



ESQ 1818: Stage 4 and 5

Traffic and Parking Impact Assessment

ESQ 1818 Stage 4 Pty Ltd / ESQ 1818 Stage 5 Pty Ltd

25 September 2023

→ The Power of Commitment



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Contents

1.	Introduction	1
1.1	Background	1
1.2	Previous traffic studies	1
1.3	Site location and proposed development summary	2
1.4	Purpose of this report	4
1.5	Assumptions and limitations	4
2.	Existing conditions	5
2.1	Overview	5
2.2	Existing site	5
2.3	Existing road network characteristics	6
2.3.1	Mulgoa Road	7
2.3.2	Retreat Drive	8
2.3.3	Ransley Street	8
2.3.4	Panthers Link Road	9
2.3.5	Jamison Road	9
2.4	Public transport and active transport	10
2.4.1	Bus services	10
2.4.2	Train services	12
2.4.3	Bicycle access	12
2.4.4	Walking access	13
3.	Assessment of traffic conditions	14
3.1	Traffic surveys	14
3.2	Comparison of 2011, 2015 and 2016 PM peak hour traffic data	14
3.3	Intersection operational performance	15
4.	Parking provision	17
4.1	Car parking provision	17
4.2	Accessible parking	19
4.3	Car wash bay	19
4.4	Other parking facilities	20
4.4.1	Bicycle parking	20
4.4.2	Motorbike parking	20
4.5	Service vehicle parking (including Loading Docks)	21
5.	Parking layout and access review	23
5.1	General layout	23
5.2	Car park circulation	26
5.2.1	Stage 4 residential component	26
5.2.2	Stage 5 residential component	26
5.2.3	Stage 4 and 5 retail component	26
5.3	Site access review	27
5.4	Pedestrian network	28
6.	Summary and conclusion	29
6.1	Proposed works	29
6.2	Traffic impact	29

6.3	Parking provision and layout	29
6.4	Mitigation measures	30
6.5	Conclusion	30

Table index

Table 1	Stage 4 and 5 development key features	3
Table 2	Development proposal drawing list	4
Table 3	Bus services	10
Table 4	Changes in peak hour traffic volume (2011 – 2016)	15
Table 5	Level of service criteria for intersections	16
Table 6	Stage 4 and 5 trip generation composition with VPA	16
Table 7	ESQ 1818 Stage 4 and 5 development parking	17
Table 8	Parking summary	18
Table 9	Accessible parking provision	19
Table 10	Car wash bay provision	19
Table 11	Bicycle parking provision	20

Figure index

Figure 1	Panthers precinct development lots	2
Figure 2	Site location	5
Figure 3	Surrounding road network	7
Figure 4	Mulgoa Road looking north	7
Figure 5	Retreat Drive looking north	8
Figure 6	Ransley Street (east of Mulgoa Road) looking east	8
Figure 7	Ransley Street (west of Mulgoa Road) looking west	9
Figure 8	Panthers Link Road looking north	9
Figure 9	Jamison Road looking east	10
Figure 10	Jamison Road looking west	10
Figure 11	Bus stops	11
Figure 12	Location of Penrith train station	12
Figure 13	Existing bicycle network	13
Figure 14	Total PM traffic at the Mulgoa Road and Retreat Drive intersection	14
Figure 15	ESQ 1818 Stage 4 loading manoeuvre (10.5 m heavy vehicle)	21
Figure 16	ESQ 1818 Stage 5 loading manoeuvre (6.4 m SRV)	22
Figure 17	Ground floor parking level	24
Figure 18	Basement parking level	25
Figure 19	ESQ 1818 external road network and parking access	27
Figure 20	ESQ 1818 pedestrian network	28

Appendices

Appendix A	Panthers Precinct VPA Parameters
Appendix B	Turning Path Plans

1. Introduction

1.1 Background

GHD Pty Ltd (GHD) has been engaged by ESQ 1818 Stage 4 Pty Ltd and ESQ 1818 Stage 5 Pty Ltd to undertake a traffic and parking impact assessment for Stage 4 and Stage 5 of the ESQ 1818 at Panthers (ESQ 1818) development located at 123 Mulgoa Road, Penrith.

A Masterplan Transport Strategy for the entire Panthers Precinct has already been developed and includes parking and transport analysis of the entire precinct, including Stages 4 and 5. A Voluntary Planning Agreement (VPA) for the Panthers Development has been signed by representatives of Transport of NSW, Penrith City Council and Panthers Rugby League Club in late 2020, which outlines triggers for road upgrades associated with staging developments within the Panthers Precinct.

This report has been prepared to provide a traffic impact and parking assessment for the proposed Stages 4 and 5 development (see Figure 1) with reference to the VPA and relevant Council Development Control Plans and Panthers Precinct Master Plan – Transport Strategy - GHD July 2014 (*Transport Strategy*).

This traffic and parking report is based on the *Transport Strategy* and uses the traffic generation rates, background growth and traffic distribution assumptions outlined within the precinct strategy. This report should be read in conjunction with the *Transport Strategy*.

This report refers directly to the Stage 4 and 5 Development Application, which consists of Lot 2 within the masterplan, while also applying the traffic generation of Stage 1 (Lots 3 and 3A) and Stage 2A, 2B and 3 (Lot 2) currently approved by Penrith City Council.

Relevant previous traffic studies for the Panthers precinct are summarised in Section 1.2 below.

1.2 Previous traffic studies

The previous reports and statements prepared by GHD for this development include:

- A Masterplan Transport Strategy, which comprised a parking and transport strategy for the entire Panthers Precinct (including Lot 2), (*Panthers Precinct Master Plan – Transport Strategy* referred to henceforth as the *Transport Strategy*) – July 2014.
- A Traffic Statement that analysed the changes in traffic impacts associated with the removal of the internal Riverlink Road, which was previously proposed to run in a north-south direction through the ESQ 1818 at Panthers Development – July 2016.
- A Traffic Impact Statement, which provided a comparison of the traffic impacts of the updated land uses associated with the proposed ESQ 1818 Development (for Lots 2, 3a and 3b) and the previously approved land uses (as contained in the *Transport Strategy*) – March 2016.
- A Traffic Impact Statement for the Development Application submission for Stage 1 (lots 3a and 3b), which provides the traffic impact and parking for the land uses on Lots 3a and 3b – August 2017.
- A Voluntary Planning Agreement (**VPA**) for the Panthers Development has been signed by representatives of Transport for NSW, Penrith City Council and Panthers Rugby League Club in late 2020, which outlines triggers for road upgrades associated with staging developments within the Panthers precinct.
- A Traffic Impact Statement for the proposed ESQ 1818 Stage 2A, 2B and 3 dated 27 August 2018 following minor amendments to the residential unit mix component of the proposed development.
- A Traffic Impact Statement for the proposed ESQ 1818 Stage 2A, 2B and 3 dated 13 March 2019 following service vehicle access amendments to be collected with the basement areas and the resulting alternation residential unit mix component of the proposed development.
- A Traffic Impact Statement for the proposed ESQ 1818 Stage 2A, 2B and 3 dated 13 June 2019 following updates to the service vehicle access amendments to be collected with the basement areas and the resulting alternation residential unit mix component of the proposed development.

- A Traffic and Parking Impact Assess report submitted in December 2021 (Rev 0) in support of the Development Application submission.

A Traffic and Parking Impact Assessment Addendum Statement dated 03 June 2022 outlining the proposed change in unit mix provision.

1.3 Site location and proposed development summary

The subject site for Stage 4 and 5 (within Lot 2) development is located northwest of the corner of Retreat Drive and Ransley Street intersection. The location of Stages 4 and 5 within the context of the overall Panthers Precinct is displayed in Figure 1.

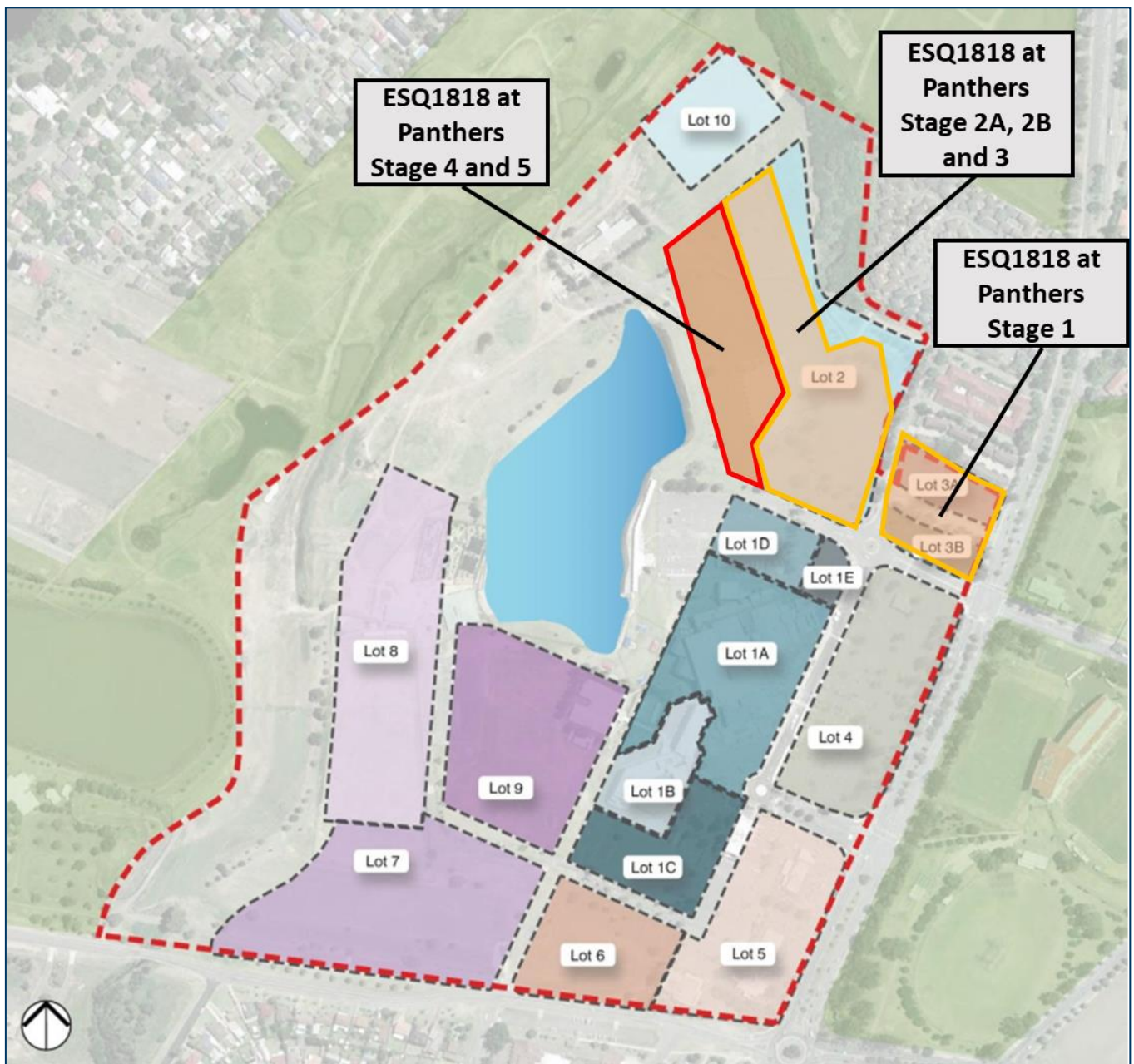


Figure 1 Panthers precinct development lots

Source: Architectus Draft Urban Design Report – modified by GHD

The proposed Stage 4 and 5 development consists of residential units and a retail component with basement parking for the use of residents and visitors as outlined in Table 1.

The development proposal includes a total of 349 residential units and retail Gross Floor Area (GFA) of 2,185 m².

