090 square metres, with the following unit arrangement;

Table 1: Proposed Unit Structure

Floor Level	1 Bedroom Units	2 Bedrooms Units	3 Bedrooms Units	Total Units
Ground Floor	1	7	-	8
Level 1	4	8	-	12
Level 2	4	8	-	12
Level 3	4	8	-	12
Level 4	-	6	2	8
Level 5	-	6	2	8
Total Units	13	43	4	60

The subject site is categorised under "Medium Density Residential Flat Building" in Section 3.3.2 of the NSW RTA Guide to Traffic Generating Development (2002) document. The following trip rates have been outlined in this document;

- Smaller units and flats (up to two bedrooms):
- Daily vehicle trips = 4-5 per dwelling
- Weekday peak hour vehicle trips = 0.4-0.5 per dwelling.

- Larger units and town houses (three or more bedrooms):
- Daily vehicle trips = 5.0-6.5 per dwelling
- Weekday peak hour vehicle trips = 0.5-0.65 per dwelling.

Using the above rates for the subject site, we obtain the following peak hour trips;

- 0.5 (upper bound) trips per unit X 56 units (1 and 2 bedrooms) =28 trips
- 0.65 (upper bound) trips per unit X 8 units (1 and 2 bedrooms) = 2.6 trips
- Total peak hour trips generated by the proposed development = 30.6 trips =31 trips (rounded up)

This number of trips during each peak hour is rather insignificant as it represents 1 vehicle every 2 minutes during each peak hour (assuming 100% out during the AM peak hour and 100% in during the PM peak hour and a uniform distribution of trips across each hour – justified due to the residential nature of the development).

As such, it is clear that the additional development traffic represents a small fraction of the existing traffic volumes and therefore the additional traffic generated from the proposal is unlikely to generate any material impact on the existing traffic operations in the vicinity.

Basement Car Parking Assessment

On site car parking has been proposed, on the subject site, within the basement level with the following provisions;

- A total of 78 car spaces (including 7 disabled car spaces);
- A total of 11 visitor car spaces;
- 1 Car wash Bay and 2 loading bays; and
- 16 Resident bicycle bays.

Full scale drawings of the proposed development are provided as part of the Development Application package and hence reference should be made to these drawings.

Penrith City Council DCP 2014 - Car Parking Requirements

The car parking requirements for residential developments are contained in Part C 10.5.1 of the Penrith City Council DCP 2014.

Car parking provision for residential flat buildings must be made as follows;

Table 2: DCP Car Parking Requirements

Unit Type	Minimum Spaces Required	Number of Units	Minimum Spaces
Studio/1 bedroom	1	13	13
2 bed rooms	1	43	43
3 bed rooms	2	4	8
Visitor/dwelling	0.2	60	12
Car wash bay	1 per 50 units	60	1.2~1
Service bay	1 per 40 units	60	1.5~2
Total Spaces			79

From the requirements presented in the table above, it is evident that a total of 79 car spaces are required for the overall development (64 car spaces for residents and 12 car spaces for visitors).

The proposal includes a total of 80 resident car spaces and a total of 12 visitor car spaces (including 7 disabled car spaces). Therefore the proposed car parking is compliant with the DCP car parking requirements.

Disability spaces with a rate of 4% of total number shall be provided to cover the DCP 2014 requirements. This amount for this property 60 units X 0.04 is equal with 2.4 ~ 2.

Penrith City Council DCP 2014 - Bicycle Parking Requirements

As per the "Penrith City Council DCP 2014" and "Planning Guidelines for Walking and Cycling" (NSW Government 2004), at multi-unit housing developments, bicycle parking should be provided at the following rates;

Table 3: DCP Bicycle Parking Requirements

Unit Type	Minimum Spaces Required	Maximum Space Required	Number of Units	Bicycle Space required
1 bedroom	0.2	0.3	13	2.6~3
2 bedrooms	0.2	0.3	43	8.6~9
3 bedrooms	0.2	0.3	4	0.8~1
Visitors/dwellings	0.05	0.1	60	3
Total Bicycle space Required				16

As per the above table, the proposed development will need to provide a total of 16 bicycle parking spaces. Thus, the proposal will need 16 bicycle bays within the basement level to comply with the DCP bicycle parking requirements.

Delivery/service/loading bay - NSW RTA Guide to Traffic Generating Development

The subject site is categorised in Section 5.2.3 of the NSW RTA Guide to Traffic Generating Development (2002) document. For residential flat building development, one loading bay for each 50 units should be provided. The proposal includes 2 common loading bays provided within the basement level 1, and thus, this site is compliant with the RTA NSW 2002.

