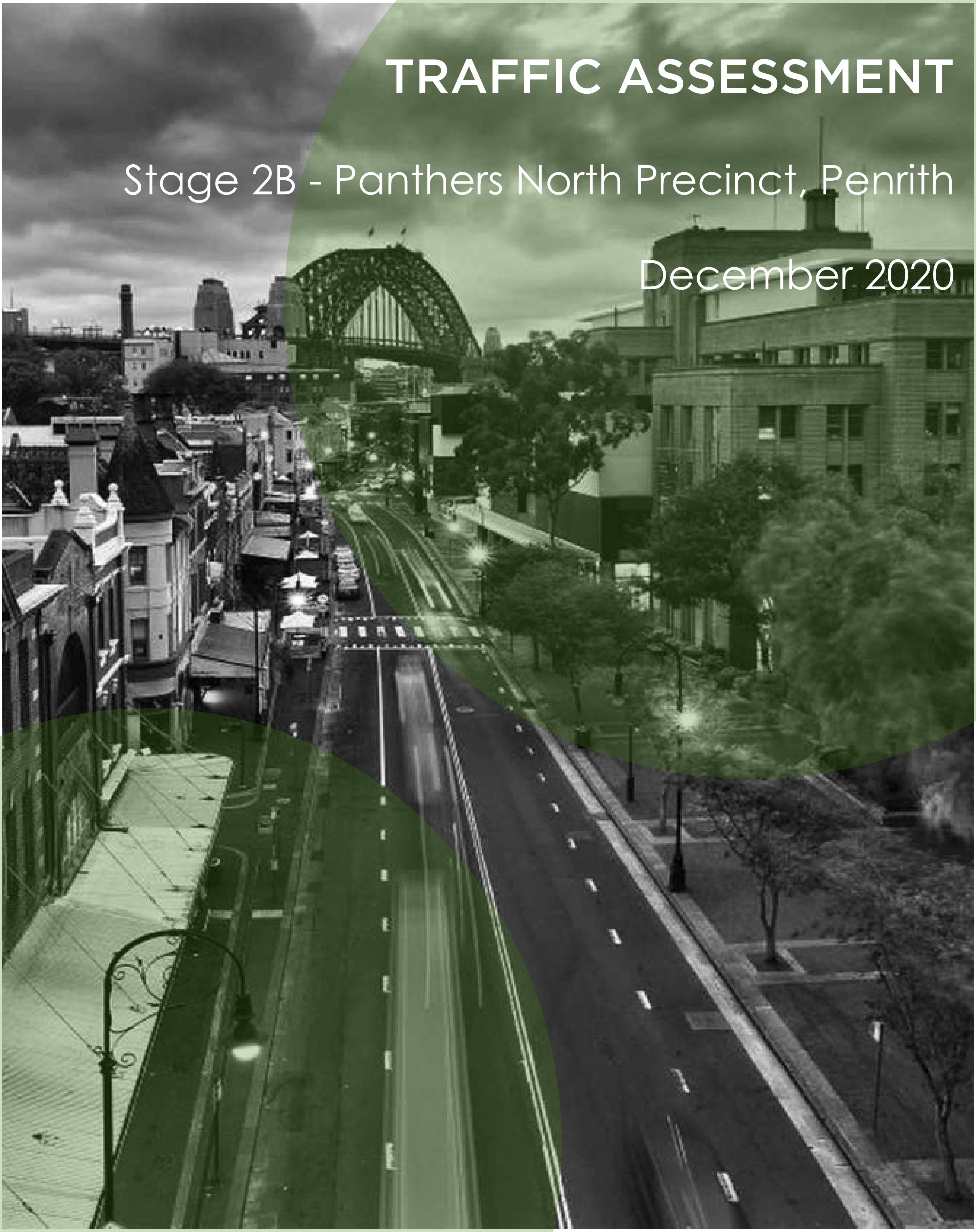
TRAFFIC ASSESSMENT

Stage 2B - Panthers North Precinct, Penrith

December 2020



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ABN 39 340 093 550

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Contents

1. Introduction

This traffic assessment is prepared on behalf of Urban Link Pty Ltd to assess the traffic and parking impacts of the proposed modifications to the residential development at Panthers North Precinct, Penrith (Stage 2B).

It is understood that the site has Development Application approval (98 residential units) and this is a Section 4.55 application that will be lodged with Penrith City Council.

The development plans have been assessed against the following:

- Penrith Development Control Plan (DCP) 2014
- Penrith Local Environmental Plan (LEP) 2010
- Australian Standards (AS 2890)
- RTA (RMS) Guide to Traffic Generating Developments
- RMS Guide to Traffic Generating Development – Technical Direction (TDT 2013/04a).

1.1. Previous Traffic Assessment

A traffic and parking assessment was prepared by GHD to assess Stage 2A, 2B and 3 of the development. The development consists of residential units and a retail component with basement car parking provided for residents and visitors. This traffic assessment has been submitted as a part of development application and has been approved by Council (refer to Appendix C).

1.2. Site Location

The subject site for Stage 2B is located within the Panthers North Precinct, Penrith as shown in Figure 1-1.

Figure 1-1: Site Location[1]

[1] Source: https://www.google.com/maps/

An aerial photograph showing the site and the surrounding area is shown in Figure 1-2.

Figure 1-2: Aerial Imagery of the Site[2]

[2] Source: https://maps.six.gov.au

2. Proposed Development

The current DA approval (Stage 2B) consist of the following:

- 1 x studio unit
- 25 x one bedroom units
- 53 x two bedrooms units
- 19 x three bedroom units
    - **TOTAL residential units 98**
- Basement level car park with the following:
    - 116 x residential car parking spaces
    - 12 x visitor car parking spaces

The Section 4.55 modification will reduce the number of residential units to the current DA approved plan. The overall breakdown of the Section 4.55 development will consist of the following:

- 1 x studio unit
- 27 x one bedroom units
- 52 x two bedrooms units
- 14 x three bedrooms units
- 1 x four bedroom unit
    - **TOTAL residential units 95**
- Basement level car park with the following:
    - 118 x residential car parking spaces
    - 12 x visitor car parking spaces

The architectural plans have been prepared by Urban Link Pty Ltd and are shown in Appendix A.

3. Council Parking Requirements

3.1. Council Car Parking Requirements

The 'Penrith Development Control Plan 2014 C10 Transport, Access and Parking' specifies car parking rates for residential flat building .

Table 3-1 presents the car parking requirements for the proposed development in accordance with Councils DCP. These car parking rates have been previously applied and have been DA approved.

Table 3-1: Council Car Parking Rates and Supply

Proposed number of units / Parking types	Council Parking Rates	Council Parking Requirements	Section 4.55 - Parking Provisions	DA Approved – Parking Provisions (98 units)
1 x studio	Penrith Development Control Plan 2014 does not specify studio parking rates	Not applicable	118 residential car parking spaces provided on site.	116 residential car parking spaces provided on site.
27 x one bedroom units	1 space per 1 or 2 bedrooms	27		
52 x two bedroom units	1 space per 1 or 2 bedrooms	52		
14 x three bedroom units	2 spaces per 3 bedrooms	28		
1 x four bedroom unit	2 spaces per 3 bedrooms	2		
Visitors	1 space per every 5 dwellings	19	12 visitor car parking spaces provided on site (plus 8 provided on-street)*	12 visitor parking spaces provided on-site (plus 8 provided on-street)*

Proposed number of units / Parking types	Council Parking Rates	Council Parking Requirements	Section 4.55 - Parking Provisions	DA Approved – Parking Provisions (98 units)
Service vehicles	1 space per 40 units for service vehicles	2	1 loading area has been provided. This has been accepted in the development application	1 loading bay provided on-site
Total car parking spaces (excluding loading dock)		128 car parking spaces	130 car parking spaces provided on site (plus 8 on street parking)	128 car parking spaces provided on site (plus 8 street on-parking)

Note * As noted in the traffic assessment (refer to Appendix C – Section 4) Council has a provided allowance of up to 50% of visitor parking provision for Stages 2B and 3.

From Table 3-1, it can be seen that the car parking provision of 130 car parking spaces does comply with Councils car parking requirements, and provides more car parking spaces with lesser residential units than the DA approval plans.

3.2. Bicycle Parking

Council bicycle parking requirements are identified in the 'Planning Guidelines for Walking and Cycling NSW 2004'. The bicycle parking rates are provided below:

- Residential bicycle parking: 20% to 30% of the proposed number of units
- Visitor bicycle parking: 5% to 10% of the proposed number of units

The proposed 24 (minimum) bicycle parking spaces comply with the Planning Guidelines for Walking and Cycling NSW 2004' as specified in Councils DCP[3].

3.3. Motorcycle Parking

'Penrith Development Control Plan 2014' does not specify motorcycle parking rates. Therefore, the proposed provision of four motorcycle parking space is considered suitable for the development.

[3] Source: Penrith Development Control Plan 2014 – C10 Transport Access and Parking (C10-19)

3.4. Car Parking Layout

Table 3-2 identifies the characteristics of the proposed parking and access layout with respect to the relevant design requirements and guidelines. The last column identifies the compliance of each design aspect, with further details provided.

Table 3-2: Car Parking Design Requirements (AS 2890)

Design Aspect	Australian Standards (AS2890)	Proposed Provision	Compliance
Car parking space length	5.4m (minimum)	5.4m (minimum)	Complies with AS2890
Car parking space width	2.4m (minimum)	2.6m (minimum)	Complies with AS2890
Accessible bay length	5.4m (minimum)	5.4m (minimum)	Complies with AS2890
Accessible bay width	4.8m (with shared area)	4.8m (minimum)	Complies with AS2890
Driveway Access Width	3.0m to 5.5m (minimum)	6.2m (minimum)	Complies with AS2890
Traffic Aisle Width	5.8m (minimum)	5.7m to 6.2m	Refer to Section 3.5
Blind Aisle	A minimum of 1 metre extension beyond the last parking space	1.0m extension beyond the last car parking space	Complies with AS2890
Column Locations	Located between 0.75m and 1.75m of aisle	Located between 0.75m and 1.75m of aisle	Complies with AS2890
Grade Transition	Transitions of 2.0 m up to 18%	Refer to Section 3.7	Refer to Section 3.7
Maximum Grade for Driveway Ramp (Straight)	Up to 20m long – 1:4 (25%)	Refer to Section 3.7	Refer to Section 3.7
Height Clearance Carpark	2.2m (minimum)	2.2m (minimum)	Complies with AS2890
Height Clearance Accessible bay	2.5m	2.5m	Complies with AS2890

Design Aspect	Australian Standards (AS2890)	Proposed Provision	Compliance
Height Clearance loading	3.5m (requirement for a small rigid vehicle)	3.2 m height clearance	Refer to Section 3.9

Note: The design of the car park and access arrangement is considered acceptable for the proposed development, with some amendments to be revised in the future design works.

The proposed carpark and access layout generally comply with the requirements of the Australian Standards with further details provided below:

3.5. Traffic Aisle

The traffic aisle is generally 5.8m (minimum) wide throughout the basement carpark. There is a short section in the car park where the traffic aisle is reduced to 5.7 metres wide as shown in Figure 3-1.

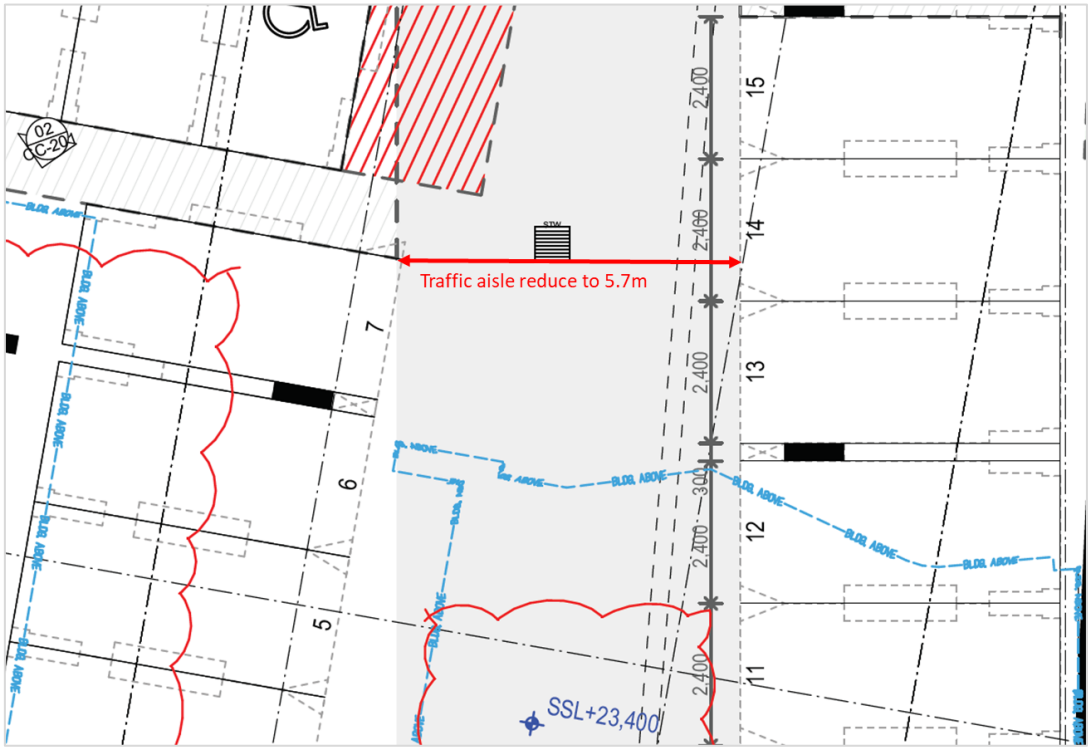

Figure 3-1: Reduced Traffic Aisle

The 5.7 metre wide traffic aisle is considered acceptable for development as the expected traffic movements generated within this traffic aisle is relatively low. In addition, there is sufficient capacity for a vehicle to manouver in and out of the adjacent car parking spaces.

3.6. Accessible bay (Shared zone)

The shared zone for the accessible bay will form part of the turning area for vehicles. This will be acceptable for the following reasons:

- The low traffic volumes within the site
- As specified in the Australian Standards (Clause 1.3.2 of AS 2890.6), a vehicular aisle can be used as a shared area
- The dimensions are compliant with the relevant Australian Standards.