Table 1 Stage 4 and 5 development key features

Stage	Use type	Number		Parking	Number
Stage 4	1-bed units	51 units		Residential Car	223 (including 19 accessible)
	2-bed units	68 units		Visitor Car	35 (including 2 accessible and 2 EV)
	3-bed units	36 units		Retail Car	90 (including 4 accessible)
	4-bed units	16 units		Bicycle	44 resident spaces and 16 visitor spaces
	Total Units	171 units		Motorbike	4
	Retail	1,030 m ² GFA		Car Wash Bays	4
				Service vehicle bays	One Council waste vehicle (10.5 m)
				Electric Vehicle (EV) bays ¹	2
Stage 5	1-bed units	59 units		Residential Car	215 (including 18 accessible)
	2-bed units	82 units		Visitor Car	36 (including 2 accessible and 2 EV)
	3-bed units	37 units		Retail Car	N/A – located in Stage 4 combined
	Total Units	178 units		Bicycle	48 resident spaces and 10 visitor spaces
	Retail	1,155 m ² GFA		Motorbike	4
				Car Wash Bays	4
				Service vehicle bays	One SRV
				EV bays	2
				<i>Note: 22 racks (equivalent to 44 bicycles) have been provided in the promenade between Stage 4 and 5</i>	
Total	Residential Units	349		Residential	438 (including 37 accessible)
	Retail GFA	2,185 m² GFA		Residential Visitor	71 (including 4 accessible)
				Retail	90 (including 4 accessible)
				<i>Excludes Car wash and service vehicle bays</i>	

In the context of the overall Panthers Precinct Masterplan, ESQ 1818 will be completed over five stages. It is proposed to consist of approximately 850 apartments and approximately 3,500 m² (GFA) of retail within Lots 2, 3a and 3b. ESQ 1818 stages are known as the following and shown in Figure 1 above:

- Stage 1 (located in Lots 3A + 3B) – completed in 2019
- Stage 2A/2B (located in Lot 2) – 180 residential units and 1,225 m² (GFA) retail currently under construction
- Stage 3 (located in Lot 2) – 148 residential units currently under construction

¹ It is intended that the EV bays will be available for use for visitor parking

- Stage 4 (located in Lot 2) – 171 residential units and 1,030 m² (GFA) retail – this proposal
- Stage 5 (located in Lot 2) – 178 residential units and 1,155 m² (GFA) retail – this proposal.

1.4 Purpose of this report

This report provides a traffic impact assessment specifically for the ESQ 1818 Stage 4 and 5 proposal and discusses the following:

- **Existing conditions** – a review of existing road features, public and active transport and traffic volumes.
- **Proposed development** – provides details of the development proposal and a review of additional traffic generated.
- **Traffic impact assessment** – provides an assessment of the performance of the road network following the development of the site with reference to the VPA analysis undertaken.
- **Parking assessment** – a review of the parking provision and layout in relation to relevant Australian Standards (AS2890), Penrith City Council DCP requirements.

This Traffic and Parking Impact Assess report is an update of the report submitted in December 2021 to review the traffic and parking provisions and impacts within the updated Stage 4 and 5 Development Application.

1.5 Assumptions and limitations

This report is subject to, and must be read in conjunction with, the limitations set out below and the assumptions and qualifications contained throughout the report. This assessment for the proposed development is based upon the following assumptions:

- Architectural plans and development land use breakdown provided by Turner Studio Architects.
- Intersection survey counts for the AM and PM period conducted in 2016 (refer to Section 3).
- Traffic distribution assumptions in relation to arrival and departure profiles, background traffic growth rates, traffic generation and routes through the network as outlined in the VPA for the proposed development, based on the Transport Strategy previously approved traffic distribution, and Council and Roads and Maritime approvals.

This study has been limited by the following:

- The analysis is a desktop study.
- The conditions of the surrounding network are based on information supplied by the traffic surveys, Google Maps and Streetview.
- Trip generation rates for the future developments have been taken from the approved *Transport Strategy* report.

This assessment for the proposed development is based on the following architectural drawings (refer to Table 2), produced by Turner Studio Architects.

Table 2 Development proposal drawing list

Drawing Number	Revision	Issue Date	Title
DA-110-008	06	WIP 2023.08.29	GA Plans – Ground Level
DA-110-007	05	WIP 2023.08.29	GA Plans – Basement 1

2. Existing conditions

2.1 Overview

This section outlines the existing traffic and transport conditions on roads in the vicinity of the site. This includes the existing transport and accessibility conditions and the existing road network performance.

2.2 Existing site

The existing site comprises an exhibition marquee adjacent to an at-grade car park facility consisting of approximately 355 car spaces providing the opportunity to host small and large exhibitions and markets.

Recently, the at-grade car park has been removed to facilitate the construction of ESQ1818 Stage 2A/2B and 3. An overflow grass area is available to facilitate additional parking and exhibition area for the larger events. Vehicle access to the existing facilities is via Retreat Drive, with the major road network consisting of Mulgoa Road (north/south connection) and Jamison Road (east/west connection). Refer to Figure 2 for site location.



Figure 2 Site location

Source: Sixmaps – Modified by GHD

2.3 Existing road network characteristics

Roads within NSW are categorised in the following two ways:

- By classification (ownership)
- By the function that they perform.

Road Classification

Roads are classified (as defined by the *Roads Act 1993*) based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Transport for NSW (TfNSW) to exercise authority of all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways and Transitways.

For management purposes, TfNSW has three administrative classes of roads. These are:

- **State Roads** – Major arterial links throughout NSW and within major urban areas. They are the principal traffic carrying roads and fully controlled by TfNSW with maintenance fully funded by TfNSW. State Roads include all Tollways, Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- **Regional Roads** – Roads of secondary importance between State Roads and Local Roads which, together with State Roads provide the main connections to and between smaller towns and perform a sub arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though TfNSW funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under delegation by local government. Regional Roads maybe all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by TfNSW.
- **Local Roads** – The remainder of roads are council controlled roads. Local Roads are the responsibility of councils for maintenance funding. TfNSW may fund some maintenance and improvements based on specific programs (e.g. urban bus routes, road safety programs). Traffic management on Local Roads is controlled under the delegation by local government.

Functional Hierarchy

Functional road classification involves the relative balance of the mobility and access functions. TfNSW define four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

- **Arterial Roads** – generally controlled by TfNSW, typically no limit in flow and designed to carry vehicles long distance between regional centres.
- **Sub-Arterial Roads** – can be managed by either TfNSW or local council. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry traffic between specific areas in a sub region, or provide connectivity from arterial road routes (regional links).
- **Collector Roads** – provide connectivity between local roads and the-arterial road network and typically carry between 2,000 and 10,000 vehicles per day.
- **Local Roads** – provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

The surrounding road network is shown in Figure 3.



Figure 3 Surrounding road network

Source: Transport for NSW maps – Modified by GHD

The Panthers Precinct and Penrith City are generally serviced by two state classified roads, namely Great Western Highway and Mulgoa Road. Further to the south, Mulgoa Road also provides access to the M4 Motorway.

2.3.1 Mulgoa Road

Mulgoa Road is a classified State Road linking the Penrith City Centre and Mulgoa Village. It is generally a four-lane divided road north of Glenmore Park, and to the south of Glenmore Park, it is a two-lane undivided road. Mulgoa Road is signposted at 60 km/h through the study area and carries an average annual daily traffic volume of 38,000 vehicles per day on the section south of Preston Street, Jamisontown (based on 2016 survey data). Mulgoa Road is a main traffic route into and out of Penrith and has a number of signalised intersections along its length. Refer to Figure 4.



Figure 4 Mulgoa Road looking north

Source: Google maps Streetview (2021)

2.3.2 Retreat Drive

Retreat Drive is a private road that provides access to Penrith Panthers and Penrith Mountainview Aged Care facility. The road is two lanes divided in a north-south direction between Ransley Road roundabout within the Panthers Precinct (refer to Figure 5). Retreat Drive provides access to the Penrith Panthers general car park facilities including the Western Sydney Community Conference Centre.



Figure 5 Retreat Drive looking north

Source: Google maps Streetview (2021)

2.3.3 Ransley Street

Ransley Street is a local road that crosses Mulgoa Road. Ransley Street, east of Mulgoa Road (refer to Figure 6), and provides access towards Nepean Square shopping centre located east of the site. Ransley Street is two lanes undivided in an east-west direction between Mulgoa Road and Station Street. It is signposted as a 50 km/h and conveys approximately 350 (two-way) vehicles during the peak hour periods (based on 2016 survey data).

Ransley Street, west of Mulgoa Road (refer to Figure 7), is located within the Panthers Precinct and provides access to Panthers and Penrith Mountainview Aged Care facility. The road is two lanes in an east-west direction and signposted at 10 km/h speed as it provides access to the car park facility and conveys approximately 200 vehicles during the peak hour periods (based on 2016 survey data).



Figure 6 Ransley Street (east of Mulgoa Road) looking east

Source: Google maps Streetview (2022)



Figure 7 Ransley Street (west of Mulgoa Road) looking west

Source: Google maps Streetview (2022)

2.3.4 Panthers Link Road

Panthers Link Road is an internal link road providing access between Panther Place, Retreat Drive and the at-grade parking facility (see Figure 8). The road is undivided, with typically one lane in each direction and access to kerbside drop-off and bus stop facilities. The posted speed limit is 10 km/h. There are footpaths provided on both sides of the road that facilitate the dropping off and picking up of patrons at the club facilities.



Figure 8 Panthers Link Road looking north

Source: Google maps Streetview (2021)

2.3.5 Jamison Road

Jamison Road is a regional road that provides east-west access between Mulgoa Road and Parker Street/Northern Road (2.4 km to the east). Jamison Road consists of a mix of divided and undivided road sections with typically two lanes each way, east of Mulgoa Road (refer to Figure 9). It is signposted at 60 km/h within proximity of the site. There are footpaths on both sides of the road with No Stopping restrictions on the approach to the intersection with Mulgoa Road.

Jamison Road to the west of Mulgoa Road, is a local road providing access to the Nepean River. This segment generally consists of a single lane each way undivided road, and unrestricted kerbside parking (refer to Figure 7). It is signposted at 60 km/h within proximity of the site. There are no formalised pedestrian footpaths.



Figure 9 Jamison Road looking east

Source: Google maps Streetview (2021)



Figure 10 Jamison Road looking west

Source: Google maps Streetview (2021)

2.4 Public transport and active transport

In reviewing the site and its accessibility to public transport opportunities, a review has been undertaken with the application of walkable distance of 400 m to 800 m to public transport and other local amenities or a 1.5 km bicycle riding distance. Details of the accessibility to public transport, walking and bicycle riding are provided in the following sections.

2.4.1 Bus services

As indicated in Figure 11, the nearest bus stops to the site are located approximately 150 m south of the site at the Penrith Panthers Leagues Club stop. An additional bus stop is located approximately 300 east of the site in Ransley Street and bus stops in the Mountain View Retreat Retirement Village are approximately 350 m north of the site. A summary of the bus service operating from these bus stops is provided in Table 3. These bus stops are considered to be within a suitable (400 m) walking distance from the site.

Table 3 Bus services

Route	Frequency	Route Description
688	Weekday: Nominally 60-minute intervals Weekend: Saturday: 60-minute intervals Sunday: 120-minute intervals	Penrith to Emu Heights (Loop Service)
689	Weekday: Nominally 60-minute intervals	Penrith to Leonay (Loop Service)

Route	Frequency	Route Description
	Weekend: Saturday: 60-minute intervals Sunday: 120-minute intervals	
690P	Weekday: Nominally 60-minute intervals Saturday: Four services, nominally 120-minute intervals Sunday: Two services	Springwood to Penrith
691	Weekday: Four services, nominally 120-minute intervals Weekend: Three services	Mount Riverview to Penrith
S13	Weekday: Four services Weekend: No service	Penrith via Mountainview Village



Figure 11 Bus stops

Source: Google maps – Modified by GHD

2.4.2 Train services

Penrith Station is located approximately 1.9 km walking distance northeast of the site. Penrith Station is serviced by the T1 North Shore, Northern and Western Line and Blue Mountains train services providing regular service to Blacktown, Parramatta and the Sydney CBD. Access to the train services is considered to be within a suitable cycle distance from the site (refer to Figure 12).