With regards to the dimension of the loading bays, AS2890.2-2002 stipulates the required dimensions for the service bays shall be 3.5 m X 6.4 m for SRV **(Figure 7)**.

SERVICE BAY DIMENSIONS

Vehicle class	Bay width (min.) m	Bay length (min.) m	Platform height m	Vertical clearance (min.) m
SRV	3.5	6.4	0.75 to 0.90	3.5
MRV	3.5	8.8	0.95 to 1.10	4.5*
HRV	3.5	12.5	1.10 to 1.40	4.5*
AV	3.5	19.0	1.10 to 1.40	4.5*

Figure 7: Service bay dimensions (AS 2890.2-2002)

AS 2890.1-2004 Compliance

This section will investigate the compliance of the proposed basement car park with the requirements outlined in AS 2890.1-2004, AS 2890.2-2002 and 2890.3-1993.

Car Space Dimensions

The subject car parking user class as per AS 2890.1-2004 is Class 1A (residential parking). The following table indicates the standard compliance of the 77 X 90 degree parking spaces provided;

Table 4: Compliance of car spaces with the design standard

Component	Standard Dimension (m)	Dimension Provided (m)	Compliance/Comments
A	2.4	2.4	Compliant
C*	5.4	5.4	Compliant
Aisle Width	5.8	5.8	Compliant

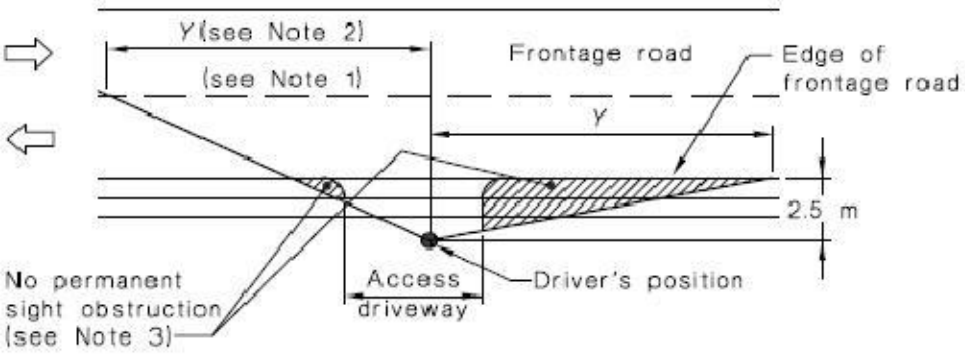
* where parking is to a wall or high kerb not allowing any overhang and where parking is controlled by wheel stops installed at right angles to the direction of parking.

Moreover, as per AS 2890.1-2004, "Spaces shall be located at least 300 mm clear of obstructions higher than 150 mm such as walls, fences and Columns."

The connectors between two aisles in two basement levels have 4.8m width. It needs to be 3.6 for one way connection or 5.5 for two way connection. As it can be seen from the table above, the proposed car park design complies with the basic car space dimensions, however the aisle width dimensional requirements is not consistent with AS2890.1-2004 in some aisles.

Sight Distance for Vehicles

Derby Street is a local road with a recommended standard speed limit of 50km/hr. For such speed limits at a domestic driveway, a sight distance of 69m is required along both road directions **(Figure 8)**. This report recommends that in order to achieve the prescribed sight distance the greyed area may need to be kept clear of visual obstructions (as seen in the table below extracted from AS 2890.1-2004).



Frontage road speed (Note 4) km/h	Distance (Y) along frontage road m		
	Access driveways other than domestic (Note 5)		Domestic property access (Note 6)
	Desirable 5 s gap	Minimum SSD	
40	55	35	30
50	69	45	40
60	83	65	55
70	97	85	70
80	111	105	95
90	125	130	Use values from 2nd and 3rd columns
100	139	160	
110	153	190	

Figure 8: Entering sight distance specifications (AS 2890.1:2004)

Sight Distance for Pedestrians

In order to provide adequate visibility of pedestrians walking along the footpath, the area outlined in **Figure 9** below must keep clear of visual obstructions.