In addition, the Australia Standard 'AS 2890 Parking Facilities: Part 6 Off-street parking for people with disabilities' requires a 2.4 metre wide parking space with a 2.4 metre wide shared zone. However, a column intrudes the shared zone at the end of the parking space. The location of the column will not affect the unloading and loading area for the people with disabilities.

Therefore, the proposed accessible bay is considered suitable for the proposed development.

3.7. Swept Path Analysis

An evaluation of the car parking spaces and the access arrangement has been undertaken using the software package 'AutoTurn'. The vehicle swept paths have been based on the B85 / B99 as outlined in the Australian Standards (AS/NZS 2890.1:2004).

The design of the car park and access arrangement is considered acceptable for the proposed development, with some amendments to be revised in the future design works.

3.8. Access Arrangement

The access arrangement is unchanged from the approved DA plans.

3.9. Service Vehicles (Waste Trucks)

Service vehicles and waste collection will be accommodated within the site similar to the current DA approval. As specified in the Waste Management Plan (refer to Appendix D) the waste vehicle is 9.6 metre long vehicle with an overall height of 3.0 metres as shown in Figure 3-2. This waste truck and similar size trucks can be accommodated within the loading dock.

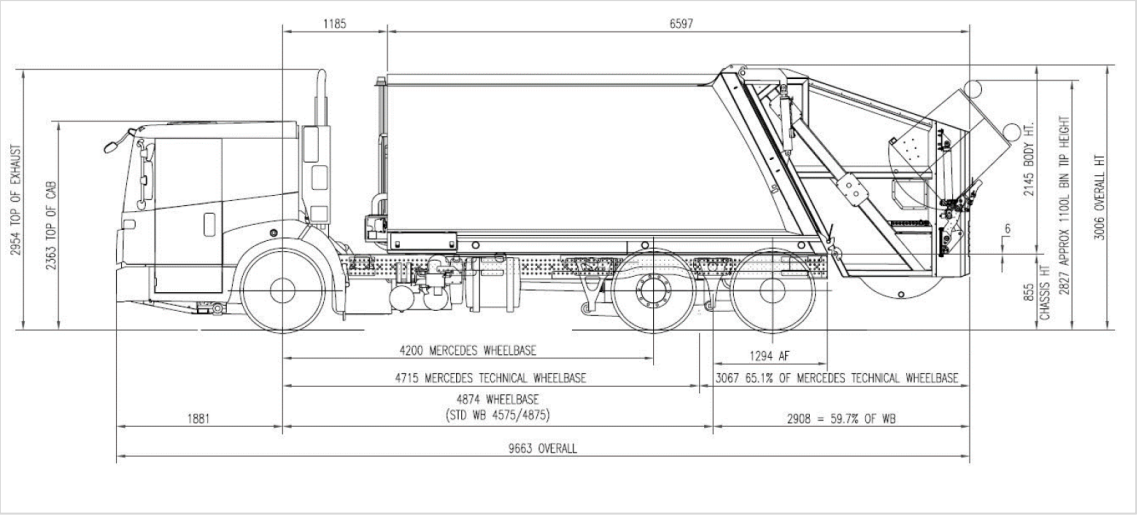

Figure 3-2: Waste Vehicle Dimensions

For this assessment a 10.5 metre medium rigid vehicle (MRV) has been used to undertake vehicle swept path analysis as shown in within Appendix B.

It is noted that the vehicle swept path analysis were successfully carried for a MRV, and therefore can accommodate the 9.6 metre long truck as specified in the Waste Management Plan.

4. Traffic Impacts

A Traffic Assessment has been previously prepared by GHD for the development of Panthers North Precinct, Penrith (Stage 2B) which was submitted as a Development Application (refer to Appendix C).

The previously approved traffic Assessment identifies a traffic generation of 49 vehicles in the peak periods for the Stage 2B residential development.

This modification (Section 4.55) of the development will have a reduced number of residential units of 95 residential units which is lesser than the approved DA. The breakdown of residential unit numbers is shown in Table 4-1.

Table 4-1: Breakdown of Residential Units

DA Approval	Section 4.55	Difference
98 residential units	95 residential units	The Section 4.55 application is to reduce the number of residential units by four.

Therefore, it is expected that the residential development under the Section 4.55 application will have a lesser traffic generation to the current approval due to the reduce number of residential units.

5. Summary and Conclusion

One Traffic Consulting has assessed the potential traffic and parking effects of the proposed modification (Section 4.55) of the residential development at Panthers North Precinct, Penrith (Stage 2B).

Based on the above assessment, it is concluded that:

- The proposed car parking provision does comply with Councils car parking requirements, and provides more car parking spaces with lesser residential units than the DA approval plans, and is considered acceptable for the site.
- The proposed car park layout generally complies with the Australian Standards (AS 2890). A vehicle swept path assessment has been prepared for the proposal, which demonstrates that vehicles are able to manoeuvre in and out the basement car park in a forward direction.
- The design of the car park and access arrangement is considered acceptable for the proposed development, with some amendments to be revised in the future design works.
- The level of traffic movements expected to be generated by the proposed development is expected to be lesser than the current DA approval.

Overall, the proposed modification (Section 4.55) of the development is not expected to have any significant changes to the assessment of the Development Application approval.

7. Appendix B Vehicle Swept Path Analysis

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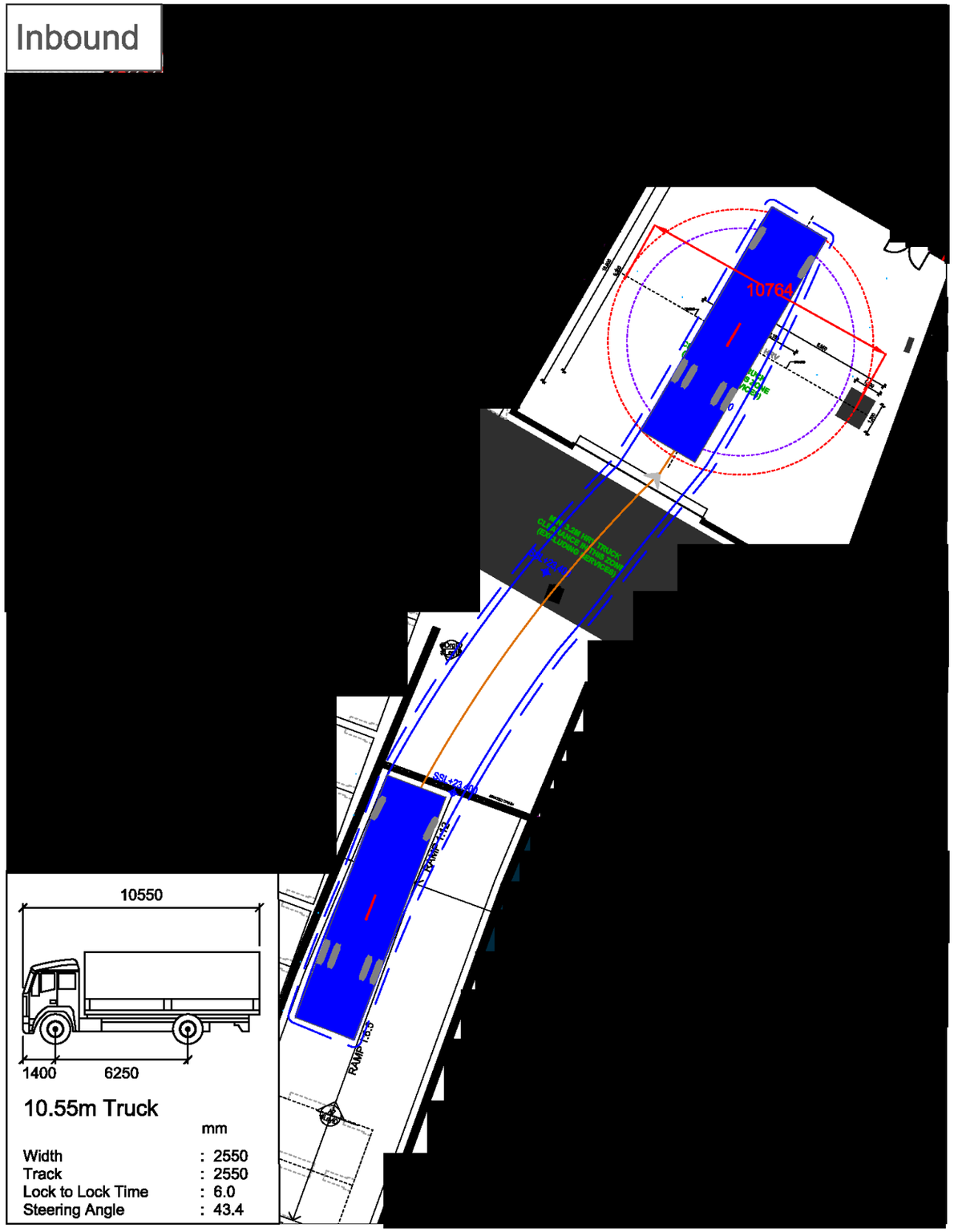

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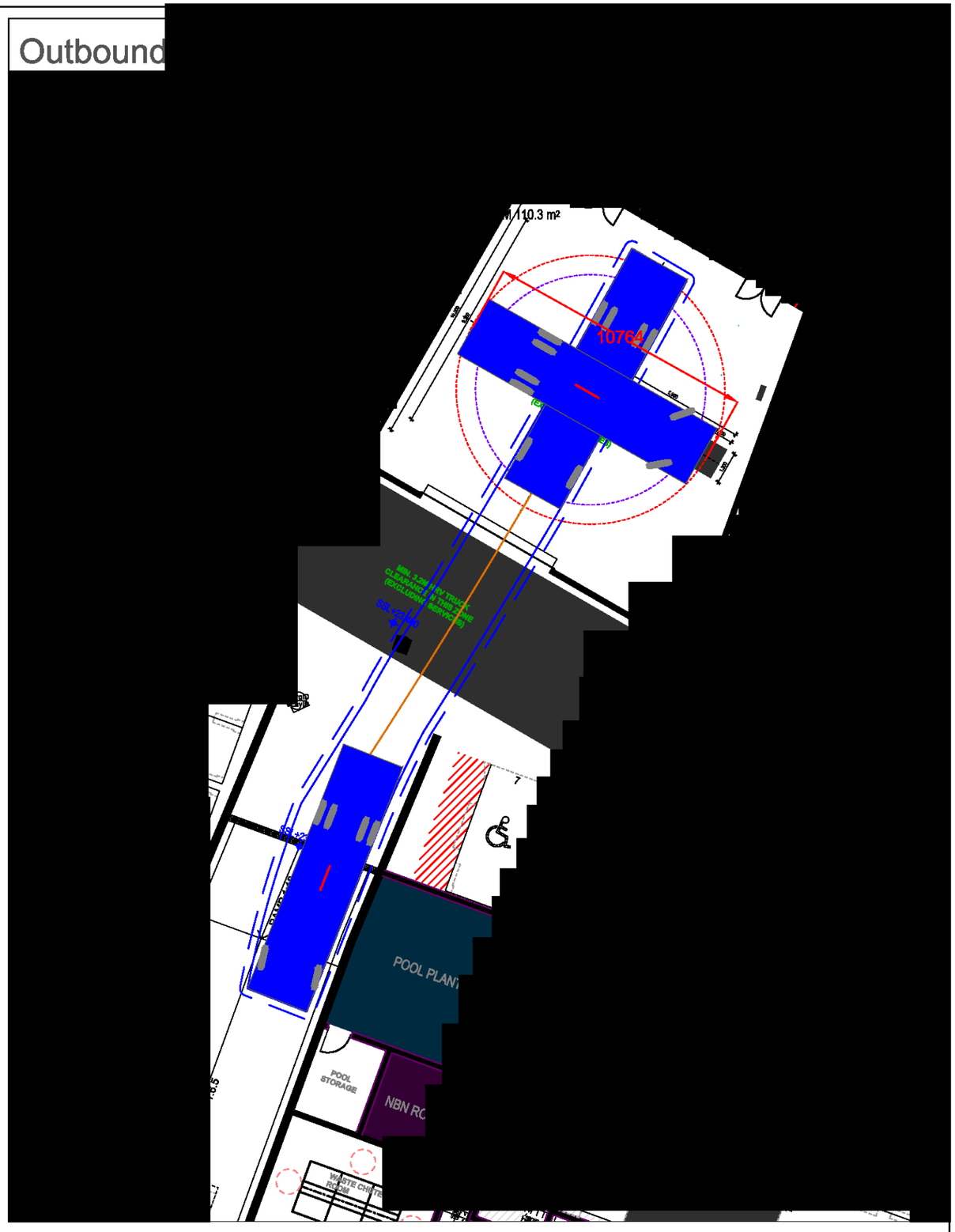
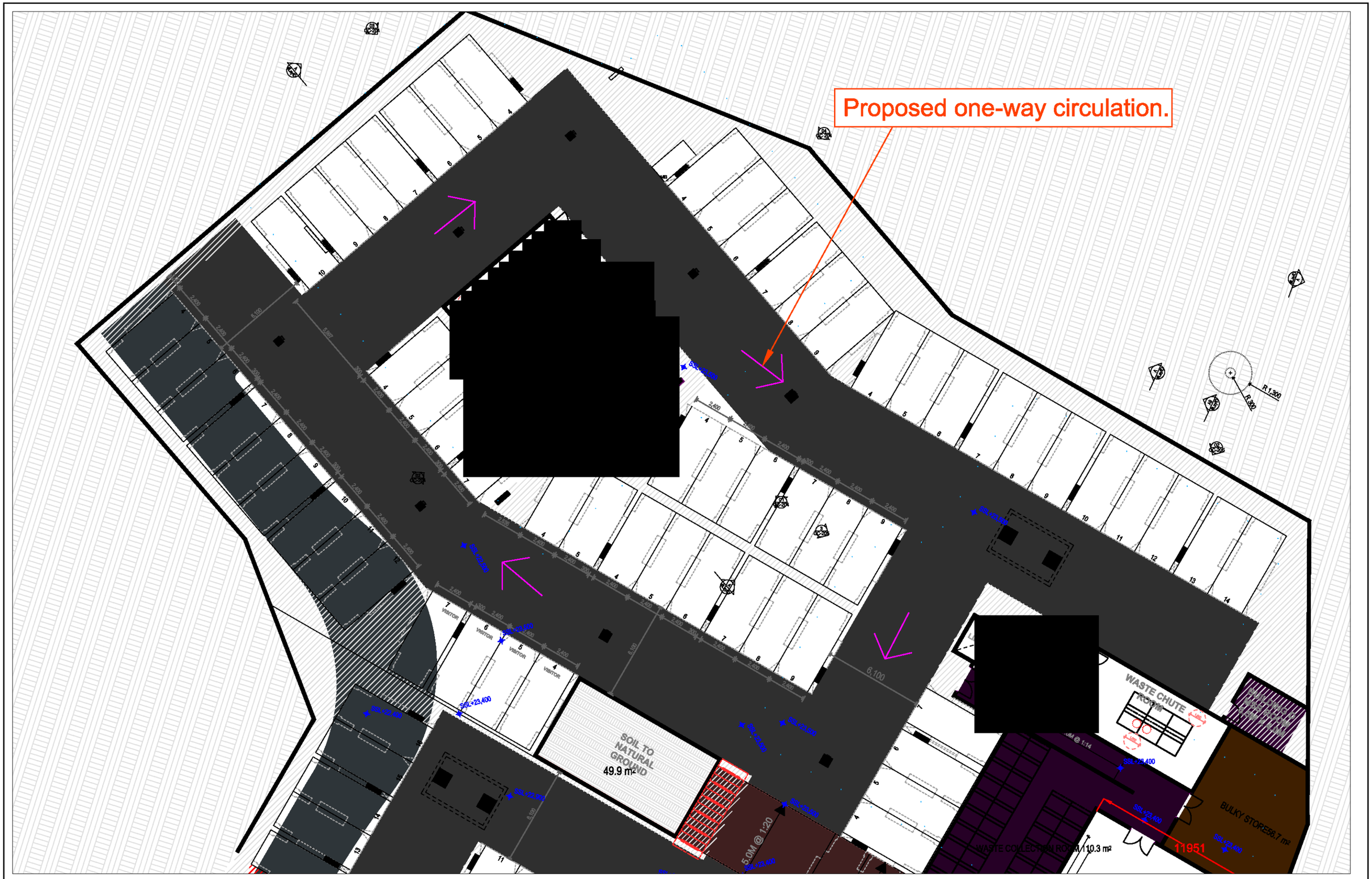