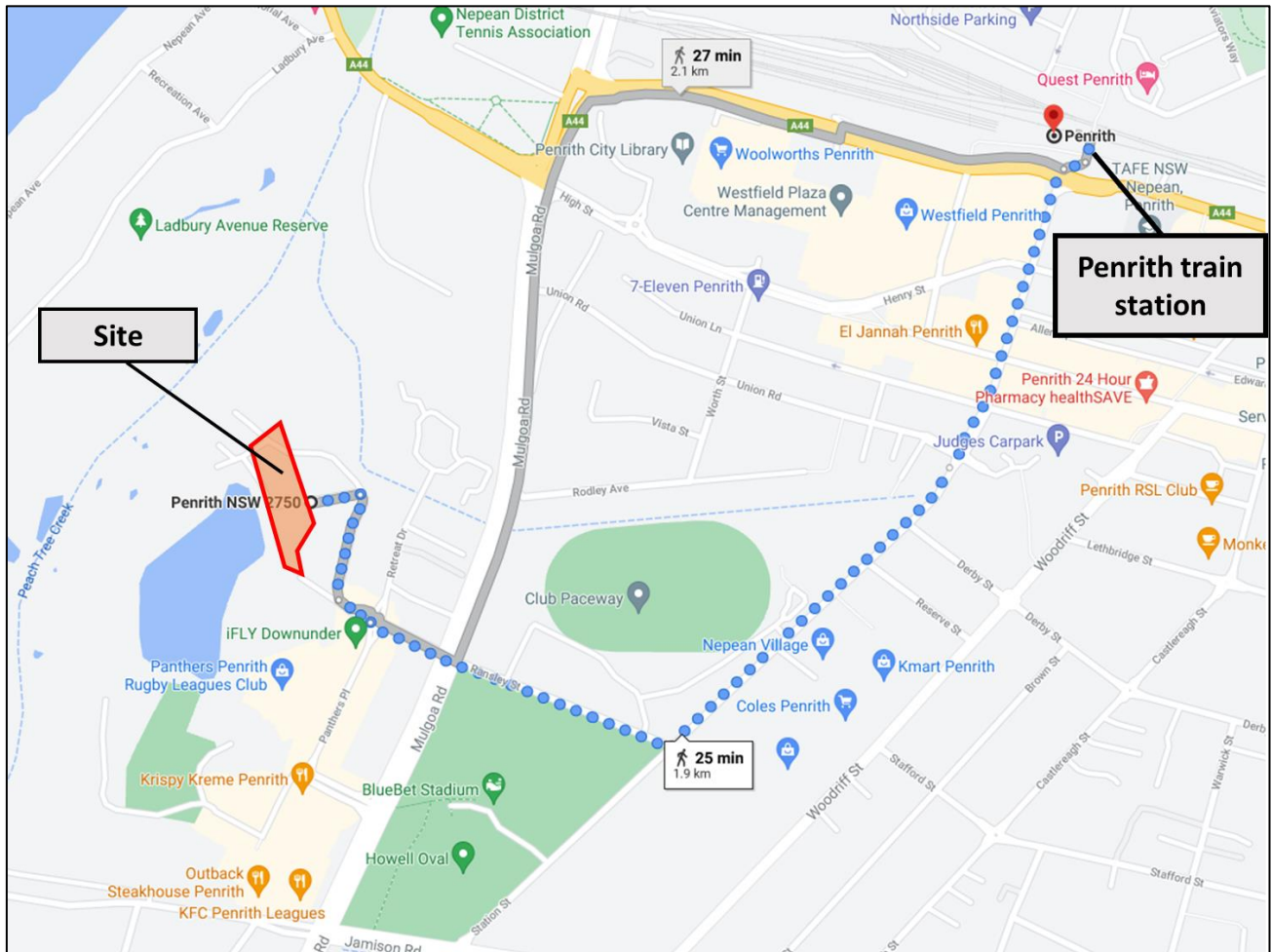


Figure 12 Location of Penrith train station

Source: Google maps – Modified by GHD

2.4.3 Bicycle access

The existing bicycle routes within the vicinity of the proposal site are shown in Figure 13 as identified from the Transport for NSW Cycleway Finder website.

As shown, there are currently off-road bicycle routes within close proximity to the site along Mulgoa Road and provide designated cycle ways to Penrith CBD and other surrounding areas.

According to the Panthers website, there is no formal bicycle parking currently provided within the site boundaries.



Figure 13 Existing bicycle network

Source: Transport for NSW Cycleway Finder – Modified by GHD

2.4.4 Walking access

The pedestrian network is reasonably well developed, with footpaths provided along all roads within the vicinity of the subject site. Signalised pedestrian crossing facilities are provided at the Mulgoa Road, Ransley Street intersection and a marked foot crossing mid-block on Ransley Street between Mulgoa Road and the Retreat Drive roundabout.

3. Assessment of traffic conditions

3.1 Traffic surveys

In order to obtain traffic data in conjunction with the overall Panthers Precinct Master Plan – Transport Strategy and VPA, Matrix Traffic and Transport Data completed traffic turning counts for the AM and PM peak periods on Wednesday 06 April 2016 at the following locations:

- Mulgoa Road / Great Western Highway / High Street
- Mulgoa Road / Ransley Street / Retreat Drive
- Retreat Drive Roundabout
- Mulgoa Road / Panther Place
- Mulgoa Road / Jamison Road
- Jamison Road / Harris Street

The surveys were undertaken at the following times to identify the AM and PM peak hours of road network activity:

- 7:00 am – 9:00 am
- 4:00 pm – 6:00 pm.

The PM peak hour surveys were undertaken to identify the change in traffic volumes/growth between 2011 and 2016 on the road network in proximity to the subject site.

3.2 Comparison of 2011, 2015 and 2016 PM peak hour traffic data

As part of the VPA traffic analysis, in order to identify the changes in traffic growth over the preceding five years (from 2011) in PM peak periods, the 2016 survey data was compared to the 2011 surveys (undertaken to support the analysis in the *Transport Strategy*).

Additionally, GHD sourced traffic survey counts collected by Transport for NSW in May 2015 on the roads in proximity to the development subject site to provide an additional point of context.

A comparison between the total traffic volumes at Mulgoa Road and Retreat Drive intersection for 2011, 2015 and 2016 in the PM peak hour is displayed in Figure 14.

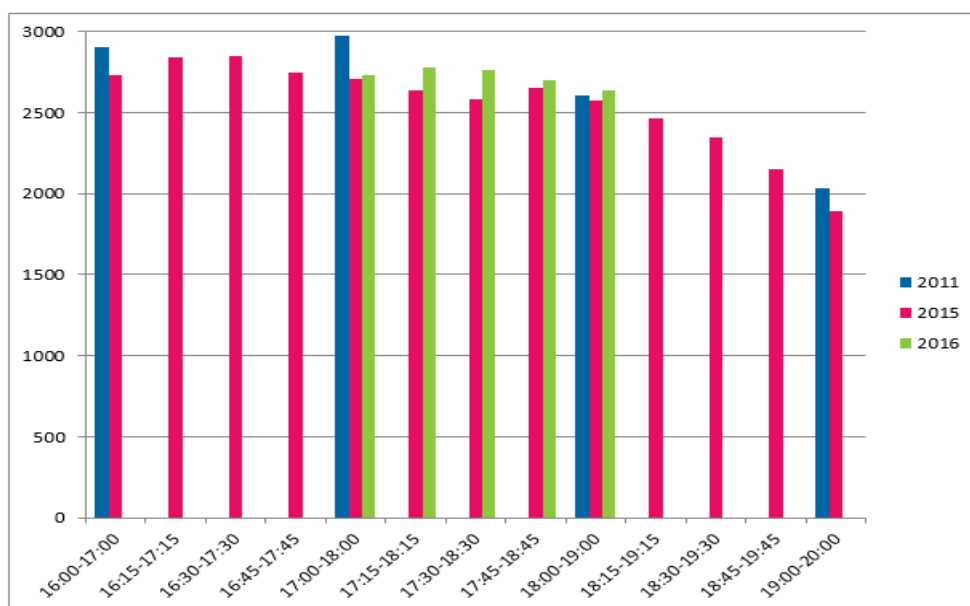


Figure 14 Total PM traffic at the Mulgoa Road and Retreat Drive intersection

Figure 14 indicates that the traffic volumes on the road network in proximity to the subject site have typically decreased between 2011 and 2015/2016.

The changes in traffic (both in terms of volume and percentage) at the intersection of Mulgoa Road, Ransley Street and Retreat Drive, as detailed in the available data sources, are displayed in Table 4.

Table 4 Changes in peak hour traffic volume (2011 – 2016)

Peak Hour		2011	2015	2016
16:00 - 17:00	Traffic Volumes	2905	2,735	-
	% Change	-	-6%	-
17:00 - 18:00	Traffic Volumes	2973	2,710	2728
	% Change	-	-10%	-9%
18:00 - 19:00	Traffic Volumes	2607	2,575	2639
	% Change	-	-1%	1%
19:00 - 20:00	Traffic Volumes	2033	1,893	-
	% Change	-	-7%	-

The data in Table 4 indicates that there has been a reduction in traffic volumes of up to 10 percent in the PM peak traffic volumes on the road network in proximity to the subject site when comparing the 2015/2016 traffic data to the 2011 traffic data.

A review of the video provided by the survey company (for the 2016 surveys) indicates that vehicles typically cleared the intersection within their allocated phase times, and there were no observed tailbacks from adjoining intersections interrupting traffic flows. Accordingly, there is no evidence to indicate that congested conditions (associated with increased traffic demand) are suppressing traffic throughput, and we are unable to identify the reasons for the reduction in traffic volumes between 2011 and 2015/2016.

However, in order to be conservative (where appropriate), the turning movements of the 2016 traffic volumes were scaled up to match the 2011 traffic volumes. This was undertaken to be conservative on the basis that the available data indicates that the 2011 volumes represent the “worst case” scenario.

The traffic analysis for the Panthers Precinct (including (ESQ1818 Stage 4 and 5), as part of the Voluntary Planning Agreement (VPA), further included a two percent per annum background traffic growth rate for the agreed future scenario/ development stage conditions (as defined in Appendix A). The background traffic, growth rate and proposed development within the Panthers Precinct determined the stages of road network improvements and associated triggers.

3.3 Intersection operational performance

The performance of a road network is largely dependent on the operating performance of key intersections, which are critical capacity control points. SIDRA intersection modelling software was used to assess the proposed peak hour operating performance of intersections of interest on the surrounding road network. The criteria for evaluating the operational performance of intersections is provided by the Roads and Maritime Services Guide to Traffic Generating Developments (2002) and reproduced in Table 5. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (i.e. Level of Service), which is applied to each band of average vehicle delay. Typically, a Level of Service (LOS) of D or better is considered acceptable.

Table 5 Level of service criteria for intersections

Level of Service	Average Delay (s)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control modes	At capacity, requires other control mode
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

As part of the VPA for the Panthers Precinct proposed developments, an intersection analysis has been undertaken on key intersections within proximity of the site, including:

- Mulgoa Road / Great Western Highway / High Street
- Mulgoa Road / Ransley Street / Retreat Drive
- Retreat Drive Roundabout
- Mulgoa Road / Panther Place
- Mulgoa Road / Jamison Road
- Jamison Road / Harris Street

The analysis for the VPA includes a comparison of the existing and future intersection operations and upgrades incorporating traffic generation for future developments within the precinct (with the inclusion of ESQ 1818 Stage 4 and 5). The VPA assumes a set of upper-limit estimated design parameters and traffic distribution as outlined in Appendix A with the objective to meet the overall network intersection operational performance of LoS D, or better, and minimise intersection vehicle queue lengths to reduce the impact on adjoining intersections.

The VPA assessment for the ESQ 1818 Stage 4 and 5 was based on an assumed upper-limit residential apartment provision, retail Gross Floor Area (GFA) and the Council agreed traffic generation rates. Penrith City Council is familiar with the VPA assessment, which should be read in conjunction with this report.

Table 6 Stage 4 and 5 trip generation composition with VPA

Stage	Land Use	Trip Generation rate	VPA Assessment Provision	VPA Trip Generation	Proposed provision (Turners Studio Architects)	Proposed Trip Generation
4/5	Residential	0.5 trips / dwelling	368 dwellings	184	349 dwellings	174
	Retail	2 trips / 100 m ² GLFA (GLFA=0.75 x GFA)	2,208 m ² GFA	33	2,185 m ² GFA	33
Total Trip (peak)				217		207

Based upon the comparison trip generation outlined in Table 6, it can be seen that the trip generation for the proposed Stage 4 and 5 developments by Turners Studio Architects is less than the VPA assessment. Therefore, the VPA assessment aligns with future intersection operations and required roadworks outlined within the VPA assessment report.

Reference is to be made to the VPA assessment report for any required road upgrades to support additional traffic generation resulting from the ESQ 1818 Stage 4 and 5 and surrounding future development proposals within the Panthers Precinct and background traffic growth.

4. Parking provision

4.1 Car parking provision

Since the development of the Transport Strategy, Council has produced a revised Development Control Plan and associated parking rates. This traffic and parking impact assessment reviews the parking component of the ESQ 1818 Stage 4 and 5 at Panthers development based on the Penrith City Council Development Control Plan 2014 (DCP) Part C10 Transport, Access and Parking. The DCP outlines the following minimum residential parking requirements:

- One and two bedroom units: one space per unit
- Three or more bedroom units: two spaces per unit
- Visitor parking: one space per five units

The DCP outlines the following minimum parking rate for retail developments:

- Restaurants – one space per 6 m² of seating area
- Retail – one space per 30 m² GFA

Table 7 provides a comparison of the minimum DCP parking requirements and the proposed parking provisions. It is noted that it is intended to provide all the retail parking in the Stage 4 car park level to facilitate ease of access to public retail parking, minimising the need for retail parking to utilise the cul-de-sac road network located north of the development and to maximise the opportunity to separate the residential parking from retail parking where possible.