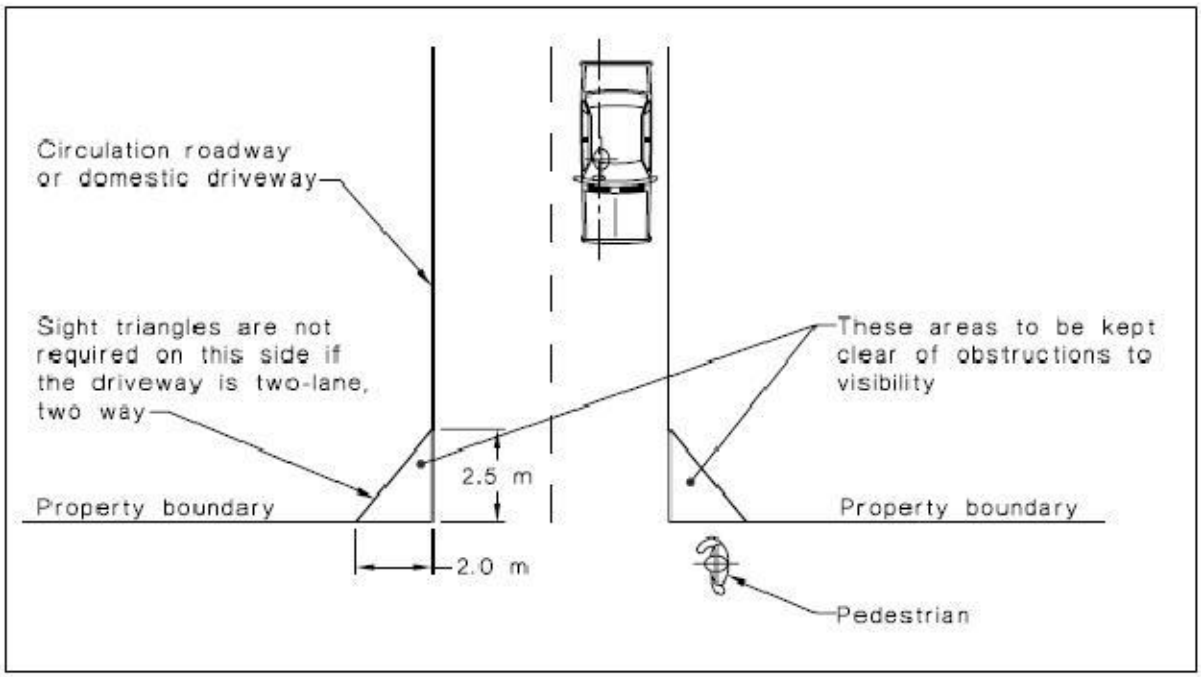


Figure 9: Minimum Sightlines for Pedestrian Safety (AS 2890.1:2004)

Disabled Car Spaces

Eight (8) dedicated parking spaces have been provided within the proposed car park. All of these spaces are designed as per the required dimensions: 2400mm width and 5400mm length.

A shared space (shaded area) on one side of the dedicated space is also provided at 2400mm X 5400mm, for two dedicated spaces at each basement level. Space identification (white symbol of access) has also been proposed as per the site plans. It is advised that a bollard also be provided for the shared spaces as per the required Australian Standard.

Blind Aisles

At blind aisles, the aisle shall be extended a minimum of 1 m beyond the last parking space. This 1m extension has been provided at the blind aisles in order to improve the manoeuvrability of vehicles when reversing out.

Ramp to the Car Park

AS 2890.1-2004 states, the grade requirements for straight ramps in private or residential car parks be as follows:

(i) Longer than 20 m—1 in 5 (20%) maximum.

(ii) Up to 20 m long—1 in 4 (25%) maximum. The allowable 20 m maximum length shall include any parts of grade change transitions at each end that exceed 1 in 5 (20%).

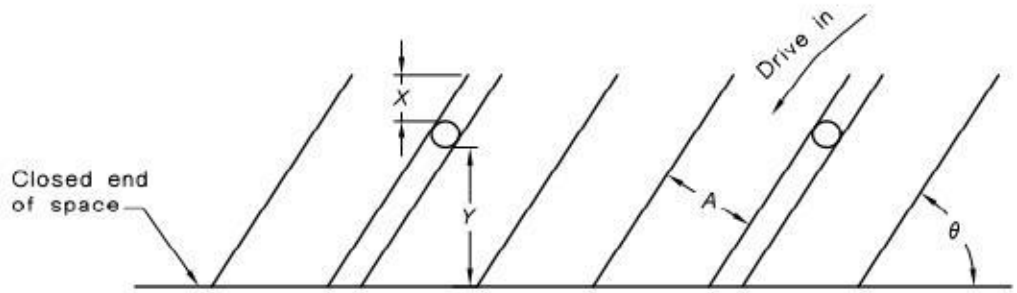
(iii) A stepped ramp comprising a series of lengths each exceeding 1 in 5 (20%) grade shall have each two lengths separated by a grade of not more than 1 in 8 (12½%) and at least 10 m long.