Swept Paths Assessment - Basement Level 1
10.5m Long Truck Entry / Exit movements

ONE TRAFFIC

Panthers North Precinct, Penrith

Drawing Reference:
075 - 201218



Swept Paths Assessment - Basement Level Mark ups

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Swept Paths Assessment - Ground Floor
B99 Vehicle Entry / B99 Exit movements

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Panthers North Precinct, Penrith

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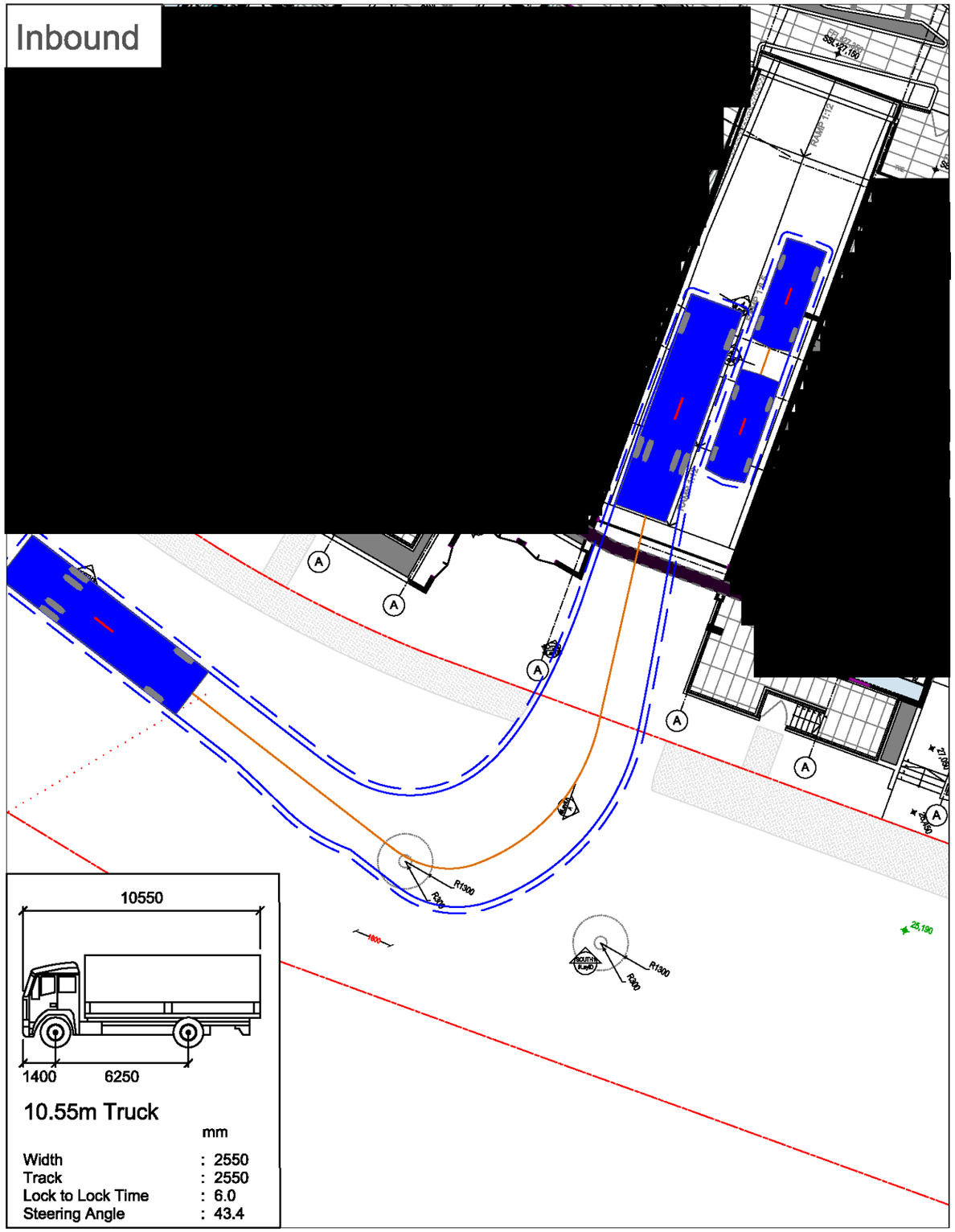

10.55m Truck

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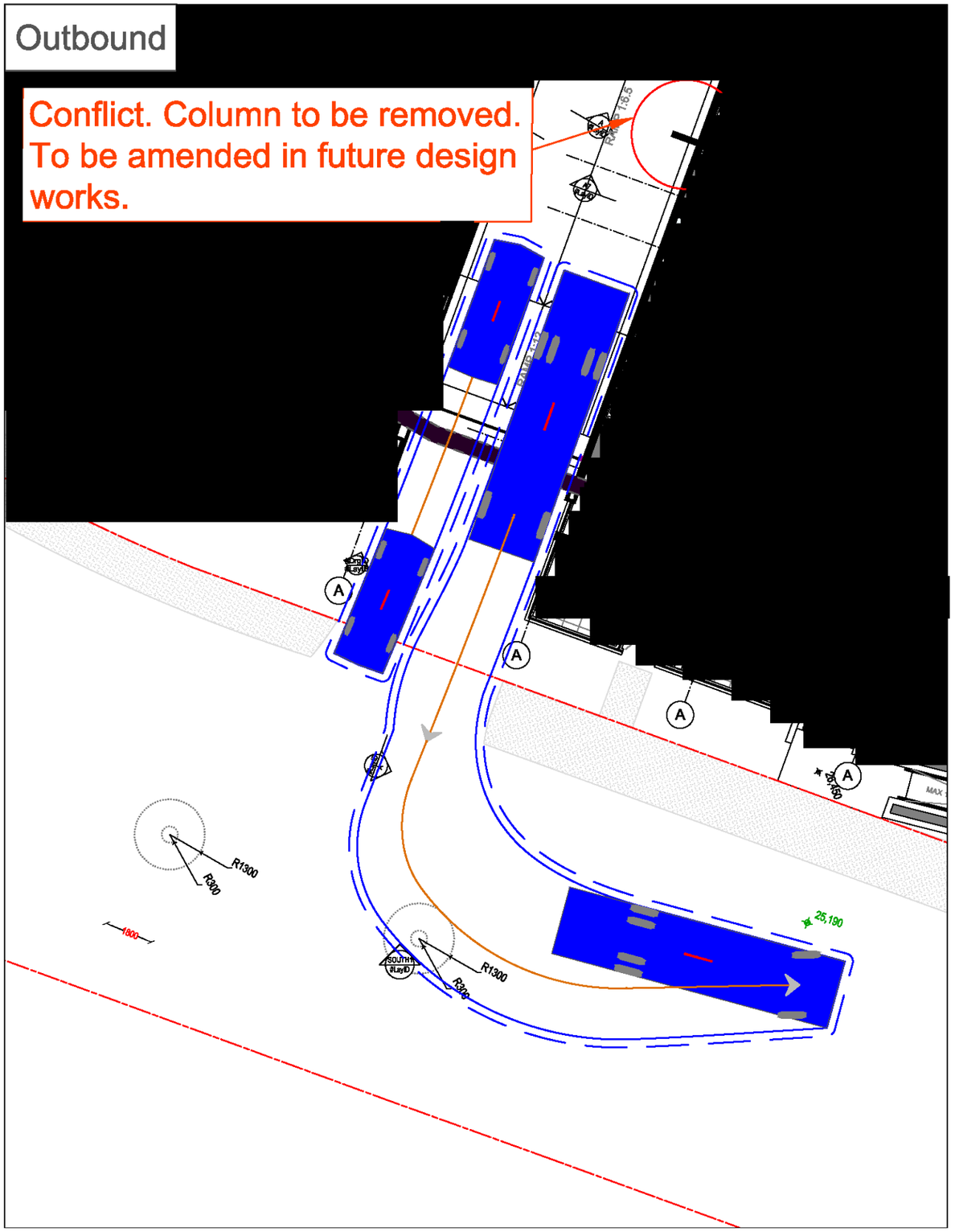

Swept Paths Assessment - Ground Floor
10.5m Long Truck Entry / Exit movements

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Panthers North Precinct, Penrith

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Swept Paths Assessment - Basement Level Mark ups

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Panthers North Precinct, Penrith

Drawing Reference:
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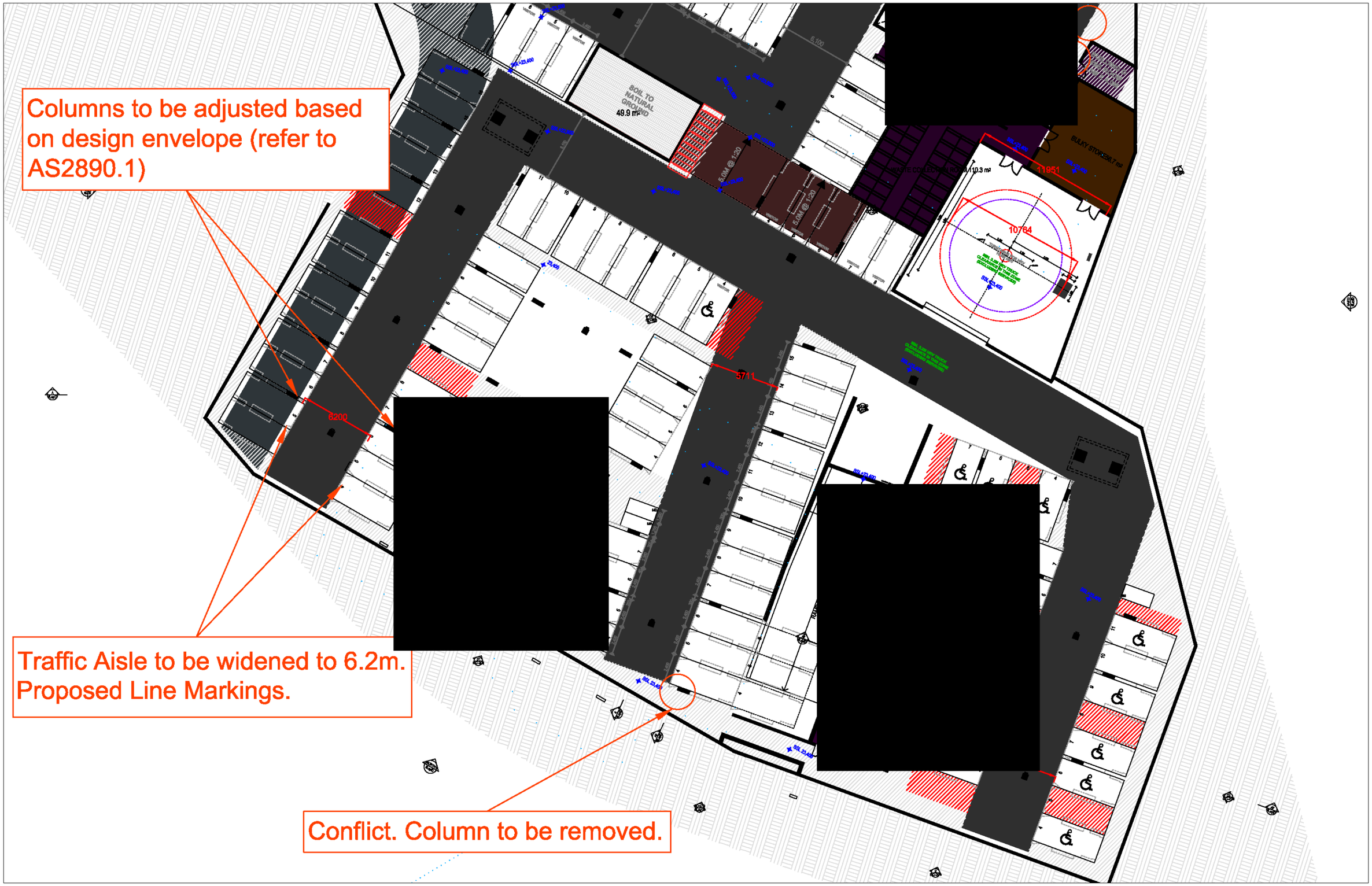