Table 7 ESQ 1818 Stage 4 and 5 development parking

Stage	Land Use	Use Type	Number	DCP(2014) Rate	Minimum Parking Provision	Proposed Parking Provision
4	Residential	1-bed units	51 units	1 space per unit	51	51
		2-bed units	68 units	1 space per unit	68	68
		3-bed units	36 units	2 spaces per unit	72	72
		4-bed units	16 units	2 spaces per unit	32	32
					223	223 (incl. 19 accessible)
		Visitors	171 units	1 space per 5 units	35	35 (incl. 2 accessible and 2 EV)
		Car wash	171 units	1 space per 50 units	4	4
				<i>Subtotal - residential</i>	<u>262</u>	<u>262</u> (incl. 21 accessible)
	Retail (Stage 4/5 combined)	Retail	2,059 m ²	1 space per 30 m ²	69	69
		Restaurant	126 m ²	1 space per 6 m ²	21	21
				<i>Subtotal - residential</i>	90	90 (incl. 4 accessible)
Subtotal					352	352
5	Residential	1-bed units	59 units	1 space per unit	59	
		2-bed units	82 units	1 space per unit	82	

Stage	Land Use	Use Type	Number	DCP(2014) Rate	Minimum Parking Provision	Proposed Parking Provision
		3-bed units	37 units	2 spaces per unit	74	
				<i>subtotal</i>	215	215 (incl. 18 accessible)
		Visitors	178 units	1 space per 5 units	36	36 (incl. 2 accessible and 2 EV)
		Car wash	178 units	1 space per 50 units	4	4
				<u>Subtotal – residential</u>	<u>255</u>	<u>255</u>
	Retail	Retail	(Refer to Stage 4)			N/A – located in Stage 4
Subtotal					255	255
Total					607	607

A summary of the parking spaces proposed for Stage 4 and Stage 5 is presented in Table 8.

Table 8 *Parking summary*

Type	Stage 4 – ground (retail)	Stage 4 – basement (residential)	Stage 5 (residential)	Total
Standard spaces	81	192	196	469
Small spaces	5	12	1	18
Accessible spaces	4	19	18	41
Standard visitor		31	32	63
Accessible visitors		2	2	4
EV spaces		2	2	4
Car wash		4	4	8
Total	90	292	255	607

The proposal includes a total of 607 residential spaces to meet the relevant statutory minimum parking requirement of the residential and residential visitor components combined, including

- 487 standard spaces
- 71(residential) visitor parking bays
- 45 accessible parking space

Additionally, within the precinct, kerbside on-street parking has been provided, which could be utilised by visitors in the area in conjunction with the retail component.

In addition to the vehicle parking, the following bicycle parking and motorbike parking is proposed as detailed in Section 4.4.1 and 4.4.2 respectively:

- Stage 4:
 - Resident bicycle parking – 44 spaces
 - Visitor bicycle parking – 16 spaces
 - Motorbike parking – 4 spaces
- Stage 5:
 - Resident bicycle parking – 48 spaces

- Visitor bicycle parking – 10 spaces
- Motorbike parking – 4 spaces.

To support the utilisation of sustainable modes of travel by residents and visitors, it is further recommended that a Transport Access Guide (TAG) be established, which summarises alternate transport options to access the development, outlining where and how these services can be accessed, and the frequency of the services. This could include, but not limited to:

- Public transport locations (bus /train).
- Active transport (cycle/walking) opportunities.
- Bicycle infrastructure facilities.

Staff, residents and visitors should be encouraged to utilise such facilities, with the TAG advised as part of staff inductions for new employees and raised at regular team meetings for the retail component by placing the TAG in prominent locations (i.e., as notice boards) within the buildings. The TAG should also incorporate the monitoring of the bicycle parking demand, with additional bicycle parking provided, if required.

4.2 Accessible parking

The Penrith City Council DCP specifies that accessible car spaces should be provided in accordance with Premises Standards, Building Code of Australia and AS2890.

With reference to the above, the proposed development should provide:

- One space per each adaptable dwelling;
- Visitor parking: two percent of the total spaces.

A summary of the minimum and proposed accessible parking provision is outlined in Table 9.

Table 9 Accessible parking provision

Land Use	No dwelling	Total parking provided	Required Accessible Spaces	Accessible Spaces Provided
Residential	349	-	37 (approx. 10%)	37
Residential Visitor *	-	71	2 (2% of spaces)	4
Retail	-	90	2 (2% of spaces)	4
Total		601	41	45

(*) A minimum of 1 accessible space has been provided in each Stage of the ESQ 1818 development

The proposed development is required to provide a total minimum of 41 accessible car spaces to meet the DCP requirement. The proposal includes a total of 45 accessible car spaces within Stage 4 and 5 to exceed the DCP requirement.

4.3 Car wash bay

The Penrith City Council DCP has the following requirement for a car wash bay:

- For residential flat buildings one space for car washing for every 50 units, up to a maximum of four spaces per building.

A summary of the car wash bay requirements and provision is outlined in Table 10.

Table 10 Car wash bay provision

Stage	Number of units	Required Car Wash Spaces	Car Wash Provided
4	171	4	4
5	178	4	4

Stage	Number of units	Required Car Wash Spaces	Car Wash Provided
Total	349	8	8

The proposal includes a provision of 8 car wash bays located within the basement level car park areas to meet the DCP requirement.

4.4 Other parking facilities

4.4.1 Bicycle parking

Penrith City Council DCP provides the bicycle parking suggested rates be in accordance with “Planning Guidelines for Walking and Cycling” (NSW 2004). This document outlines the suggested provision of:

- Residential:
 - Resident bicycle parking: 20-30 percent of the proposed number of units
 - Visitor Parking: 5-10 percent of the proposed number of units.
- Retail:
 - Staff Parking: 3-5 percent of the proposed number of staff; and
 - Visitor Parking: 5-10 percent of the proposed number of staff.

Based on the above guidelines, the following rates have been adopted for the provision of residential bike parking:

- Resident bicycle parking – 25 percent of residential units (one in four)
- Visitor bicycle parking – five percent of residential units (one in 20)

These rates are consistent with previous analysis completed by GHD for ESQ1818 development within the Panthers Precinct. Further, residents will have the opportunity to park bikes in their storage cage, one of which will be provided to each apartment.

For the proposed development of 349 units based on the above rates, the suggested minimum total bicycle parking provision is outlined in Table 11.

Table 11 Bicycle parking provision

Stage	Land Use	Number of units / GFA	Minimum Recommended Bicycle Parking *		Bicycle Parking Provided	
			Residential	Visitor	Residential	Visitor
4	Residential	171 units	43	9	44	16
5	Residential	178 units	45	9	48	10
Total		349	88	18	92	26

(*) Based on the minimum rates outlined in Planning Guidelines for Walking and Cycling” (NSW 2004)

The proposed development is required to provide a total minimum of 106 bicycle spaces to meet the DCP requirement. The proposal includes a total of 118 bicycle parking spaces within Stage 4 and 5 to exceed the DCP requirement.

All the bicycle parking will be provided on the ground floor parking levels.

It is recommended that in conjunction with the Transport Access Guide to be developed, the bicycle parking demand be monitored, with additional bicycle parking provided, if required.

4.4.2 Motorbike parking

The Penrith City Council DCP does not outline parking requirement for motorbikes. However, to encourage alternative transport options, the development also includes two motorbikes in each of the Sage 4 and Stage 5 car parks.

4.5 Service vehicle parking (including Loading Docks)

The Panthers Master Plan focuses on a pedestrian oriented, quality-landscaped and urban public domain that will provide for equitable access for all modes of travel throughout the study area. In designing the internal road network for the proposed development, the specific needs of service vehicles and emergency vehicles has been provided.

Service vehicles will park in a loading bay located as close as possible to their destination point within the development.

A loading dock located on the ground floor within Stage 4 has been provisioned to minimise the need for heavy vehicles associated with deliveries and waste collection to utilise the cul-de-sac road network north of the development (refer to the separate waste management plan for detail of waste transfer between Stage 4 and 5).

This loading dock has been designed to accommodate a single 10.5 m long heavy vehicle (equivalent to the Council waste collection vehicle). A swept path analysis displaying a 10.5 m heavy vehicle accessing the Stage 4 development, manoeuvring internally and exiting in a forward direction is displayed in Figure 15.

In addition to the designated loading dock in Stage 4, a loading area on the ground floor of Stage 5 has been provisioned to accommodate a vehicle up to the size of a single 6.4 m SRV. This loading dock will assist in supporting short term deliveries, maintenance vehicles to the development and assisting in parking for residents moving in and out of the development. A swept path analysis displaying a 6.4 m SRV accessing the Stage 5 development, manoeuvring internally and exiting in a forward direction is displayed in Figure 16.

Each loading dock layout has been developed to allow for the design vehicle to enter and exit the development in a forward direction, providing improved safety associated with improved visibility when travelling in a forward direction.

It is recommended that a loading dock management plan is prepared to manage the use and operations of the loading docks. The management plan will outline the operation of the loading dock (in Stage 4) and provide an opportunity to pre-arrange vehicular access to the loading dock and supporting parking area in Stage 5, such as deliveries or waste collection vehicles. This plan will assist in managing the arrival and departures of the vehicles, thereby minimising the potential risk of vehicles exceeding the on-site parking provision. The plan should also include activated signage at ground level prior to access, to advise drivers when the loading dock is occupied and not to enter the facility.

Additionally, convex mirrors should be installed in areas where sightlines maybe somewhat restricted, notably on ramp access areas and egress points from the loading dock.

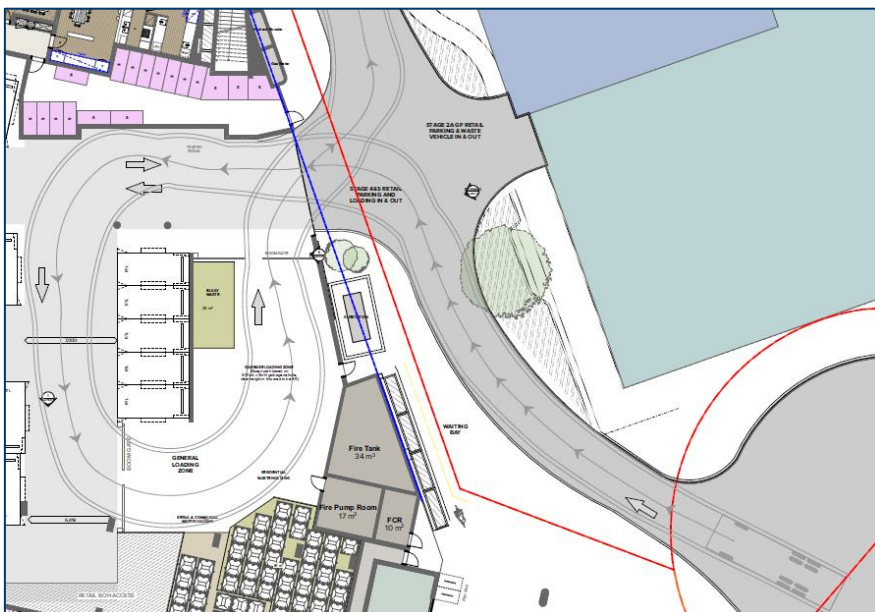


Figure 15 ESQ 1818 Stage 4 loading manoeuvre (10.5 m heavy vehicle)

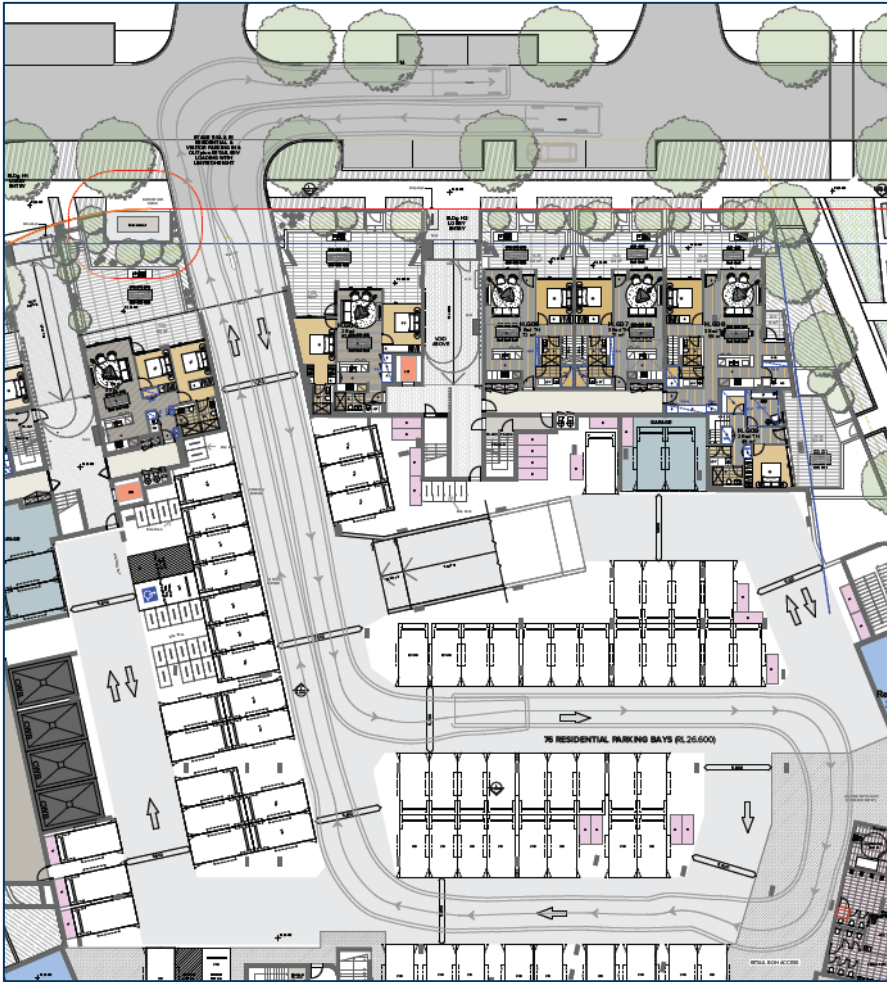


Figure 16 ESQ 1818 Stage 5 loading manoeuvre (6.4 m SRV)

Within Stages 4 and 5, there are eight car wash bays, as outlined in Section 4.3, which can facilitate small service vehicles such as utes and vans for supplementary general maintenance vehicles for the development.