The stepped ramp provided from ground level to the basement car park at the subject site is 28.8m with the highest grade of 25%. This maximum grade of the ramp needs to be a maximum of 20% to be compliant with AS 2890.1-2004.

Also, the ramp width needs to be 5.5+0.6 metre as per the Australian Standards since the ramps to the basement car parks are two-way ramps. This condition has not been satisfied due to the design's provision of 6 m width ramp widths.

Column Location and Spacing

There are columns supporting the building structure at the basement level car parking. The design envelope around a parked vehicle which is to be kept clear of columns is shown in the Figure and the Table below. As per this table (an excerpt from AS/NZS 2890.1:2004, section 5.2), at the 90 degree parking angles, the minimum X and Y dimensions are to be 750mm and 3650mm respectively. From the CAD drawings, the X and Y values are measured to be 750mm and 3650mm (or more) respectively. Since these two dimensions satisfy the minimum requirements, the column spacing is compliant with the standard.



A = parking space width (see Figure 2.2)

Parking angle, θ, degrees	Dimensions, mm	
	X, min.	*Y*, min.
30	375	1825
45	530	2581
60	650	3161
75	724	3526
90	750	3650

Figure 10: Column spacing requirements (excerpt from AS 2890.1-2004)

Swept Path Assessment

Swept path assessments have been undertaken for the critical car spaces using an 85th percentile vehicle template in AS 2890.1-2004 **(Figure 11)**. These swept paths are presented in Appendix A of this document. Based on these swept paths, it is noted that the anticipated manoeuvres by vehicles at critical car spaces can be sufficiently accommodated within the proposed car parking design constraints.

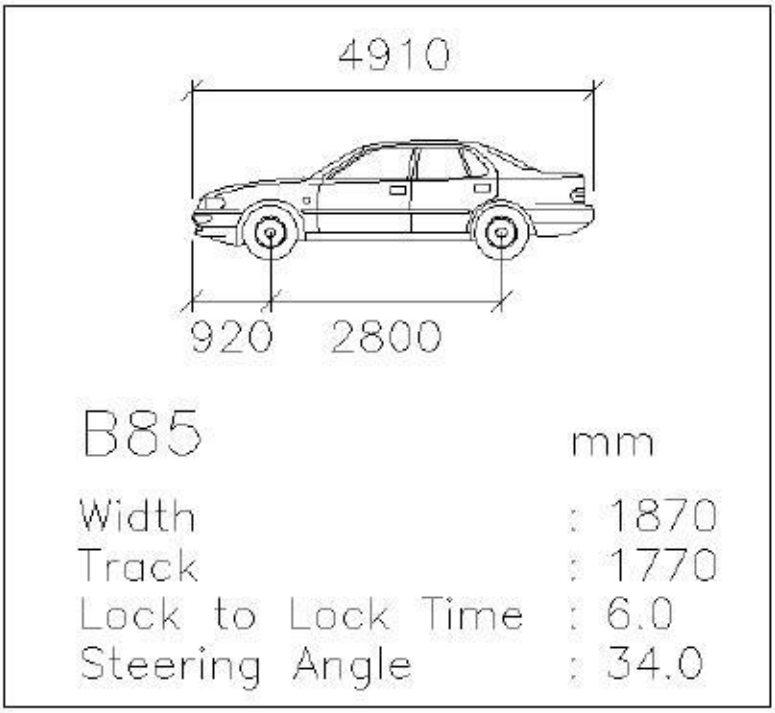


Figure 11: B85th percentile vehicle template (AS 2890.1-2004)

Conclusions

Based on the assessment presented in this report, it is considered that:

- The proposed site is very well located to public transport services.
- The proposed site will generate additional, but low levels of trips in the weekday AM and PM peak hours. These trips can be accommodated by the nearby roads without affecting intersection performance or increasing delays and queues.
- The car parking assessment indicates that the provision of car parking at the proposed site is well compliant with the requirements outlined in the Penrith Council DCP 2014.
- 16 bicycle bays need to be provided within the basement level in order to be compliant with the Penrith DCP 2014, and Planning guidelines for walking and cycling (NSW government, 2004).
- The car park assessment indicates that the design is compliant with the requirements outlined in AS 2890.1-2004, except for column spacing, ramp's gradient and the width and service bay size;
- The swept path assessment undertaken to test the manoeuvrability of 85th percentile vehicles within the basement level indicates sufficient manoeuvrability conditions of these vehicles within the design constraints.

Based on this study, once the amendments are done there is no traffic engineering reason why a planning permit for the proposed residential development at should be refused.

Appendix A: Swept Path Assessment