Swept Paths Assessment - Basement Level Mark ups

ONE TRAFFIC

Panthers North Precinct, Penrith

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5200

950 3050

B99

	mm
Width	: 1940
Track	: 1840
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

Swept Paths Assessment - Basement Level 1
B99 Vehicle Entry / B99 Exit movements

ONE TRAFFIC

Panthers North Precinct, Penrith

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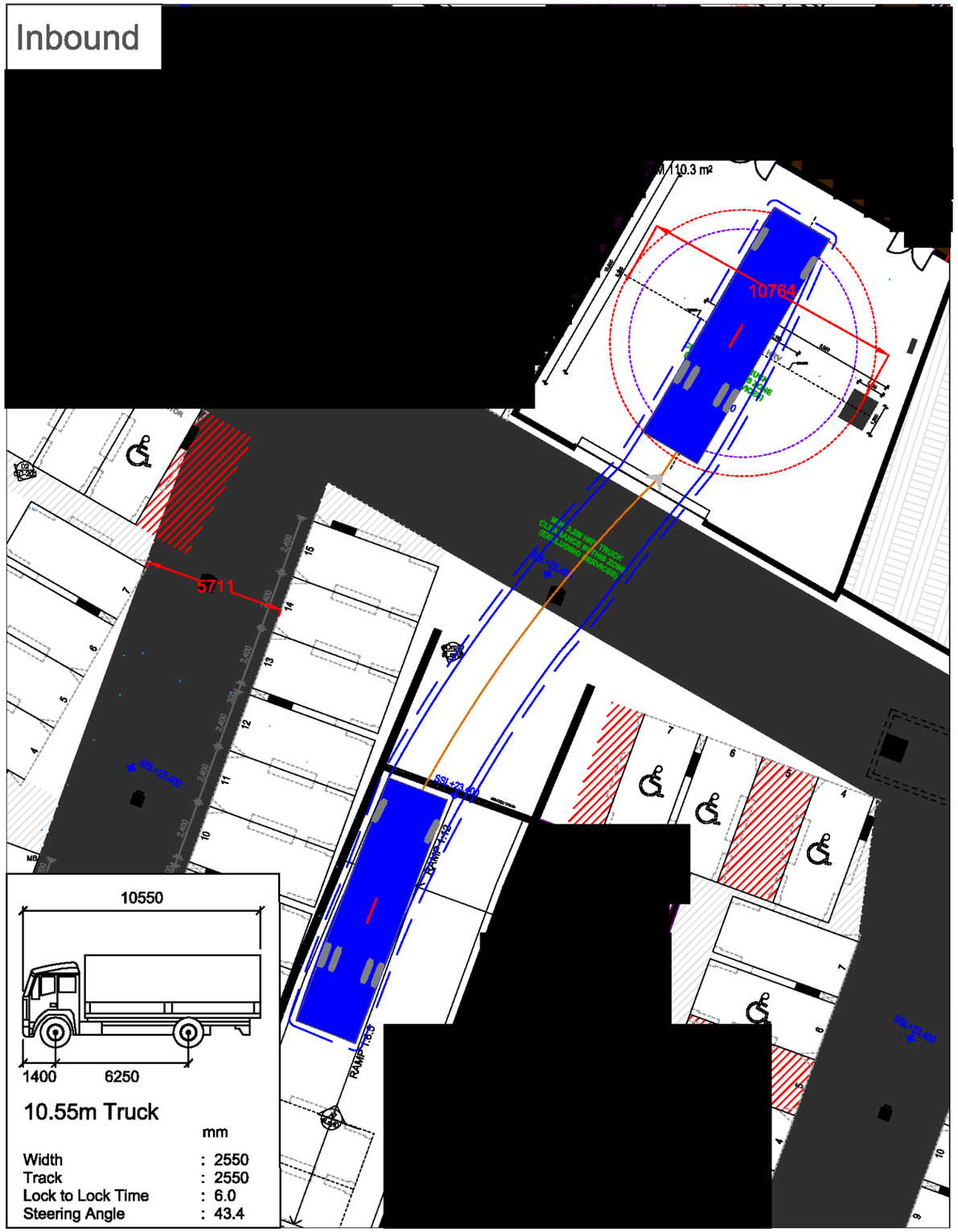

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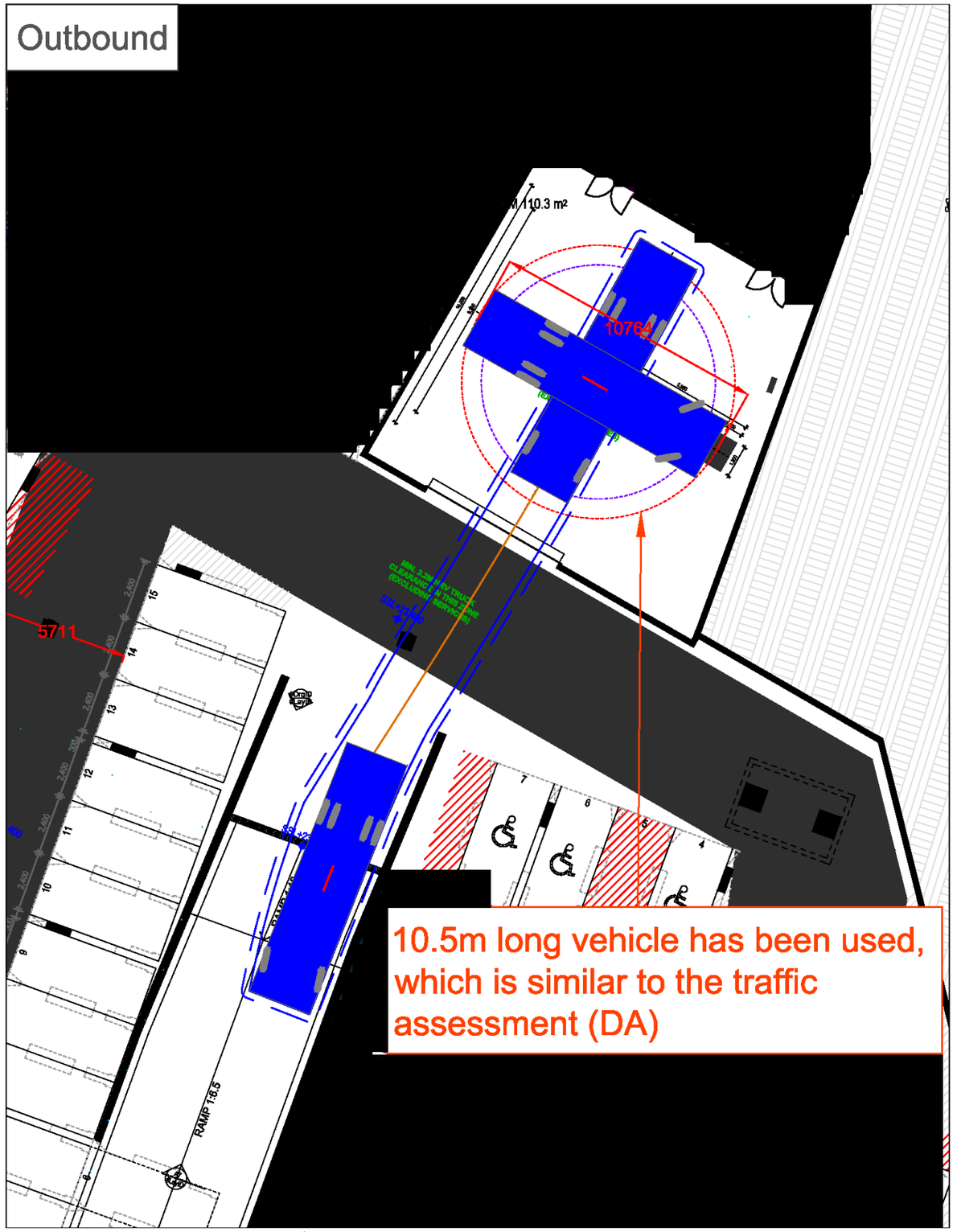

Swept Paths Assessment - Basement Level 1
10.5m Long Truck Entry / Exit movements

ONE TRAFFIC

Panthers North Precinct, Penrith

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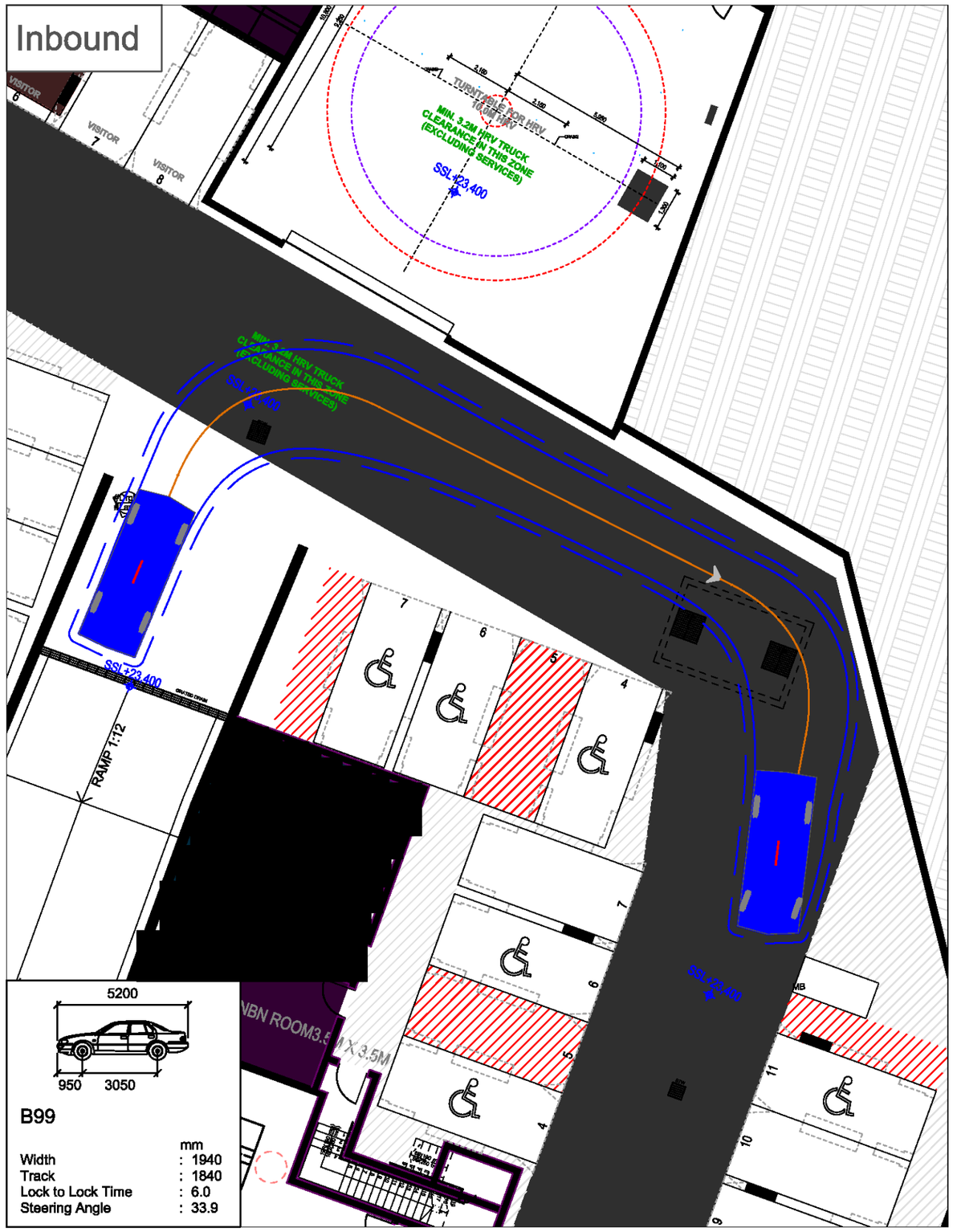

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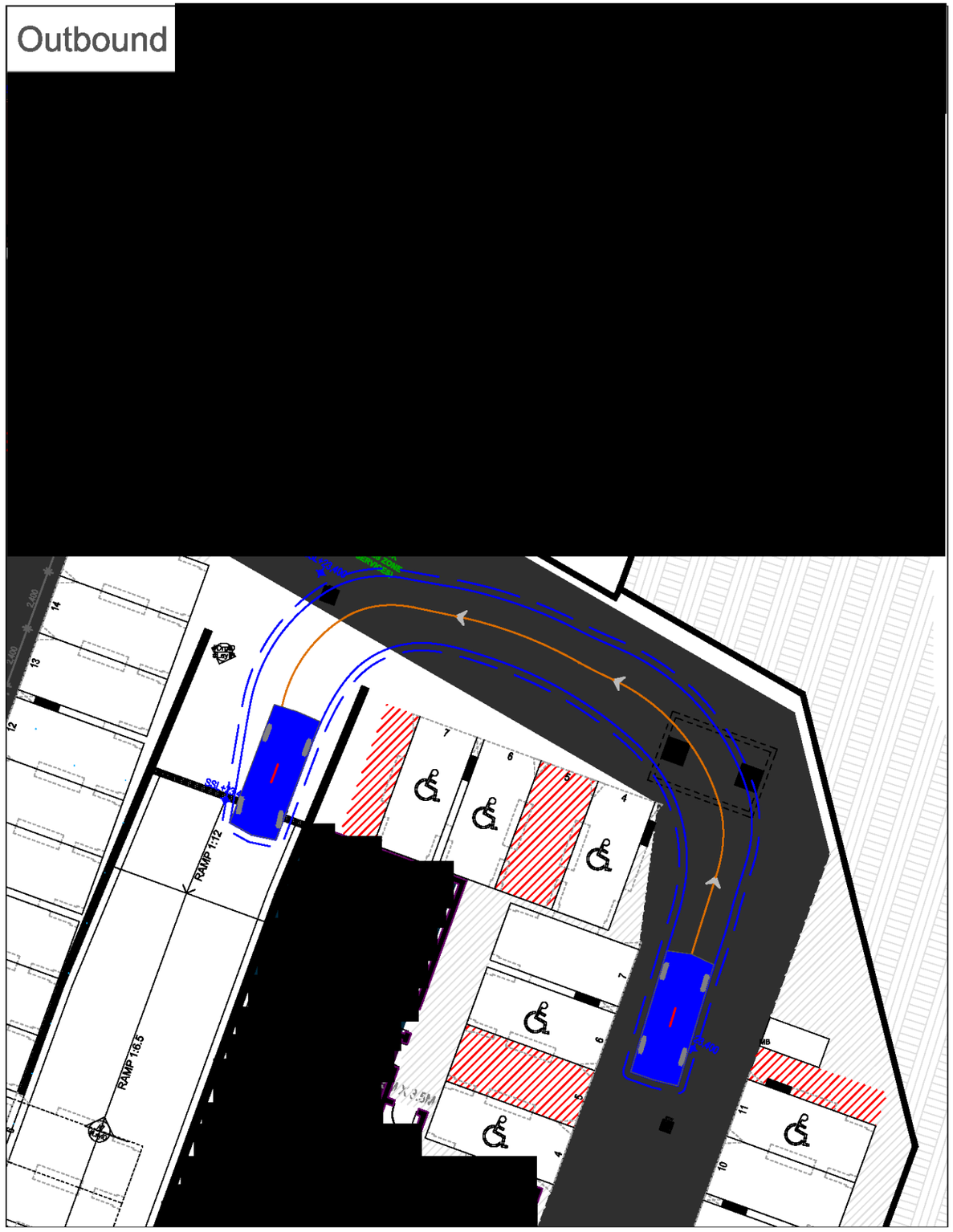