Appendix B provides the turning path plans for 6.4 m SRV, 8.8 m MRV and 10.5 m service vehicle to access the proposed service vehicle loading docks, which shows the manoeuvrability within the site to allow the design vehicle to enter and exit the site in a forward direction. Additionally, the turning path plans show the turn paths for a B99/B85 vehicle (light vehicles) as key areas, such as circulation ramps within the development.

5. Parking layout and access review

5.1 General layout

An assessment of the car parking has been undertaken using *AS2890.1 – Off Street Car Parking* in accordance with the designated car park classifications as follows

- Class 1A facility (residential parking):
 - Spaces: 2.4 m x 5.4 m; and
 - Aisle Width: 5.8 m
- Class 2 facility (visitor parking):
 - Spaces: 2.5m x 5.4 m; and
 - Aisle Width: 5.8 m
- Class 3 facility (retail parking):
 - Spaces: 2.6 m x 5.4 m; and
 - Aisle Width: 5.8 m.

A review of the parking layout has been completed within the proposed development. The parking consists of:

- Residential parking spaces with minimum dimensions of 2.4 m x 5.4 m (typically 2.5 m wide) and aisle widths of a minimum 5.8 m.
- Visitor parking bays of 2.5 m x 5.4 and aisle widths of a minimum 5.8 m.
- Retail parking space dimensions with dimensions of 2.6 m x 5.4 m and aisle widths of a minimum 5.8 m.

The proposed parking spaces and aisle dimensions provided align with AS2890.1 user classes.

Appendix B provides turning path plans for a B85/B99 design vehicles at ramp locations to advise on the desirable turn path requirements.

The layout of the ground floor parking area is displayed in Figure 17 , and the basement parking level is displayed in Figure 18.

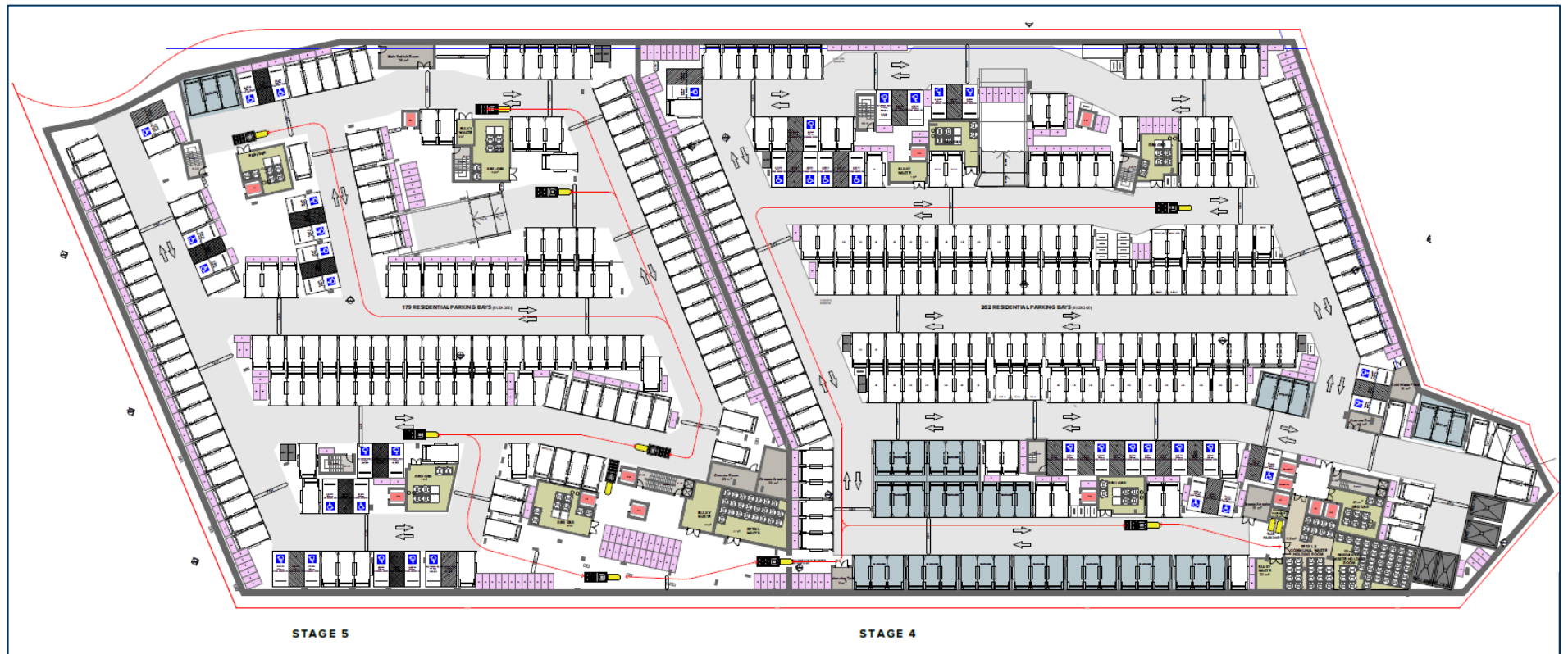


Figure 18 Basement parking level

5.2 Car park circulation

5.2.1 Stage 4 residential component

With respect to the Stage 4 residential parking:

- The residential parking for Stage 4 is located on the basement level.
- Access/egress to and from the residential parking will be provided on the northern road network (refer to Figure 19).
- Circulation is available throughout the basement to allow vehicles to exit and enter the basement in a forward direction.
- All the circulation aisles will be bi-directional.

5.2.2 Stage 5 residential component

With respect to the Stage 5 residential parking:

- The residential parking for Stage 5 is located on the ground floor and basement parking levels.
- Access/egress to and from the residential parking will be provided on the northern road network (refer to Figure 19).
- Circulation is available throughout the basement to allow vehicles to exit and enter the basement in a forward direction. All the circulation aisles will be bi-directional.
- All Stage 5 visitor parking will be provided on the ground floor level.
- An internal ramp will provide connectivity between the ground floor and basement parking levels.
- On the ground floor one way circulation will be provided through the parking area (as agreed with Penrith City Council). All the circulation aisles on the basement level will be bi-directional.

For both the Stage 4 and Stage 5 residential car parks:

- It is recommended that parking identification measures are provided within the visitor parking area and linked in real-time to a sign at the entry to the car park to advise motorists prior to entering the car park whether visitor parking is available.
- It is also recommended that clear signage be provided on the location of the visitor parking area / spaces and identify the area where residential parking is only provided past a specific point.
- Furthermore, it is recommended that convex mirrors are provided in areas where sight visibility may be somewhat restricted between the conflicting movements to aid in circulation. Key locations include at ramp / aisle interfaces and parking aisles where acute angles are proposed.

5.2.3 Stage 4 and 5 retail component

With respect to the proposed retail car parking:

- All retail parking will be provided on the Stage 4 ground floor level as this will minimise the need of traffic associated with retail demand travelling in the cul-de-sac road network north of the development.
- Access/egress to and from the retail parking (including heavy vehicles associated with deliveries and waste collection) will be provided on the eastern road network (refer to Figure 19).
- The eastern road network will be one way northbound and the access/egress will be left in/left out only.
- One-way circulation will be provided on the retail parking area, as agreed with Penrith City Council.

Consideration should be given to parking identification measures to be provided within the retail parking area and be linked in real-time to a sign at the entry to the car park to advise motorists prior to entering the car park whether retail parking is available.

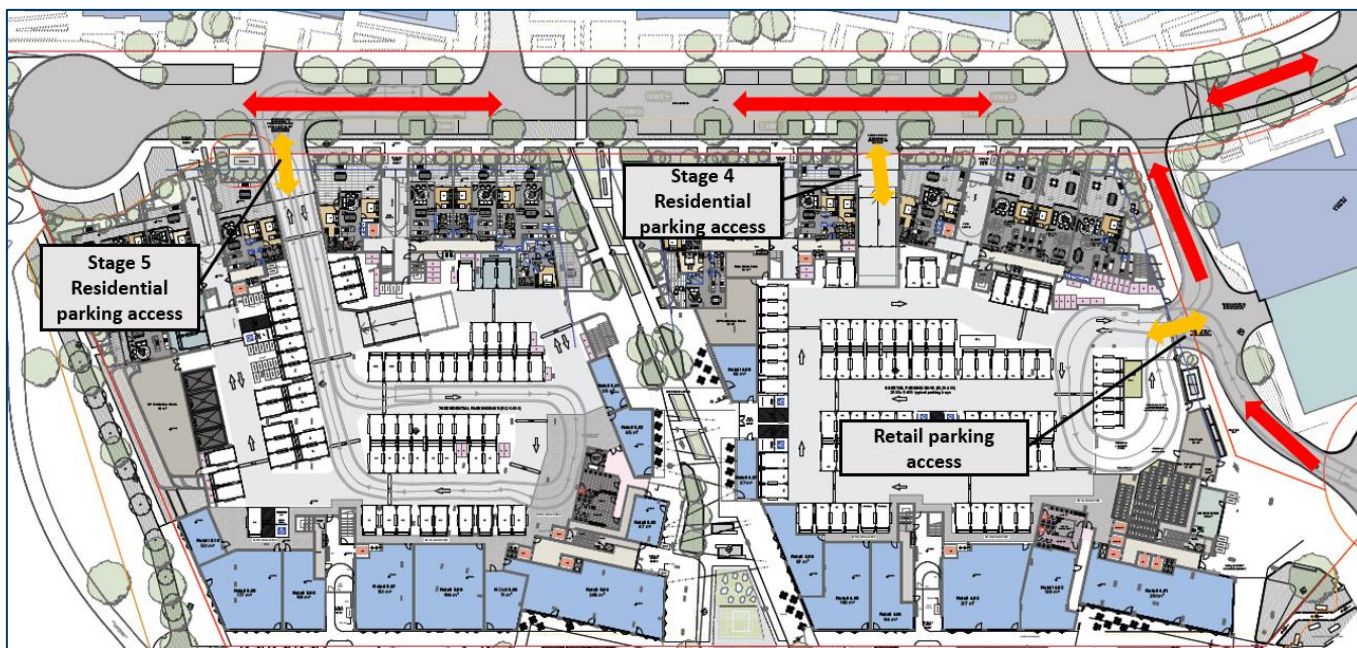


Figure 19 ESQ 1818 external road network and parking access

5.3 Site access review

The sight distance requirements are described in Section 3.2 of AS2890.1 and are prescribed on the basis of the signposted speed limit or 85th percentile vehicle speeds along the frontage road.

Egress from the development site is via the proposed new access road, which is anticipated to have a speed limit of up to 40 km/h. The ESQ 1818 precinct is in a low-speed environment with on-street parking, narrow road environment and traffic control measures to assist in maintaining traffic speeds. AS2890.1 sight distance requirements are provided for speeds from 40 km/h. The sight distance at 40 km/h requires a desirable visibility distance of 55 m and a minimum distance of 35 m. The proposed driveway access to each development is located on a straight section of the road alignment with no anticipated permanent obstructions to affect the visibility from the driver when exiting the site.

5.4 Pedestrian network

Designated formed footpaths are proposed along the internal road network to generally align with the DCP 2014 E13 Part B Panthers Precinct. Key connective paths are provided to attraction nodes, such as the lake foreshore and promenade between Stage 4 and 5.

Pedestrian crossing facilities should be provided to link key areas to the development (refer Figure 20) to promote safe active transport access to/from and within the site. Pedestrian crossings should incorporate raised “wombat” crossings and be designed in line with relevant guidelines and standards. The raised crossing aid in the mobility of pedestrians as well as slowing vehicles on approach and through the facility.

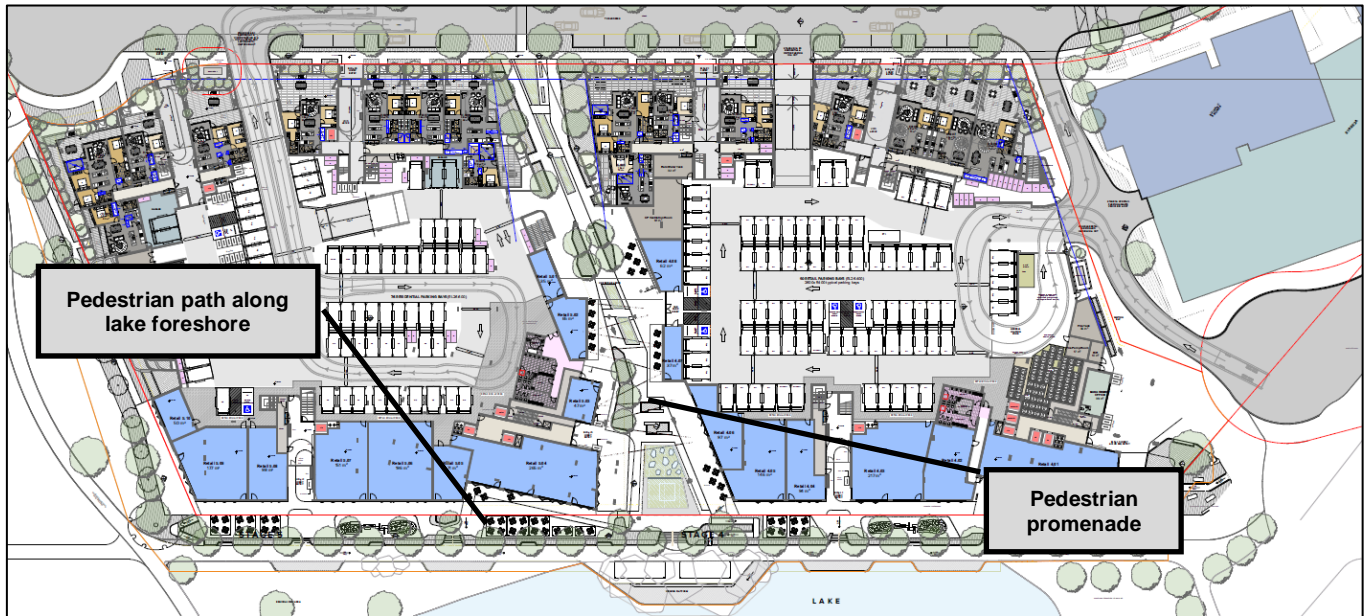


Figure 20 ESQ 1818 pedestrian network

6. Summary and conclusion

6.1 Proposed works

This traffic and parking impact assessment statement outlines the traffic, transport, parking and access impacts as a result of the proposed residential development for ESQ 1818 Stage 4 and 5 Lot 2 within the Penrith Panthers Precinct, which comprises of:

- Residential apartments: 349 units
- Retail space: 2,185 m² GFA
- Car parking spaces:
 - Residential: 438 spaces (including 37 accessible spaces)
 - Visitor: 71 spaces (including 4 accessible spaces)
 - Retail: 90 spaces (including 4 accessible spaces)
- Bicycle parking:
 - Stage 4 – 44 residential spaces and 16 visitor spaces
 - Stage 5 - 48 residential spaces and 10 visitor spaces
- Motorbike parking: 4 spaces
- Car wash facilities: 8 car wash bays
- EV: 4 spaces.

Service vehicle parking:

- A combined loading dock located on the ground floor within Stage 4 to accommodate a vehicle up to the size of a 10.5 m truck (equivalent to the Council waste collection vehicle).
- An additional parking area in ground floor of Stage 5 has been provisioned to accommodate a vehicle up to the size of a 6.4 m SRV to assist in supporting short term deliveries, maintenance vehicles to the development and assisting in parking for residents moving in and out of the development.
- Additionally, there are eight car wash bays within the basement that can supplement maintenance vehicles such as utes/vans if required.

6.2 Traffic impact

The broad conclusions of the traffic impact assessment are as follows:

- The traffic generation of the proposed development based on the agreed trip generation rates is 207 trips, which is compatible with the 217 trips assessed as part of the VPA analysis. Therefore, the intersection operation and required roadworks are to align with the VPA requirements.
- Reference is to be made to the VPA report for any required road upgrades to support additional traffic generation resulting from the Stage 4 and 5 development, surrounding future development proposals within the Panthers Precinct and background traffic growth.

6.3 Parking provision and layout

The broad conclusions of the parking assessment are as follows:

- An assessment of the statutory parking requirement against the Penrith City Council DCP indicates that the proposed development meets the minimum requirements for the residential, residential visitor and retail components.
- Accessible parking is provided in line with the Penrith City Council DCP minimum requirements.
- The layout of the basement car park is generally in accordance with AS2890.1, AS2890.2, and AS2890.6.

- A vehicle tuning path review has been undertaken at site access and within the parking module an indicate vehicles are able to enter and exit the site in a forward direction. Future design stages should ensure adequate vehicle turn path are provided at site access and ramps/parking aisle interfaces.

6.4 Mitigation measures

It is recommended that the following key mitigation measures be implemented for the development:

- A loading dock management plan to manage the arrival and departures of service vehicles to the site reducing the potential of multiple service vehicle arrivals, with activated advance warning signage prior to entry to the development to advise drivers that the loading docks are occupied and not to enter the facility and convex mirrors to improve visibility.
- Convex mirrors should be provided in areas where sight visibility may be somewhat restricted between the conflicting movements to aid in circulation.
- A Transport Access Guide (TAG) to identify alternate travel options for residents, visitors and staff to encourage sustainable transport and reducing parking demand. The TAG should incorporate monitoring of the bicycle parking demand, with additional bicycle parking provided, if required.
- Real-time parking identification (and directional signage) measures for the retail and residential visitor components be implemented to advise motorists prior to entering the car park whether parking is available within ground floor and basement areas.

6.5 Conclusion

Based on the assumptions and investigations undertaken by GHD and the conclusions drawn above, it is considered that the proposed Stage 4 and 5 development satisfies the planning requirements on traffic engineering grounds with regards to Penrith City Council DCP requirements the forecast traffic generation associated with the proposed development aligns with the VPA analysis.

Appendix A

Panthers Precinct VPA Parameters

Panthers Precinct Modelling Parameters

Table 1 - Summary of Scenarios for traffic modelling

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Rev 9

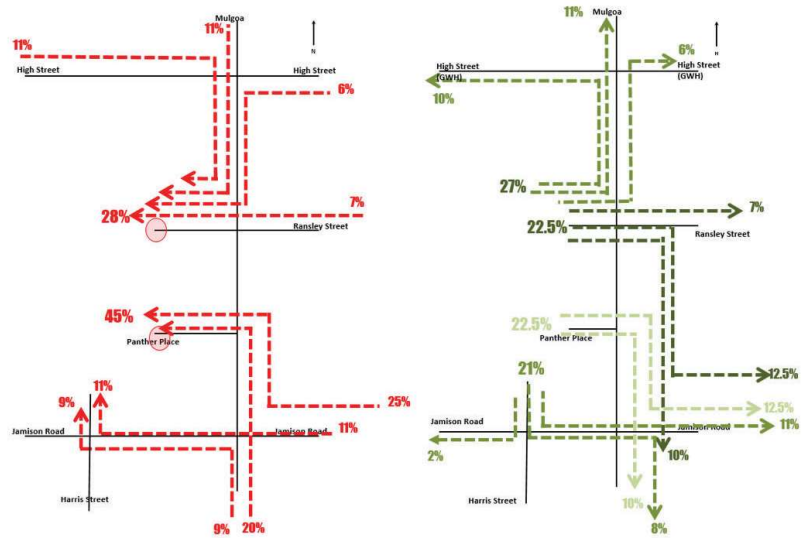
Scenario	Year of modelling	Lot	Development Stage/ Land Use	Number (units/dwelling)	Number GFA (m ²)	Trip Generation Rate
Existing	2016 base model	1A	Existing Club Expansions	N/A	N/A	N/A – Included in existing Base Traffic model ^
		1B	Existing Chifley Hotel	N/A	N/A	N/A – Included in existing Base Traffic model ^
		1E	Ifly	N/A	N/A	N/A – Included in existing Base Traffic model ^
		Lot 8	NRL Academy	N/A	N/A	N/A – Included in existing Base Traffic model ^
1	2019	Lot 6	Seniors Living	151 dwellings	25,488 m ²	0.4 trips / dwelling
2	2020	Lot 3A + 3B	ESQ Stage 1 – Residential	152 dwellings	12,975 m ²	0.5 trips / dwelling
		Lot 2	ESQ Stage 2A/2B – Residential	186 dwellings	16,070 m ²	0.5 trips / dwelling
			ESQ Stage 2A/2B – Retail	N/A	1,225 m ²	2 trips/100 m ² GLFA (GLFA = 0.75 x GFA)
3 (Stage 1)	2021	Lot 4	<i>Western Sydney Conference and Community Centre</i>			
			• Conference Centre	1000 seats	3,034 m ²	0.32 trips per seat *
			• Community Centre	N/A	1,244 m ²	AM Peak: 2.81 trips /100 m2 GFA * PM Peak: 2.5 trips /100 m2 GFA *
			• Panther Retail	N/A	141 m ²	2 trips/100 m ² GLFA (GLFA = 0.75 x GFA) *
			• Hotel	190 rooms	9,500 m ²	0.5 trips / room *
			• Serviced Apartments	137 rooms	11,100 m ²	0.5 trips / room *
3 (Stage 2)	2021	Lot 4	<i>Western Sydney Conference and Community Centre</i>			
			• Hotel	190 rooms	12,079 m ²	0.5 trips / room *
3 (Stage 3)	2021	Lot 4	<i>Western Sydney Conference and Community Centre</i>			
			• Serviced Apartments	145 rooms	9,980 m ²	0.5 trips / room *
			• Panther Retail	N/A	1,170 m ²	2 trips/100 m ² GLFA (GLFA = 0.75 x GFA) *
4	2022	Lot 2	ESQ Stage 3 – Residential	144 dwellings	12,135 m ²	0.5 trips / dwelling
5	2024	Lot 2	ESQ Stage 4/5 – Residential	368 dwellings	34,000 m ²	0.5 trips / dwelling
			ESQ Stage 4/5 – Retail	N/A	2,208 m ²	2 trips/100 m ² GLFA (GLFA = 0.75 x GFA)
		Lot 1C	Entertainment Leisure Centre	N/A	2,600 m ²	0.6 trips/100 m ² GFA
			Retail	N/A	1,200 m ²	2 trips/100 m ² GLFA (GLFA = 0.75 x GFA)
			Residential	48 dwellings	4,100 m ²	0.5 trips / dwelling
		Lot 1A	Existing Club – Future Expansion	N/A	5,000 m ²	1 trip/100 m ² GFA
6	2025	Lot 9	<i>Commercial Office and indoor recreation</i>			
			• Commercial office	N/A	7,500 m ²	AM Peak: 1.6 trips /100 m2 GFA # PM Peak: 1.2 trips /100 m2 GFA
			• Indoor Recreation	N/A	7,500 m ²	0.5 trips/100 m ² GFA
		Lot 7	Car Park	N/A		N/A: Parking area only – No additional traffic flow has been assumed.
7	2026	Lot 1D	• Serviced Apartments	84 dwellings	6,495 m ²	0.5 trips / room
			• Retail	N/A	900 m ²	2 trips/100 m ² GLFA (GLFA = 0.75 x GFA)
			• Car Park	N/A	N/A	N/A – traffic generation associated with land use
8	2031	Lot 5	Residential	300 dwellings	25,500 m ²	0.5 trips / dwelling

Notes:

- (*) Lot 4 rates for Western Sydney Community and Conference Centre (based on ITE and first principles) and rates for Hotel/Service apartment/retail components Panthers Prescient Masterplan. Approved by Council email from Joel Carson dated 15/1/2018.
- (**) RMS TDT 2013/04a: Guide to Traffic Generation Developments – Updated traffic surveys
- (^) The masterplan traffic generation not applicable as these developments were completed prior to the base model of 2016. As agreed at Council meeting with Joel Carson and Walter Sinnadurai (29/1/2018)
- Trip generation rates as per Table 1 above is agreed by Council via email from Joel Carson dated 29/1/2018
- Lot 10 (planned zone substation) is no longer proceeding