Swept Paths Assessment - Basement Level 1
B99 Vehicle Entry / B99 Exit movements

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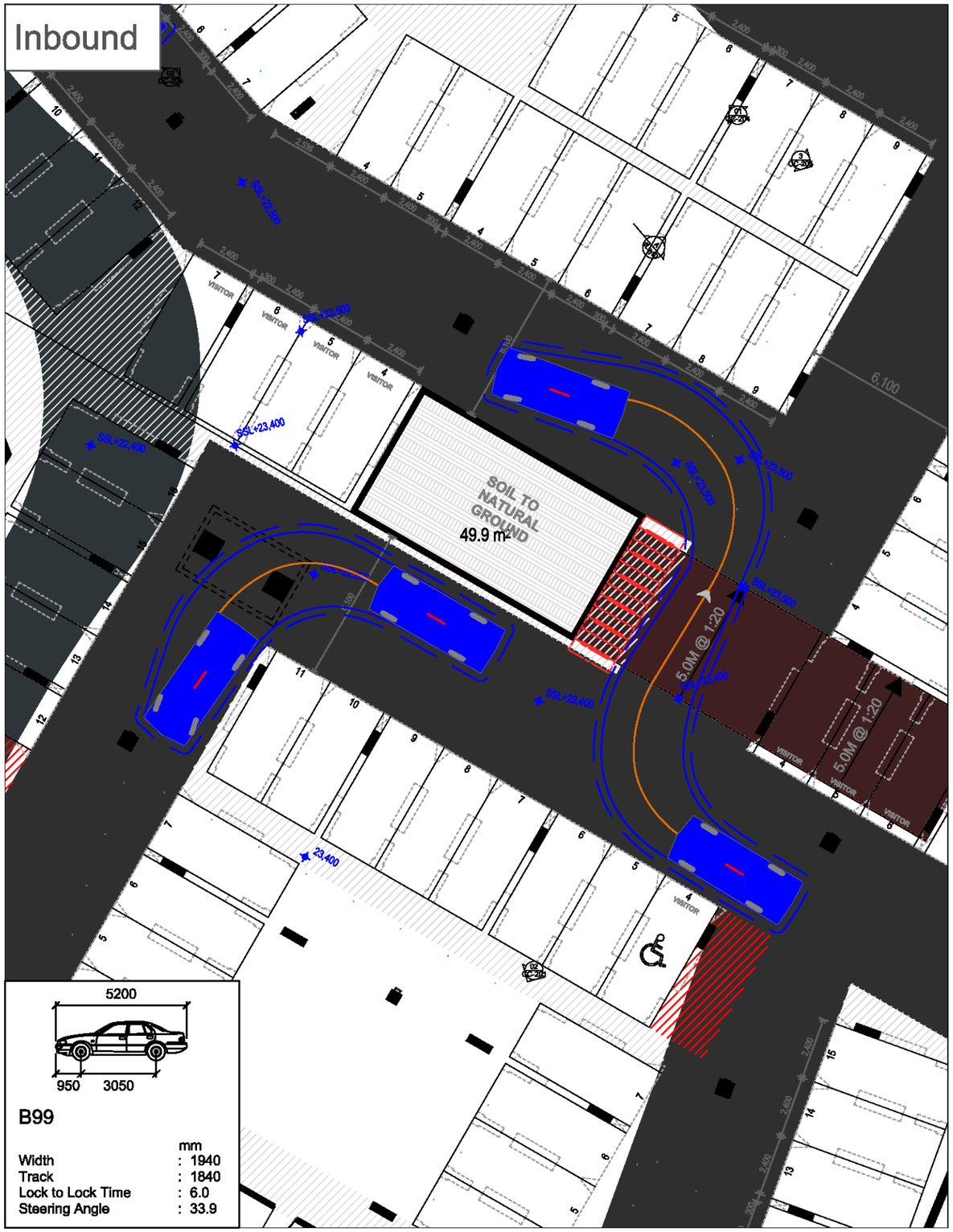

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Steering Angle	: 33.9

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Swept Paths Assessment - Basement Level 1
B99 Vehicle Entry / B99 Exit movements

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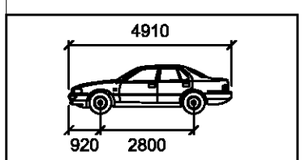

B85

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Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

Swept Paths Assessment - Basement Level 1
B85 Vehicle Entry / B85 Exit movements

ONE TRAFFIC

Panthers North Precinct, Penrith

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4910

920 2800

B85

	mm
Width	: 1870
Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

Swept Paths Assessment - Basement Level 1
B85 Vehicle Entry / B85 Exit movements

ONE TRAFFIC

Panthers North Precinct, Penrith

Drawing Reference:
075 - 201218

Inbound

Outbound

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B85

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Width	: 1870
Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

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Swept Paths Assessment - Basement Level 1
B85 Vehicle Entry / B85 Exit movements

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Panthers North Precinct, Penrith

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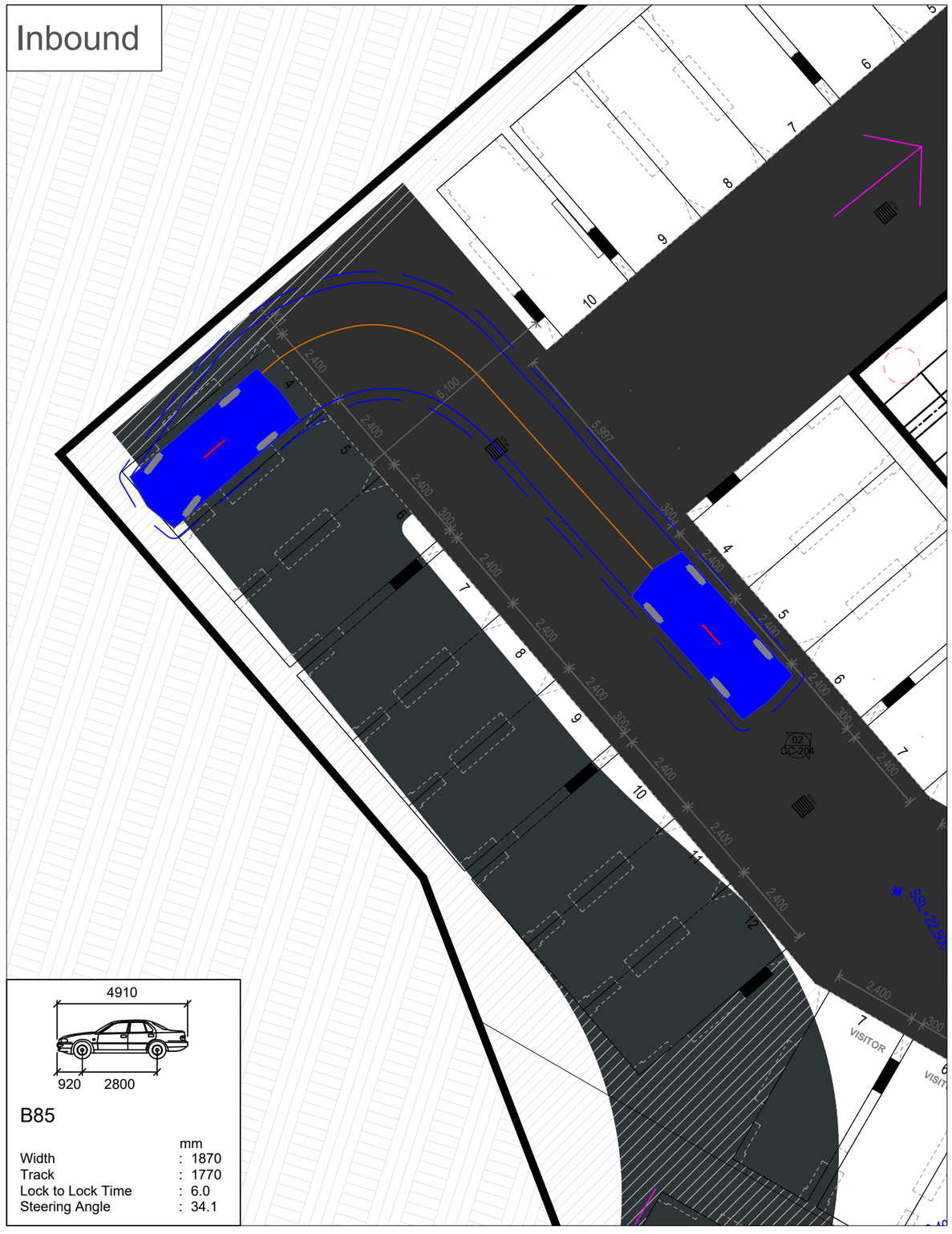

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Outbound

Swept Paths Assessment - Basement Level 1
B85 Vehicle Entry / B85 Exit movements

ONE TRAFFIC

Panthers North Precinct, Penrith

Drawing Reference:
075 - 201218

8. Appendix C Traffic Assessment (DA)

13 June 2019

Jacquel Australia Project Management
Attention: Mohamed Sallam

[redacted]

Our ref: 21/25061
Your ref: 220779_Rev6

Dear Andrew

ESQ1818: Stage 2A, 2B & 3
Traffic and Parking Impact Assessment Statement

1 Introduction

1.1 Background

GHD Pty Ltd (GHD) has been engaged by ESQ 1818 Pty Ltd to undertake traffic and parking impact assessment Stage 2A, 2B and 3 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 2A, 2B and 3. A Voluntary Planning Agreement (*VPA*) for the Panthers Development has been signed by representatives of Roads and Maritime Services (Roads and Maritime), Penrith City Council and Panthers Rugby League Club on the 28th November 2012 which outlines triggers for road upgrades associated with staging developments within the Panthers precinct. The VPA is currently being reviewed and amended to incorporate changes to the land uses within the Panthers precinct including Lot 2 that incorporates the proposed ESQ 1818 Stage 2A, 2B and 3.

The VPA, that is currently being revised, includes an agreed set of traffic modelling parameters including land use trip generation, traffic distribution for the developments within the precinct and land use Gross Floor Areas (GFA), dwelling or mixed-uses. A summary of the agreed parameters is included in **Appendix A.**

This statement has been prepared to provide a traffic impact assessment for the proposed Stage 2A, 2B and 3 development (see Figure 1 below) with reference to the revised VPA and relevant Council Development Control Plans and Panthers Precinct Master Plan – Transport Strategy - GHD July 2014 (Transport Strategy).

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

[redacted]

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

This statement is an updated version of a previously submitted statement 13 March 2019) and includes the amendments associated with alterations to the service vehicle access, now proposed to be within the basement within Stage 2B (in Building D and E) to service both Stage 2A and 3 residential dwellings and subsequent residential unit mix amendments. Relevant previous traffic studies for the Panthers precinct are summarised in Section 1.2 below.

1.2 Previous traffic studies

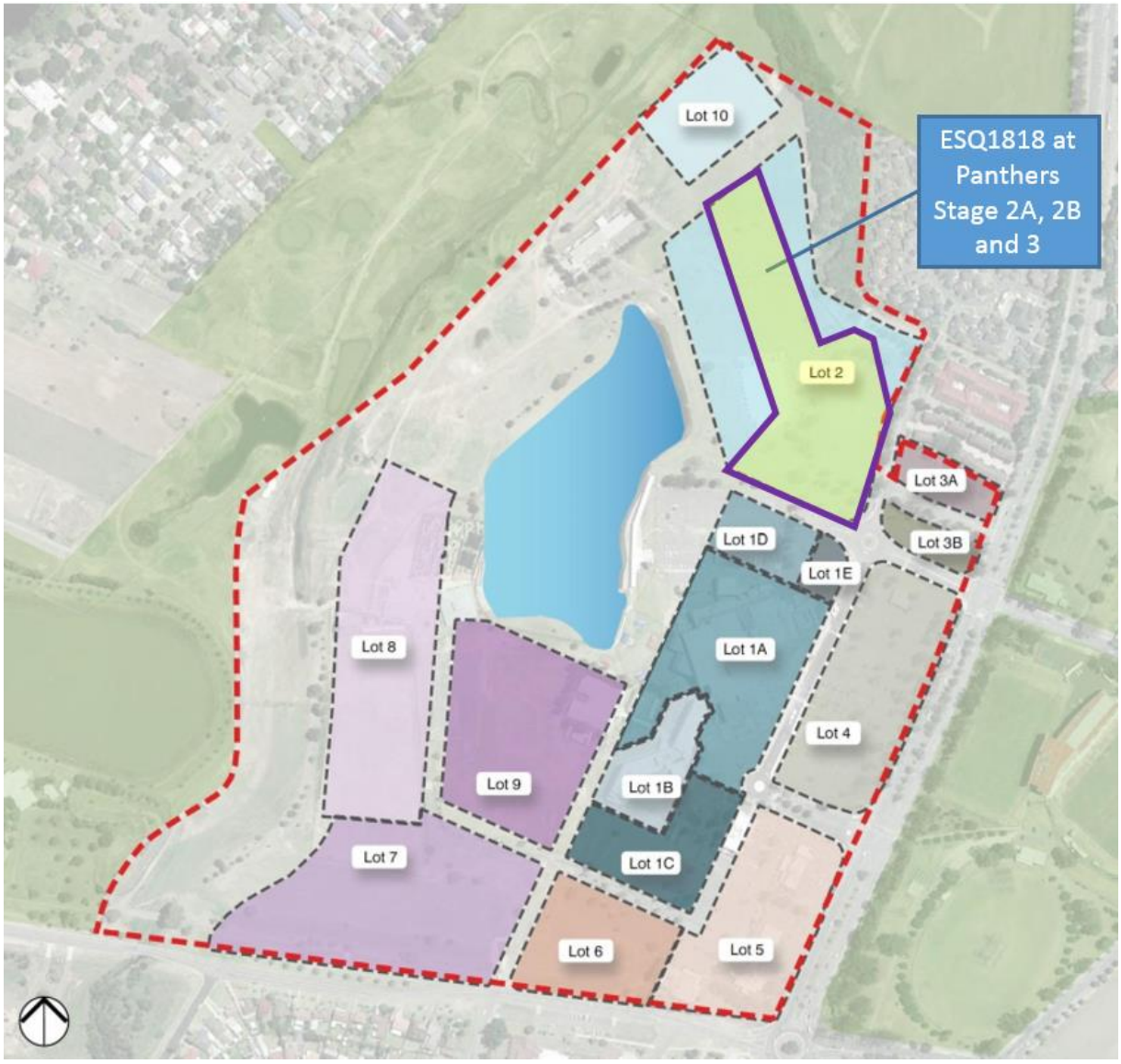
The previous reports and statements prepared by GHD for this development include:

- 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 Roads and Maritime Services (Roads and Maritime), Penrith City Council and Panthers Rugby League Club on the 28th November 2012 which outlines triggers for road upgrades associated with staging developments within the Panthers precinct. The VPA is currently being reviewed and amended to incorporate changes to the land uses within the Panthers precinct including Lot 2 that incorporates the proposed ESQ 1818 Stage 2A, 2B and 3.
- 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.

1.3 Site location and proposed development summary

The subject site for the Stage 2A, 2B and 3 (Lot 2) development is located on the northwestern corner of Retreat Drive and Ransley Street intersection. The location of Stage 2A, 2B and 3 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 2A, 2B and 3 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 proposal includes a total residential Gross Floor Area (GFA) of 28,355 m^2 and retail GFA of 1,225 m^2.

Table 1 Stage 2A, 2B and 3 development key features

Land Use	Use type	Number		Parking	Number
Stage 2A	1-bed units	36		Residential Car	88 (incl. 10 accessible)
	2-bed units	42		Visitor Car	17 (incl. 1 accessible)
	3-bed units	4		Retail Car	25 (incl. 2 accessible)
	Retail	1,225 m^2 GFA		Bicycle	20 Residential 4 Visitor 16 Staff/Visitor (Retail)
				Motorbike	2 Residential/Visitor 5 Retail
				Car Wash Bays	2
				Service Vehicle Bays	1 (Loading Dock) Plus car wash bays
Stage 2B	Studio	1		Residential Car	116 (incl. 10 accessible)
	1-bed units	25		Visitor Car	12 (incl. 1 accessible) +8 on street allowance *
	2-bed units	53		Bicycle	24 Residential 8 Visitor
	3-bed units	19		Motorbike	2 Residential/Visitor
	Retail	N/A		Car Wash Bays	2
				Service Vehicle Bays	1 (Loading Dock) Plus car wash bays
Stage 3	1-bed units	48		Residential Car	157 (incl. 14 accessible)
	2-bed units	92		Visitor Car	31 (incl. 2 accessible)
	3-bed units	8		Bicycle	29 Residential 7 Visitor
	Retail	N/A		Motorbike	2 Residential/Visitor
				Car Wash Bays	3
				Service Vehicle Bays	None – combined use with Stage 2A
Total	**Units**	**328 (incl. 34 adaptable)**			
	Retail GFA	**1,225 m^2**			
	Car Parking	**446 spaces plus 8 spaces on street allowance ***		*Excludes Car wash and service vehicle bays*	

Note: (*) Council has permitted an allowance of up to 50% of the visitor parking provision for Stage 2B and 3.

In the context of the overall Panthers Precinct Masterplan, ESQ 1818 will be completed over five stages with an expected year of completion in 2024. It is proposed to consist of 850 apartments and approximately 3,500 m^2 (GFA) of retail within Lots 2, 3a and 3b. ESQ 1818 stages are known as:

- Stage 1 (located in Lots 3A + 3B);

- Stage 2A/2B (located in Lot 2);
- Stage 3 (located in Lot 2);
- Stage 4 (located in Lot 2); and
- Stage 5 (located in Lot 2).

1.4 Purpose of this statement

This statement provides a traffic impact assessment specifically for the ESA 1818 Stage 2A, 2B and 3 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 existing intersections following the development of the site (and include traffic generation of the Stage 2A, 2B and 3 submission); and
- **Parking assessment** – a review of the parking provision and layout in relation to relevant Australian Standards (AS2890), Penrith City Council DCP requirements.

1.5 Study assumptions and limitations

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.
- 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 either 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 statement and 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-100-002	P8	06/06/2019	Site Plan
DA-110-010	P14	12/06/2019	General Arrangement Plans: Basement 01
DA-110-020	P19	06/06/2019	General Arrangement Plans: Ground Level
DA-112-010	P6	22/03/2019	General Arrangement Plans: Building C_Basement Level
DA-112-020	P17	06/06/2019	General Arrangement Plans: Building C_Ground Level
DA-112-110	P14	04/06/2019	General Arrangement Plans: Building D + E_Basement Level
DA-112-120	P17	06/06/2019	General Arrangement Plans: Building D + E_Ground Level
DA-112-210	P9	12/06/2019	General Arrangement Plans: Building F_Basement Level
DA-112-220	P12	12/06/2019	General Arrangement Plans: Building F_Ground Level
DA-112-310	P12	06/06/2019	General Arrangement Plans: Building G_Basement Level
DA-112-320	P14	06/06/2019	General Arrangement Plans: Building G_Ground Level
DA-360-010	P6	06/06/2019	Ramp Sections
DA-710-008	P7	06/06/2019	GFA Diagrams Ground Level

1.6 Disclaimer

This statement has been prepared by GHD for ESQ 1818 Pty Ltd and may only be used and relied on by ESQ 1818 Pty Ltd for the purpose agreed between GHD and the ESQ 1818 Pty Ltd as set out in Section 1.4 of this statement.

GHD otherwise disclaims responsibility to any person other than ESQ 1818 Pty Ltd arising in connection with this statement. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this statement were limited to those specifically detailed in the statement and are subject to the scope limitations set out in the statement.

The opinions, conclusions and any recommendations in this statement are based on conditions encountered and information reviewed at the date of preparation of the statement. GHD has no responsibility or obligation to update this statement to account for events or changes occurring subsequent to the date that the statement was prepared.

The opinions, conclusions and any recommendations in this statement are based on assumptions made by GHD described in section 1.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

2 Existing conditions

2.1 Existing site

The existing site comprises of an at-grade car park facility consisting of approximately 355 car spaces and an adjoining exhibition marquee providing opportunity to host small and large exhibitions and markets. 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 (2017) – Modified by GHD

2.2 Existing road network

The Panthers precinct and Penrith City generally are 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.

2.2.1 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. See Figure 3.

Figure 3 Mulgoa Road looking north

Source: Google maps Streetview

2.2.2 Retreat Drive

Retreat Drive is a private road which 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. It provides access to the car park facility.

Figure 4 Retreat Drive looking north

Source: Google maps Streetview

2.2.3 Ransley Street

Ransley Street is a local road that crosses Mulgoa Road. Ransley Street, east of Mulgoa Road, provides access towards Nepean Square shopping centre located east of the site. The road 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 (within the Panthers Precinct) 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 the car park facility and conveys approximately 200 vehicles during the peak hour periods (based on 2016 survey data).

Figure 5 Ransley Street (east of Mulgoa Road) looking east

Source: Google maps Streetview

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

Source: Google maps Streetview

2.2.4 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 7). 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.

Figure 7 Panthers Link Road looking north

Source: Google maps Streetview

2.2.5 Jamison Road

Jamison road is a regional road which 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 and one lane each, west of Mulgoa Road. It is signpost at 60 km/h within proximity of the site.

Figure 8 Jamison Road looking east

Source: Google maps Streetview

2.3 Public transport and active transport

In reviewing the site and its accessibility to public transport opportunities, reference is made to the NSW Planning Guidelines for Walking and Cycling (2004). This document outlines a recommended 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 access is provided in the following sections.

2.3.1 Bus services

As indicated in Figure 9, 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 150 west of the site in Ransley Street. 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 Weekend: Saturday: 60-minute intervals Sunday: 120-minute intervals	Penrith to Leonay (Loop Service)
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 Shopper Hopper via Mountainview Retirement Village & Centro Nepean

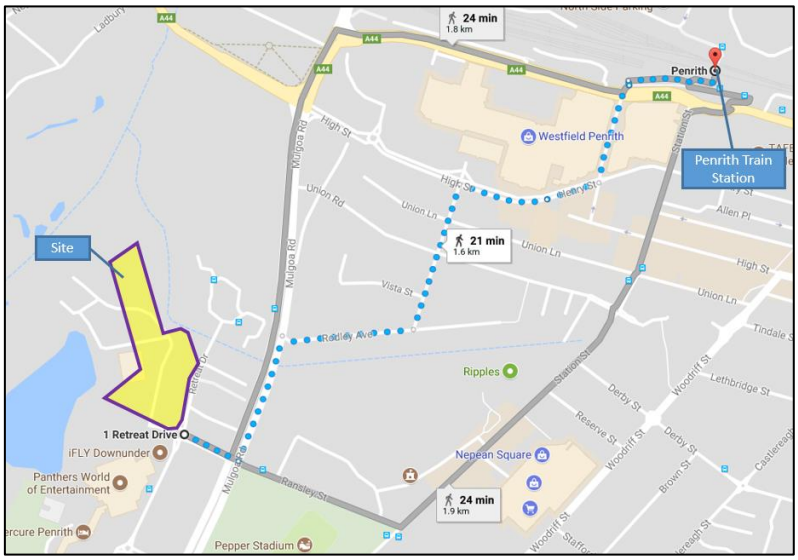
Figure 9 Bus stops

Source: Google maps (2017) – Modified by GHD

2.3.2 Train services

Penrith station is located approximately 1.6 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 (see Figure 10).

Figure 10 Location of Penrith train station



Source: Google maps (2017) – Modified by GHD

2.3.3 *Bicycle access*

The existing bicycle routes within the vicinity of the proposal site are shown in Figure 11 as identified from the Roads and Maritime Services Cycleway Finder website.

As shown, there are currently off-road bicycle routes within close proximity to the site along Mulgoa Road and provides 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 11 Existing bicycle network

Source: Transport for NSW Centre for Road Safety – Modified by GHD

2.3.4 *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 existing conditions (2016)

3.1 Traffic surveys (2016)

In order to obtain traffic data, Matrix Traffic and Transport Data completed traffic turning counts for the AM and PM peak periods on Wednesday 6th 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; and
- 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

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 Roads and Maritime Services (Roads and Maritime) 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 are displayed in Figure 12.

Figure 12 Total PM traffic at the Mulgoa Road and Retreat Drive intersection

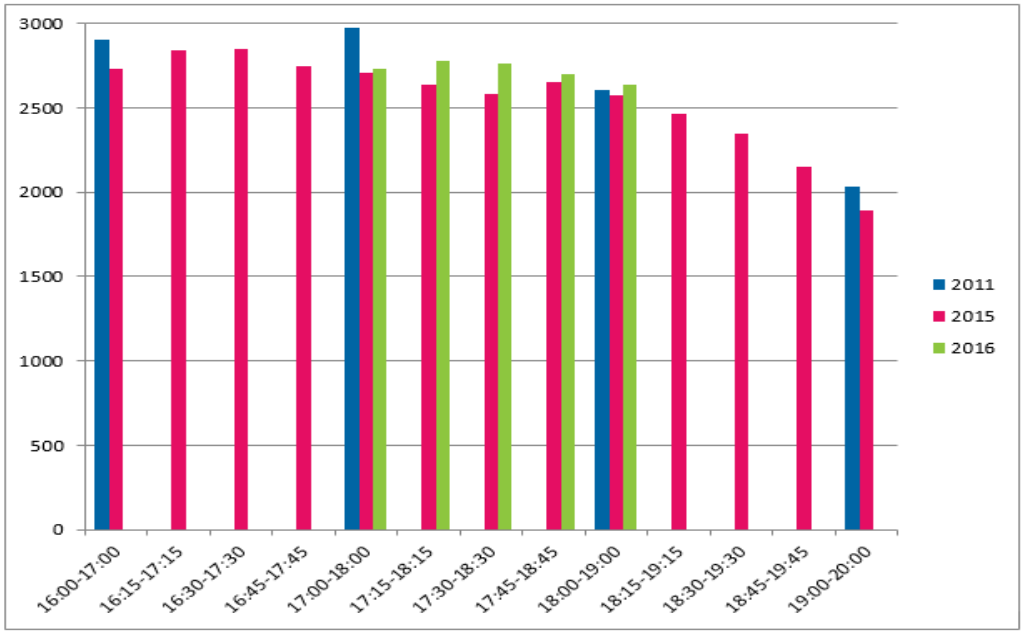


Figure 12 indicates that the traffic volumes on the road network in proximity to the subject site have typically decreased between 2011 and 2015/2016.