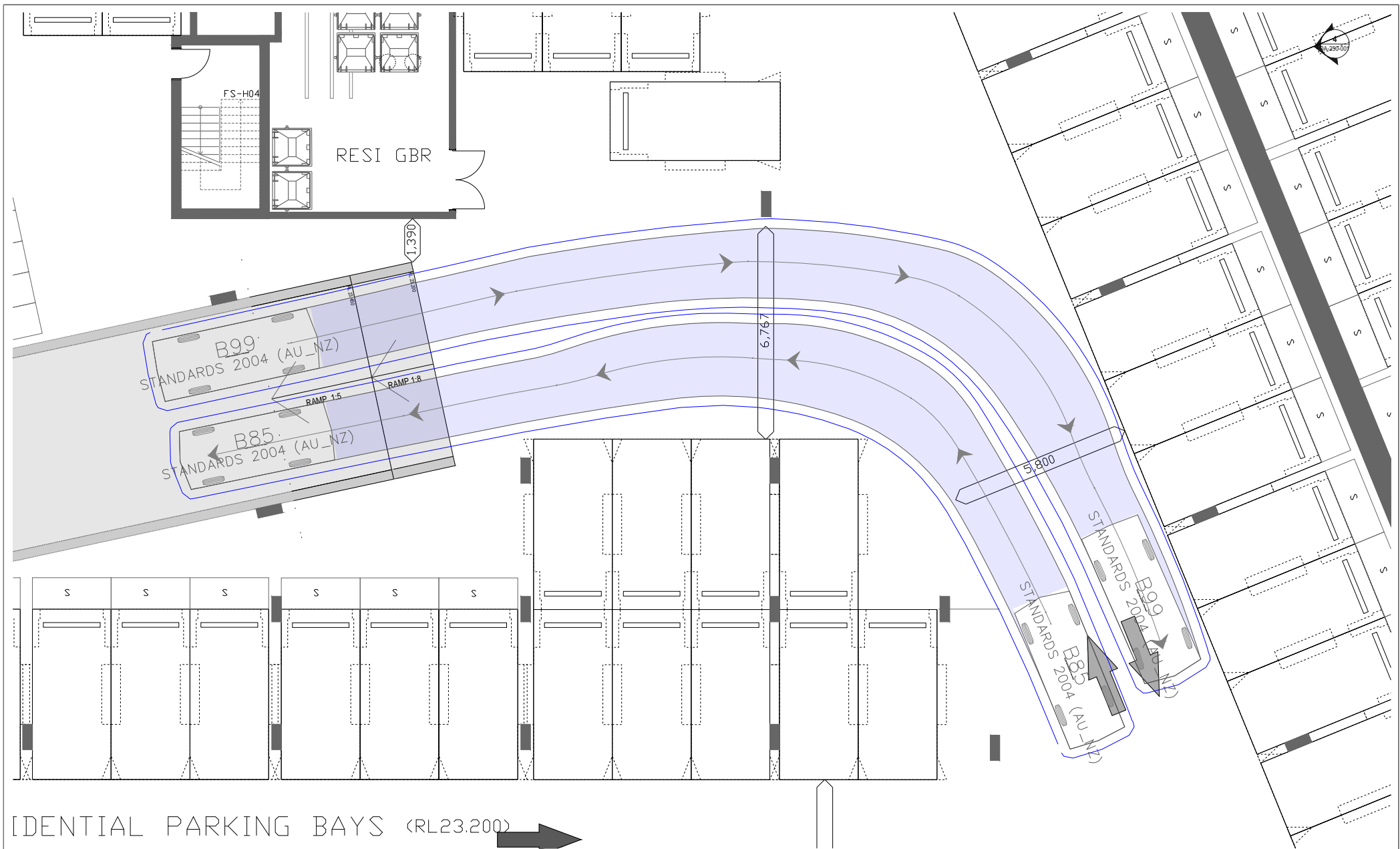


Lot location map – Penrith Panthers site

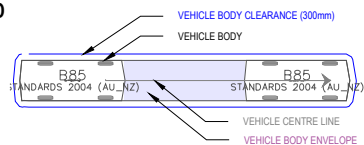


Appendix B

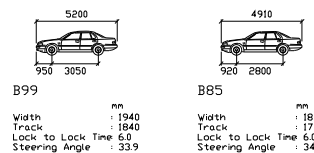
Turning Path Plans



LEGEND



VEHICLE PROFILES (NOT TO SCALE)



ESQ 1818 STAGE 4 AND 5

SWEPT PATH
Basement 01 - Ramp Access

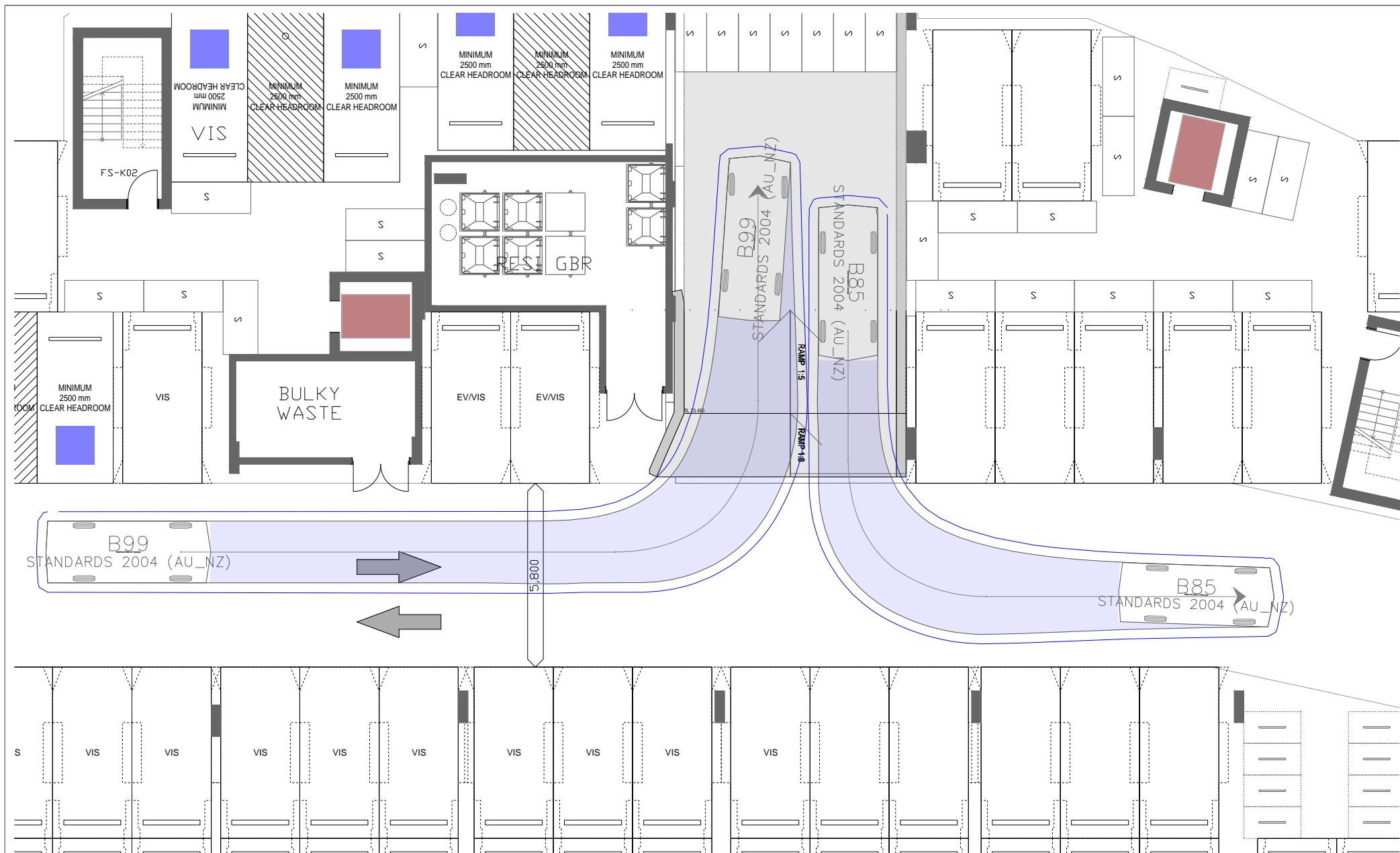
Job Number 1255449

Revision A

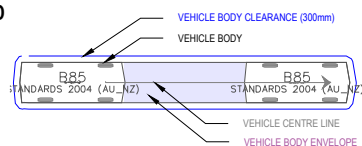
Date Sep 2023

Figure 01

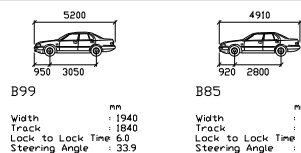
Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com



LEGEND



VEHICLE PROFILES (NOT TO SCALE)



ESQ 1818 STAGE 4 AND 5

Job Number 1255449

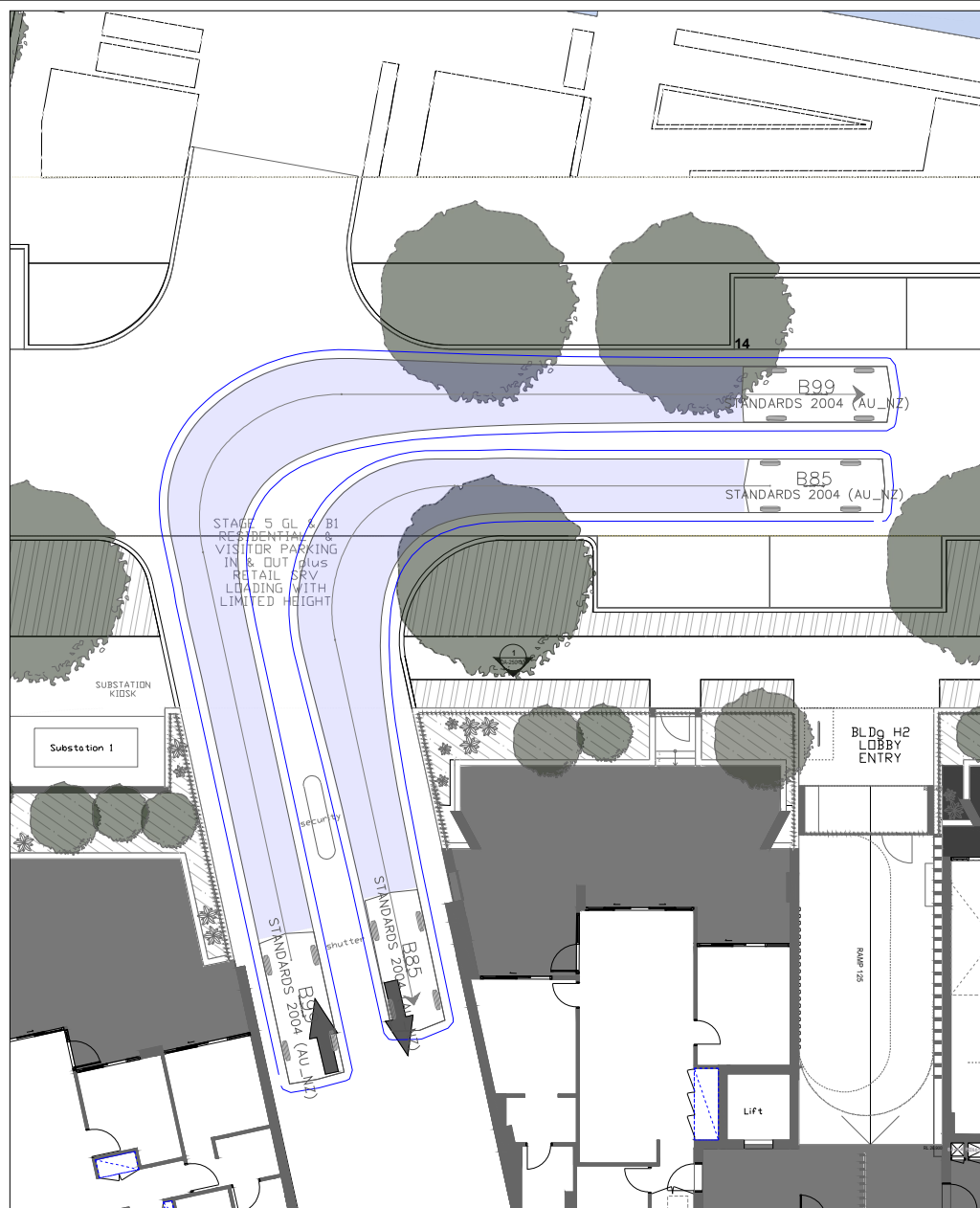
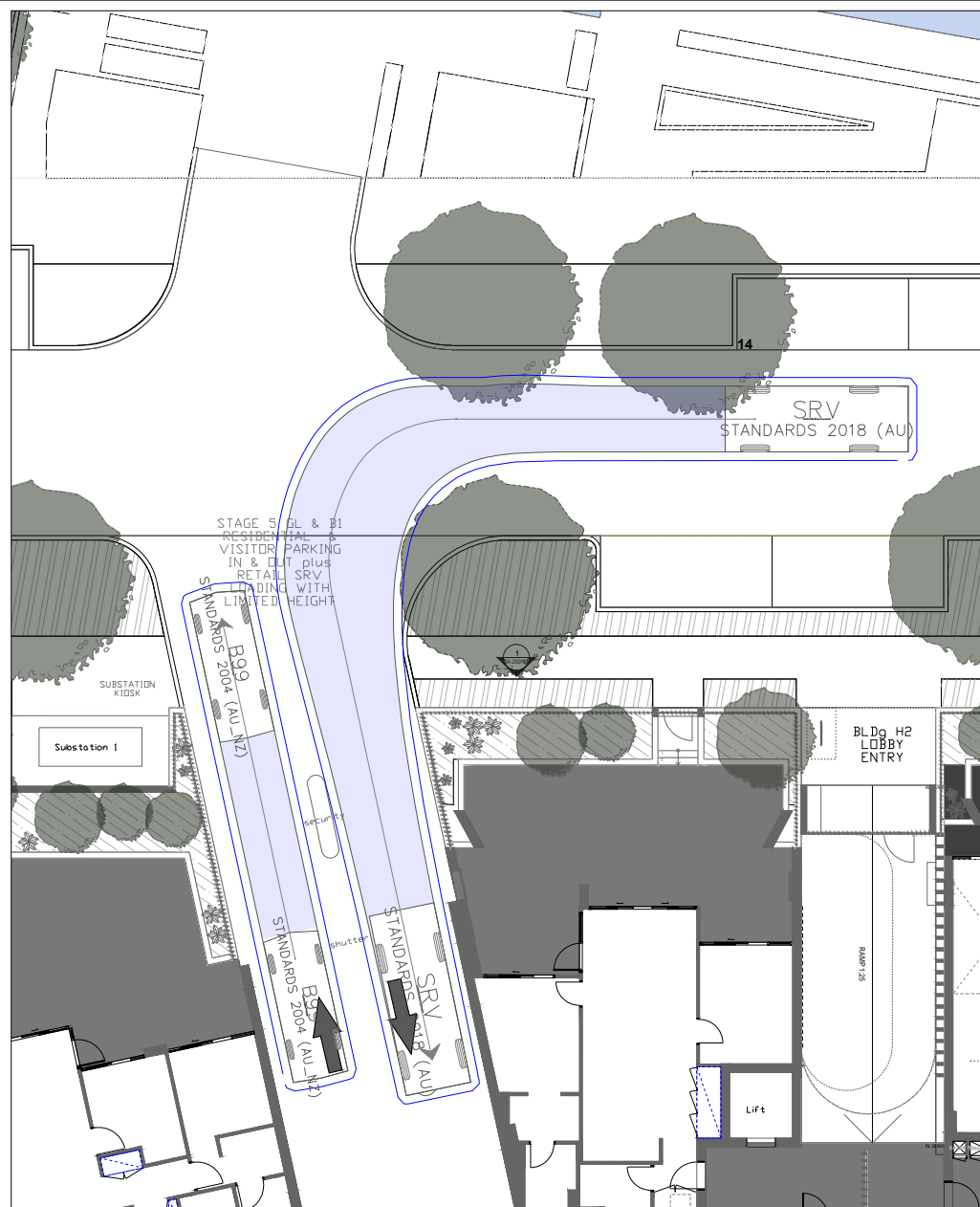
Revision A