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 volumes (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% 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 tail backs 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.

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 per Vehicle (seconds/veh)	Traffic Signals, Roundabouts	Give Way & 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 Voluntary Planning Agreement (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; and
- 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 2A, 2B and 3). The VPA assumes a set of upper-limit estimated design parameters and traffic distribution as outlined in **Appendix A** with the objective to meet 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 2A, 2B and 3 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 statement.

Table 6 Stage 2A, 2B and 3 trip generation comparison with VPA

Stage	Land Use	Trip Generation Rate	VPA Assessment provision	VPA Trip Generation	Proposed provision (Turners Studio Architects)	Proposed Trip Generation
2A/2B	Residential	0.5 trips / dwelling	186 dwellings	93	179 dwellings	90
	Retail	2 trips / 100 m^2 GLFA (GLFA=0.75 x GFA)	1,225 m^2	18	1,225 m^2	18
3	Residential	0.5 trips / dwelling	144 dwellings	72	148 dwellings	74
Total Trips (peak)				***184 trips***		***182 trips***

Based upon the comparison trip generation outlined in Table 6, it can be seen that the trip generation for the proposed Stage 2A, 2B, 3 development by Turners Studio Architects is nominally equivalent, but no more 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 2A, 2B and 3, 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 assesses the parking component of the ESQ 1818 Stage 2A, 2B and 3 at Panthers development based on the Penrith City Council Development Control Plan 2014 (DCP) Part C10 Transport, Access and Parking. Table 7 provides a comparison to the minimum DCP parking requirements and the proposed parking provisions. The DCP outlines the following minimum parking requirements:

- Studio units – not specified
- 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.
- Retail parking: 1 space per 30 m^2

Table 7 ESQ 1818 Stage 2A, 2B and 3 development parking

Stage	Land Use	Use type	Number	DCP (2014) Parking rates	Minimum Parking Provision	Proposed Parking Provision
Stage 2A	Residential	1-bed unit	36 units	1 space per unit	36	
		2-bed unit	42 units	1 space per unit	42	
		3+ bed unit	4 units	2 spaces per unit	8	88
		Visitors	82 units	1 space per 5 units	17	17
	Retail		1,225 m2 GFA	1 space per 30 m^2	41	25
Subtotal					***144***	***130***
Stage 2B	Residential	Studio	1 unit	Not specified	0	
		1-bed unit	25 units	1 space per unit	25	
		2-bed unit	53 units	1 space per unit	53	
		3+ bed unit	19 units	2 spaces per unit	38	116
		Visitors	98 units	1 space per 5 units	20	12 (plus 8 on street) *
Subtotal					***136***	***128 (plus 8 on street) ****

Stage	Land Use	Use type	Number	DCP (2014) Parking rates	Minimum Parking Provision	Proposed Parking Provision
Stage 3	Residential	1-bed unit	48 units	1 space per unit	48	
		2-bed unit	92 units	1 space per unit	92	
		3+ bed unit	8 units	2 spaces per unit	16	157
		Visitors	148 units	1 space per 5 units	30	31
Subtotal					***186***	***188***
Total					***466***	***446 (plus 8 on street)****

Note: (*) Council has permitted an allowance of up to 50% of the visitor parking provision for Stage 2B and 3.

The proposal includes a total of 361 residential spaces and 60 residential visitor spaces (plus 8 on street spaces) to meet the relevant statutory minimum parking requirement for both the residential and residential visitor component. The use of on-street parking was permitted for up to 50 percent of the visitor parking provision for Stage 2B and 3 under an agreement with Penrith City Council. This allowance in the reduction of visitor parking within the basement was as a result of the Council request to reallocate the service loading dock within the basement amendment to the basement configuration along the northern creek boundary and streetscape improvements. Visitors to the residential facilities within the development are able to utilise both the basement (typically of longer duration), or street parking (typically of shorter duration).

The DCP requirement for the retail component for the development is 41 car spaces (Stage 2A), with the proposed provision of 25 car spaces. It is proposed that the differential in parking provision for the retail component be offset with the use of the newly constructed multi-storey car park facility located directly south of the development. 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.

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 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 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 has the following requirement for accessible parking:

- Accessible car spaces should be provided in Accordance to Premises Standards, Building Code of Australia and AS2890.
- With reference to the above, the proposed development should provide:
  - One space per each adaptable dwelling; and
  - Visitor parking: Two percent of the total spaces.

A summary of the minimum and proposed accessible parking provision is outlined in Table 8.

Table 8 Accessible parking provision

Land use	Total parking provided	Required Accessible Parking Spaces	Accessible spaces provided
Residential	361	34 adaptable units	34
Residential Visitor	60 (within basement)	2	4 *
Retail Visitor	25	1	2
Total		**37**	**40**

(*) 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 37 accessible car spaces to meet the DCP requirement. The proposal includes a total of 40 accessible car spaces with the individual stages to meet 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 9.

Table 9 Car wash bays provision

Land use	Number of units	Required Car Wash spaces	Car Wash spaces provided
Stage 2A	82	2	2
Stage 2B	98	2	2
Stage 3	148	3	3
Total	***328***	***7***	***7***

The proposal includes a provision of 7 car wash bay located within the basement level car park areas to meet the DCP requirement.

4.4 Bicycle parking facilities

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; and
  - 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.

Information on staffing provision has yet to be established, therefore to assist in the guidance of the retail bicycle parking component, it has been based on Austroads Cycling Aspects of Austroads Guides which outlines for shops as:

- Staff Parking: 1 space per 300 m^2 GFA; and
- Visitor Parking: 1 space per 500 m^2 GFA.

For the proposed development of 328 units, 1,225 m^2 GFA for retail and based upon the above rates, the suggested minimum total bicycle parking provision is outlined in Table 10.

Table 10 Bicycle parking provision

Stage	Land use	Number of units/GFA	Minimum recommended bicycle parking *		Bicycle parking provided	
			Resident/Staff	Visitor	Resident/Staff	Visitor
Stage 2A	Residential	82 units	16	4	20	4
	Retail	1,225 m^2	4	3	8	8
Stage 2B	Residential	98 units	20	5	24	8
Stage 3	Residential	144 units	29	7	29	7
Total			***69***	***16***	***81***	***27***

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

To encourage alternate sustainable transport options, the proposal includes the provision of new bicycle parking facilities to accommodate **108 bicycles.** It is noted there is opportunity to expand and provide additional bicycle parking within the basement areas should the demand exceed the bicycle parking supplied. 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.

Bicycle parking for residents should be provided within basement with the visitor cycle parking located in close proximity to the entry in the basement or building entries.

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.

Two separate loading docks have been provisioned for the proposal as follows

- One loading dock within Stage 2A to facilitate the loading facilities (including waste collection) for both the residential and retail component of Stage 2A.
- One loading dock within Stage 2B, to facilitate the loading facilities (including waste collection) of the residential components of Stage 2B and 3.

Council has requested that the loading docks be positioned within the basement for the residential only developments (Stage 2B and 3). Architectural plans have been updated to incorporate a loading dock in Stage 2B basement to facilitate the loading facility for both Stage 2B and 3, while Stage 2A at the rear of the retail parking area on the ground floor.

In addition, the Council provided updated service vehicle specifications to be accommodated within the loading dock facilities. These include:

- Length: 9.67 m
- Wheelbase: 4.20 m
- Front overhang: 1.88 m
- Swept circle: 17 m
- Roadway/ramp grade (maximum): 1:6.5 (15.4%) – outlined within AS2890.2 (for Small Rigid Vehicle).
- Rate of change (maximum): 1:12 (8.3%) in 4.0 m of travel – outlined within AS2890.2 (for Small Rigid Vehicle).
- Unobstructed internal height clearance of 3.5 m – outlined within AS2890.2 (for Small Rigid Vehicle).

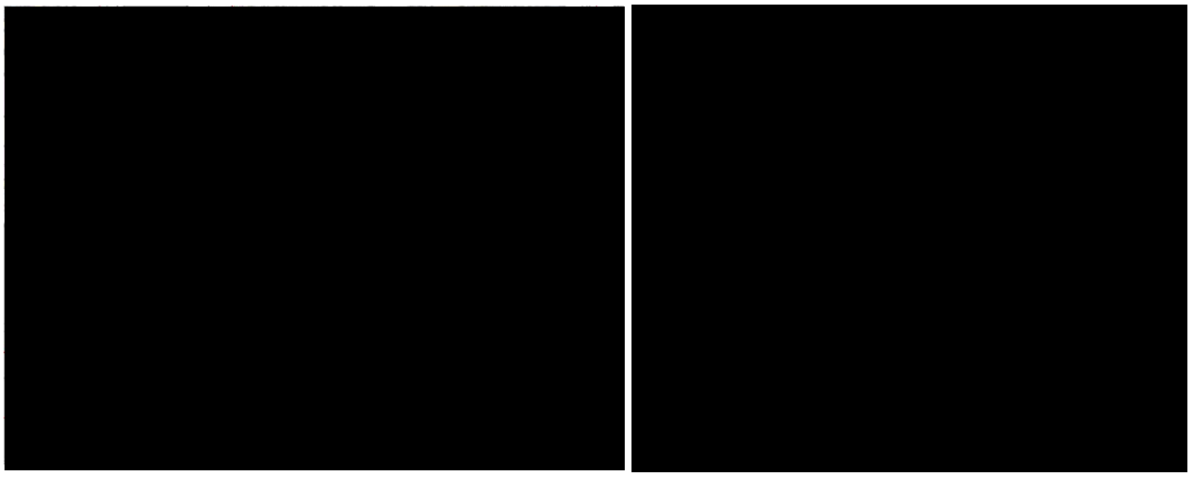
Each dock contains a mechanical turntable within the loading dock to facilitate the turning of a vehicle up to 9.67 m in length (as specified by Council) to allow vehicle entry and exit from the loading dock in a forward direction. The turntable also forms the location of a parked service vehicle permitting a parking area for one space for a vehicle up to 9.67 m in length (at any one time), which is suitable for waste collection vehicles.

Ramp grades between the ground floor level and basement loading dock areas have been provided to accommodate the required Council specifications.

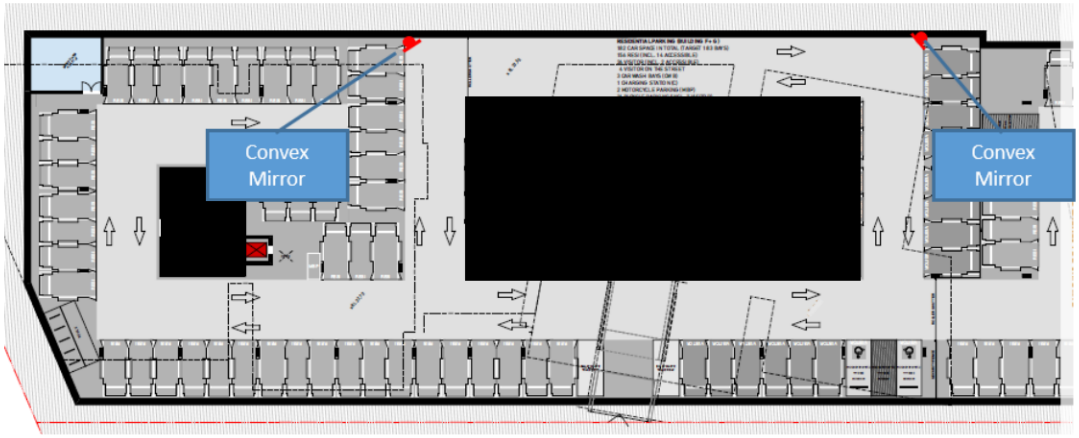
It is suggested, a loading dock management plan would need to be in place to manage the use and operations of the loading docks. The management plan will outline the operation of the loading dock and provide an opportunity to pre-arrange vehicular access to the loading dock, such as deliveries or waste collection vehicles. Such a 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 the basement and loading dock. Such signage should advise drivers when the loading dock is occupied and not to enter the facility.

Additionally, convex mirrors should be installed in areas where sight lines maybe restricted, notably on ramp access areas and egress points from the loading docks as shown in Figure 13.

Figure 13 Convex mirrors recommendations



Stage 2A ***Stage 2B***



Stage 3

Within Stages 2A, 2B and 3 there are seven 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 a turning path plans for a 9.67 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 tuning path plans show the turn paths for a B99/B85 vehicle (light vehicles) as key areas such as circulation ramp within the development.

4.6 Other parking provisions

A vehicle charging station is proposed to be provided within the visitor car parking provisions within each stage of the development for the use of electric powered vehicles. This facility provides the opportunity to encourage the use of alternate sustainable vehicle options.

The Penrith City Council DCP does not outline parking requirement for motorcycles. However, to encourage alternative transport options, the development also includes the following designated motorcycle provision within the basement of each development. In addition, there are areas of available space for informal motorcycle parking (if required).

- Stage 2A:
  - 2 spaces (residential/visitor); and
  - 5 spaces (retail).
- Stage 2B:
  - 2 spaces (residential/visitor).
- Stage 3:
  - 2 spaces (residential/visitor).