Date Sep 2023

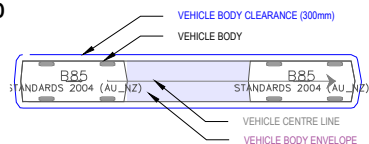
SWEPT PATH
Basement 01 - Ramp Access

Figure 02

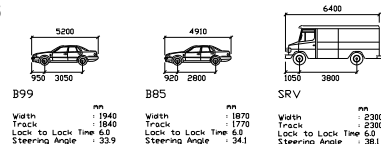
Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com



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VEHICLE PROFILES (NOT TO SCALE)



ESQ 1818 STAGE 4 AND 5

SWEPT PATH
Ground Level - S5 Access

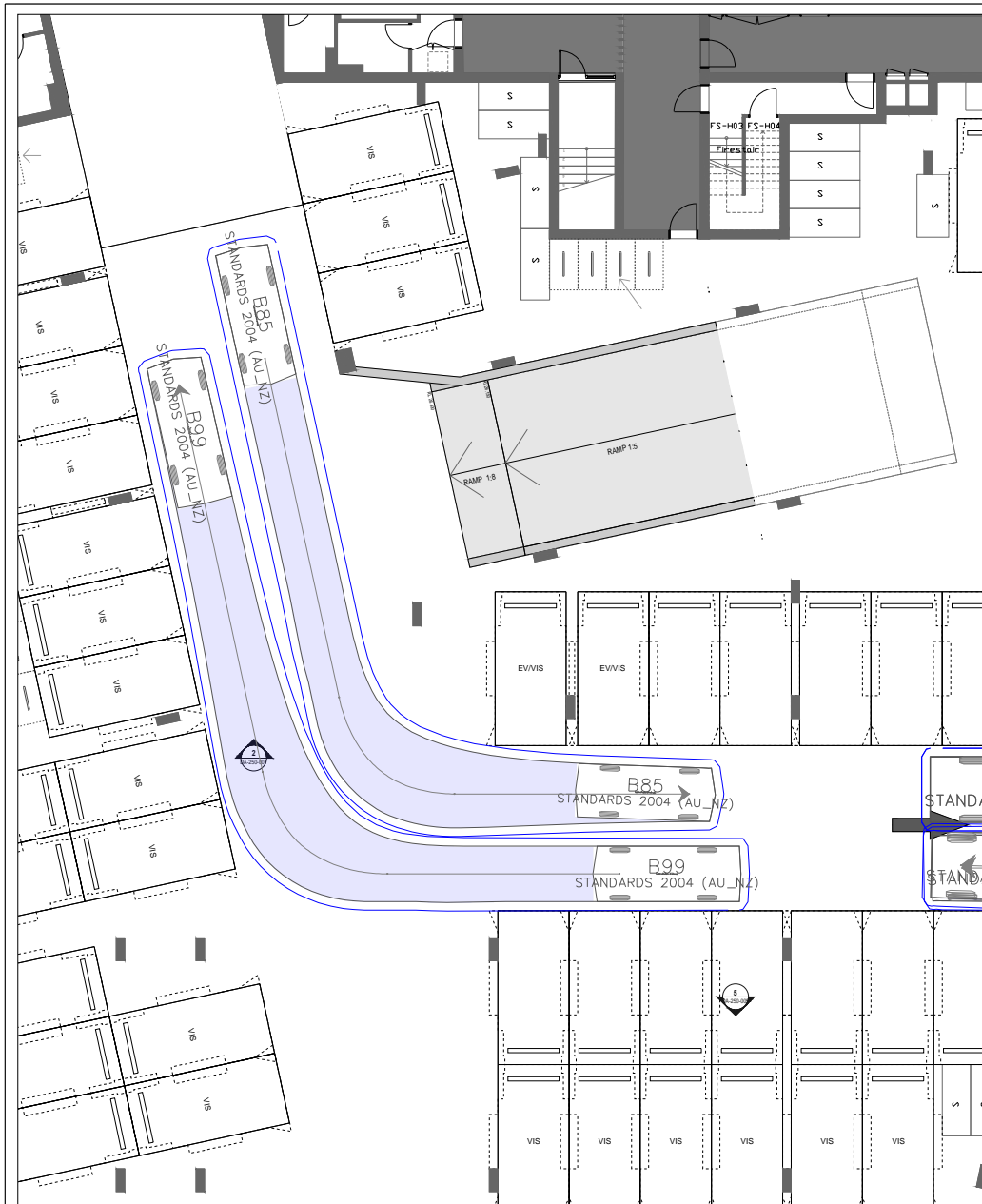
Job Number | 1255449

Revision | A

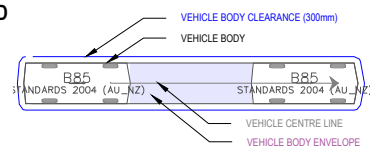
Date | Sep 2023

Figure 03

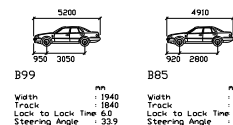
Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmall@ghd.com W www.ghd.com



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VEHICLE PROFILES (NOT TO SCALE)



ESQ 1818 STAGE 4 AND 5

Job Number 1255449

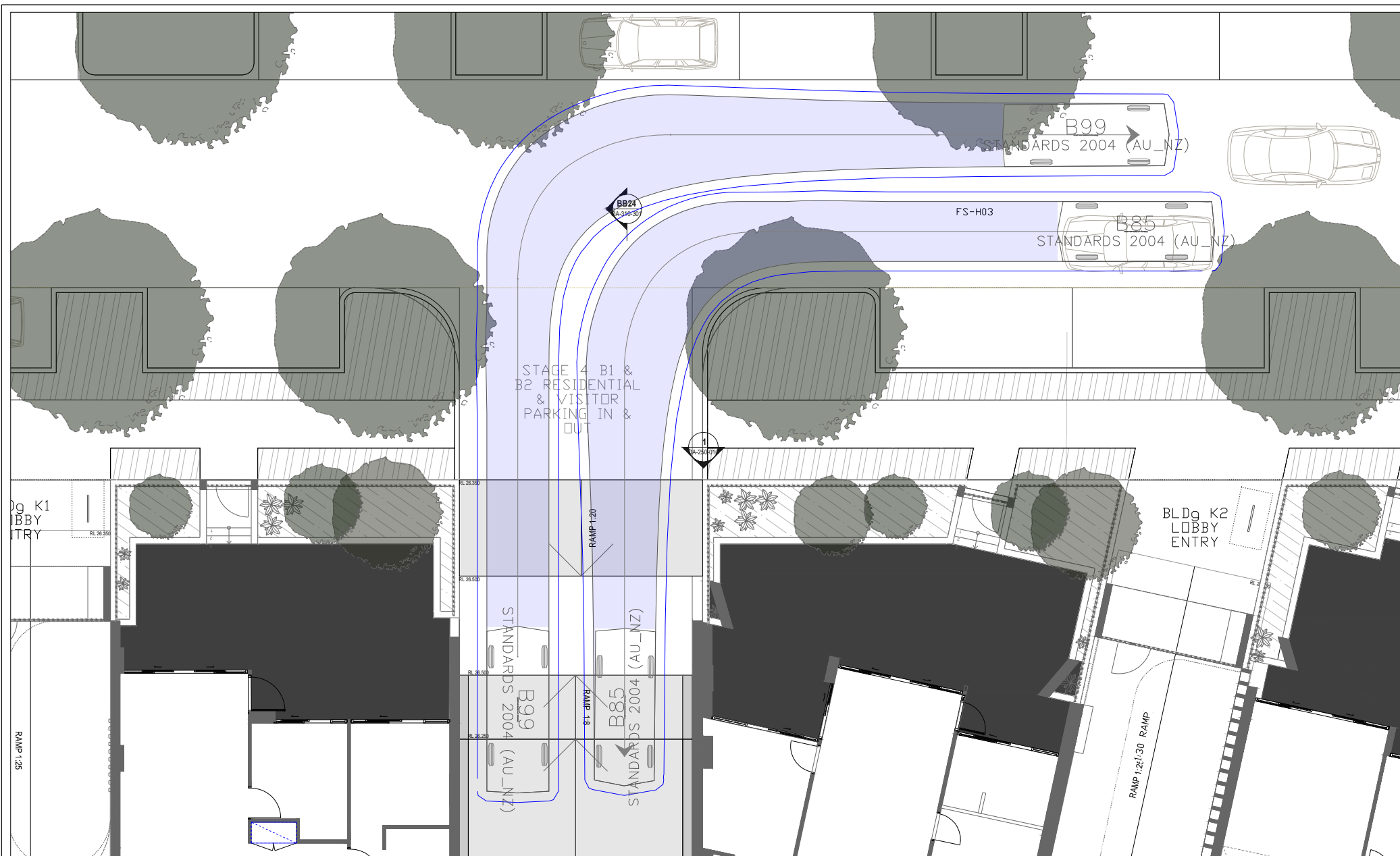
Revision A

Date Sep 2023

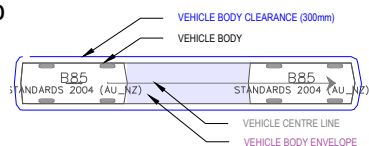
SWEPT PATH
Ground Level - S5 Corner & Ramps

Figure 04

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VEHICLE PROFILES (NOT TO SCALE)

B99	B85
Width: 1940	Width: 1878
Track: 1840	Track: 1778
Lock to Lock Time: 6.0	Lock to Lock Time: 6.2
Steering Angle: 33.9	Steering Angle: 34.1



ESQ 1818 STAGE 4 AND 5

Job Number 1255449

Revision A

Date Sep 2023

SWEPT PATH Ground Level - S4 Parking Access Figure 06

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