5 Parking layout and access review

5.1 Car park arrangement

5.2 General layout

An assessment of the car parking has been undertaken using *AS2890.1 – Off Street Car Parking.* Table 1.1 of AS2890.1 which presents a number of car park classifications applicable to different land-uses. According to the table, the car park will comprise a Class 1A facility suitable for residential use, and Class 2 facility, which is suitable for the use of generally medium-term parking (visitors). The parking space dimensions and associated aisle widths for each facility classification are presented in AS2890.1: Figure 2.2 include:

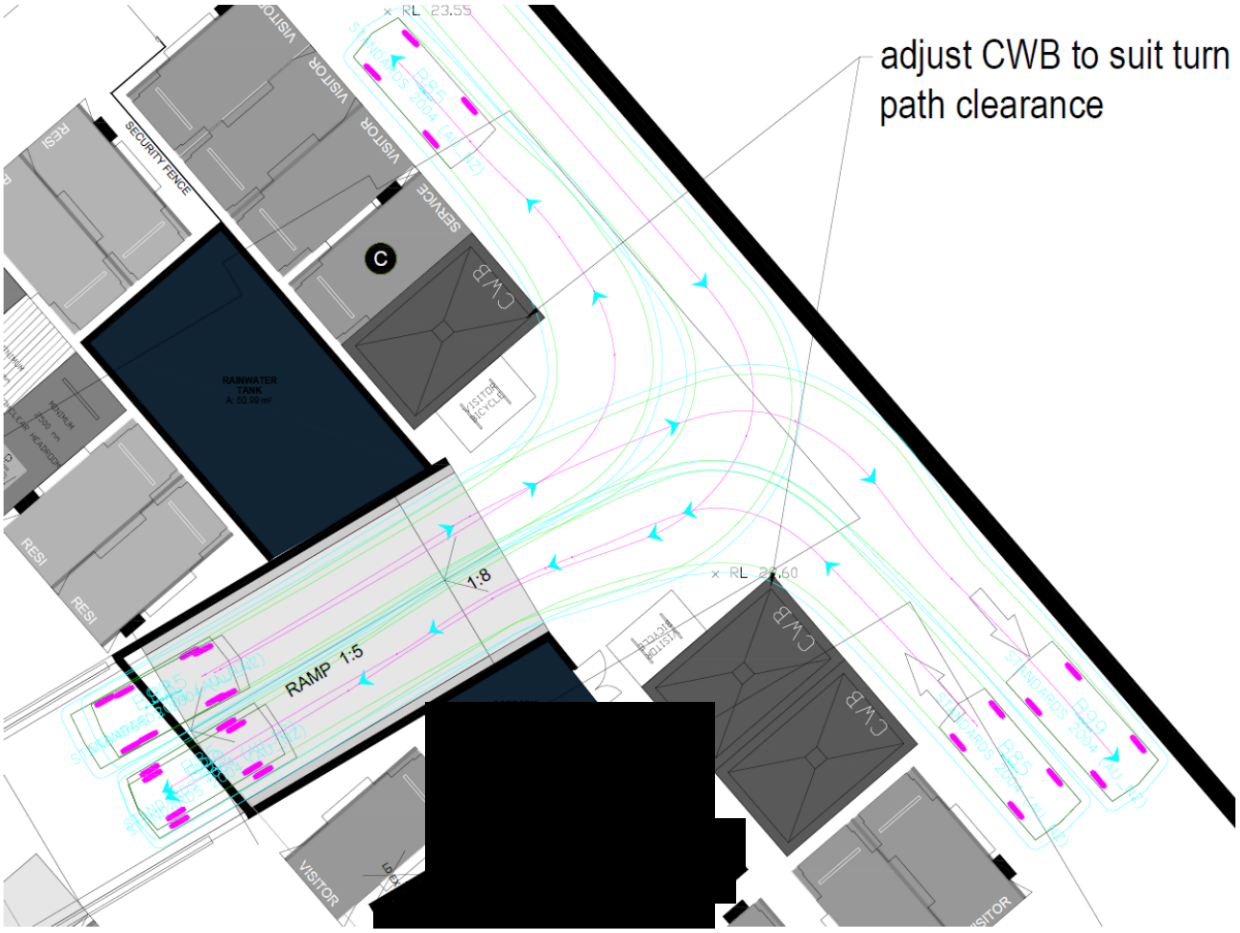
- Class 1A facility (residential):
  - Spaces: 2.4 m x 5.4 m; and
  - Aisle Width: 5.8 m
- Class 2 facility (retail):
  - Spaces: 2.5 m x 5.4 m; and
  - Aisle Width: 5.8 m

A review of the parking layout has been completed within the proposed development. The basement parking consists of residential parking spaces with dimensions with dimensions of 2.4 m x 5.4 m and aisle widths of minimum 5.8 m and visitor parking space dimensions with dimensions of 2.5 m x 5.4 m and aisle widths of minimum 5.8 m.

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

Appendix B provides a turning path plans for a B85/B99 design vehicles at ramp locations to advise on the desirable turn path requirements (and replicated in Figure 14. It was identified there is minor encroachment on the clearance at the ramp access to Stage 3 with the car wash bays within the basement. Such amendments should be accommodated in future design stages.

Figure 14 Vehicle clearance encroachment on car wash bays



5.3 Accessible parking

Also within the layout, there is provision for accessible car spaces. Section 2.2 of AS2890.6 requires parking space dimensions 2.4 m x 5.4 m with an access aisle width of 5.8 m and a shared area of 2.4 m x 5.4 m between spaces.

The proposed car park has been designed to provide compliant parking space with minimum dimensions of 2.4 m by 5.4 m, minimum aisle width of 5.8 m and a shared space of 5.4 m by 2.4 m, which meets the minimum requirement.

Also provided within Stage 3 is an accessible parking space based upon AS4299-1995 Adaptable Housing, which outlines an accessible parking space of 3.8 m x 5.4 m.

5.4 Car park circulation

5.4.1 Stage 2A Residential Component

The basement car parking consists of two-way circulation throughout the parking module. The basement level parking provides visitor parking provision within immediate proximity to the basement access. Circulation is available throughout the basement to allow vehicles to exit and enter the basement in a forward direction, however it will require a three-point turn utilising the nearby aisle. It is therefore recommended that parking identification measures are provided within the visitor parking area to advise motorists prior to entering the car park whether visitor parking is available.

5.4.2 Stage 2A Retail Component

The ground floor car park consisting of a single two-way aisle with an end-bay facility utilised as a turning area. Clear delineation and signage are to be provided restricting parking within the turning area. Due to the number of parking spaces provided and the associated turning area, it is recommended that parking identification measures are provided within the retail parking area to advise motorists prior to entering the car park whether parking is available.

5.4.3 Stage 2B Residential Component

The basement car parking consists of two-way circulation throughout the parking module. The basement level parking provides visitor parking provision within immediate proximity to the basement access and parking aisle. Circulation is available throughout the basement to allow vehicles to exit and enter the basement in a forward direction, however it will require a three-point turn utilising the nearby aisle. It is therefore recommended that parking identification measures are provided within the visitor parking area to advise motorists prior to entering the car park whether visitor parking is available.

5.4.4 Stage 3 Residential Component

The basement car parking consists of two-way circulation throughout the parking module. The basement level parking provides visitor parking provision within immediate proximity to the basement access. Circulation is available throughout the basement to allow vehicles to exit and enter the basement in a forward direction, with the opportunity for drivers to recirculate. It is recommended that parking identification measures are provided within the visitor parking area to advise motorists prior to entering the car park whether visitor parking is available and directional signage to the separated visitor parking area located east of the ramp access/egress.

5.5 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.

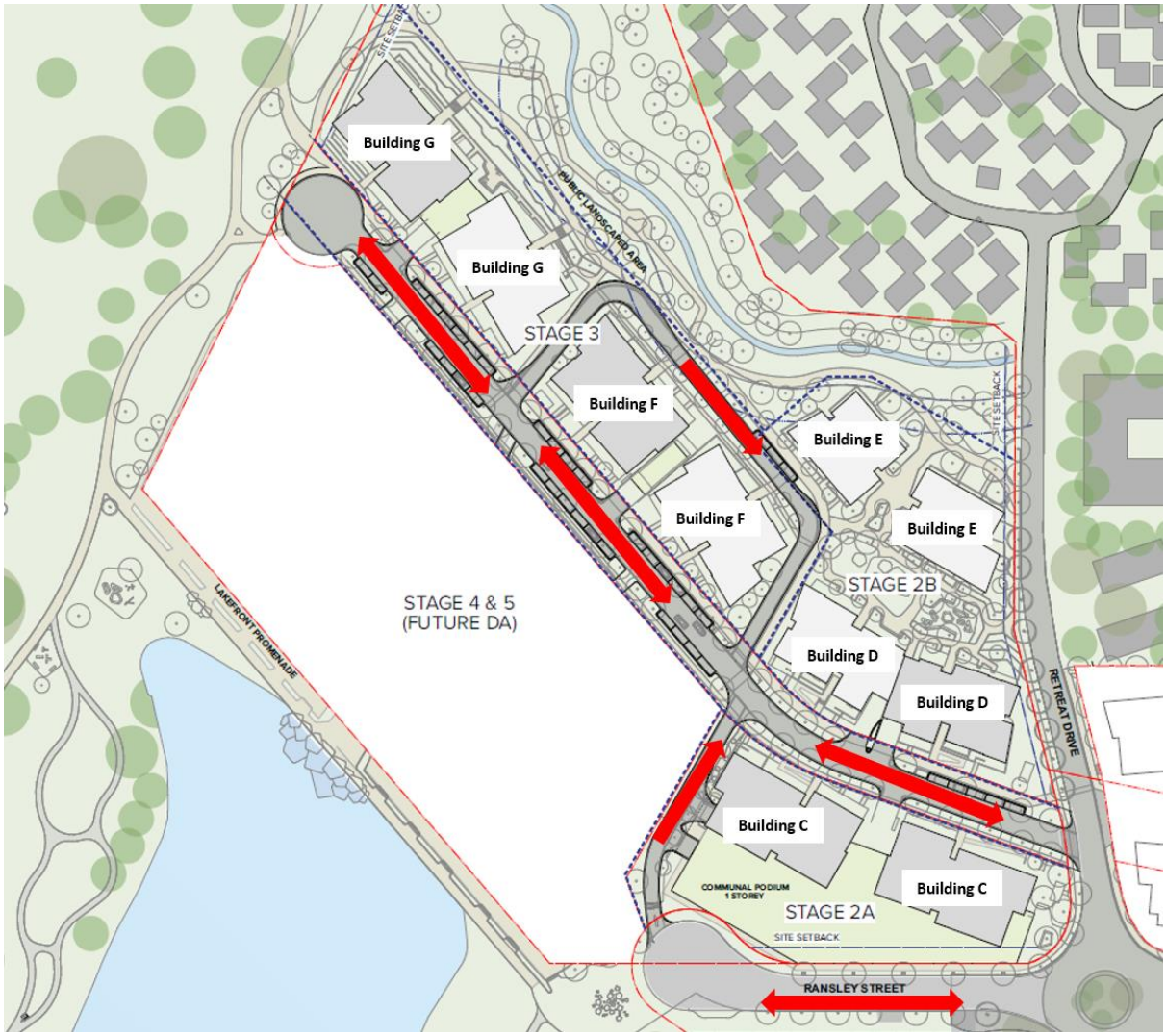
Egress from the development sites is via the proposed new access road which is anticipated to have a speed limit of up to 40 km/h. The ESQ 1818 precinct is in a low-speed environment with on-street parking, narrow road environment and traffic control measures to assist in maintaining traffic speeds. 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.

5.6 Road network

The road network within the ESQ 1818 precinct provides connection to the existing Retreat Drive via a priority controlled intersection and the Ransley Street roundabout. A central road (6.5 m wide) provides two-way access and kerbside side parking (2.5 m wide), generally in line with DCP 2014 E13 Part B Panthers Precinct secondary streets with Parking (Road Type 2a). A minor one-way road (4.6 m wide) provides circulation north of Building F to Building G. It is proposed to provide a one-way link (4.6 m wide) west of Building C, primarily aimed as a pedestrian area, while still providing vehicular access to the car park facility. Refer to Figure 15.

Figure 15 ESQ 1818 external road 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 2A, 2B and 3 Lot 2 within the Penrith Panthers Precinct, which comprises of:

- Residential apartments: 328 units
- Retail space: 1,225 m^2 GFA
- Car parking spaces:
  - Residential: 361 spaces
  - Visitor: 60 spaces within the basement and 8 spaces utilising on street parking availability
  - Retail: 25 spaces
- Bicycle parking: 108 spaces
- Motorcycle parking: 11 spaces
- Car wash facilities: 7 car wash bays
- Service vehicle parking: two loading docks suitable to accommodate one 9.67 m trucks within each loading dock. Stage 2A is at ground level to service the Stage 2A residential and retail facilities, while the loading dock in the basement of Stage 2B will service the residential component of both Stage 2B and 3. Additional there are seven car wash bays within the basement that can supplement maintenance vehicles such as utes/vans.

6.2 Traffic impact

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

- The traffic generation of the proposed development based on the agreed trip generation rates is 182 trips, which is compatible with the 184 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 2A, 2B and 3 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 within the report are as follows:

- An assessment of the statutory parking requirement against the Penrith City Council DCP indicates that the development is required to provide 466 parking spaces for the residential, visitors and retail components. The proposed development meets the requirements for the residential and visitor component with the Penrith City Council agreement for an allowance of up to 50 percent of the visitor parking provision for Stage 2B and 3 permitted on street.

- The provision of 25 spaces for the retail component does not achieve the DCP requirement of 41 spaces. It is proposed that the differential in parking provision for the retail component be offset with the use of the newly constructed multi-storey car park facility located directly south of the development. 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.
- The layout of the basement car park is generally in accordance with AS2890.1, AS2890.2, and AS2890.6, subject to minor modification of the car wash bay location at the bottom of Stage 3 ramp access.
- An assessment of the loading dock facility accommodating up to one service vehicle, indicates that it will be able to accommodate the expected design service vehicles of up to 9.67 m in length and allow the vehicles to enter and exit the site in a forward direction with the use of a mechanical turntable. Additionally, the total of seven car wash bays provided within the development can facilitate small service vehicles such as utes and vans for supplementary general maintenance vehicles.

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.
- 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.
- 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.

6.5 Conclusion

Based on the assumptions and investigations undertaken by GHD and the conclusions drawn above, it is considered that the proposed Stage 2A, 2B and 3 development satisfies the planning requirements on traffic engineering grounds with consideration to reduce parking provision (for the retail component), Penrith City Council agreement that up to 50% of visitor parking is permitted on-street for Stage 2B/3 and mitigation measures outlined. The reduction of parking rate applied could be supplemented with the consideration the use of the newly constructed multi-story car park adjacent to the site, the proposed on-street parking provisions and implementation of a Transport Access Guide to encourage sustainable transport options and reducing parking demand. Furthermore, the forecast traffic generation associated with the proposed development aligns with the VPA analysis.

Sincerely
GHD Pty Ltd

[redacted]
Sean Clarke
Senior Traffic Engineer
[redacted]

Appendix A

Voluntary Planning Agreement Traffic Modelling Parameters

Panthers Precinct Modelling Parameters **07/8/2018**

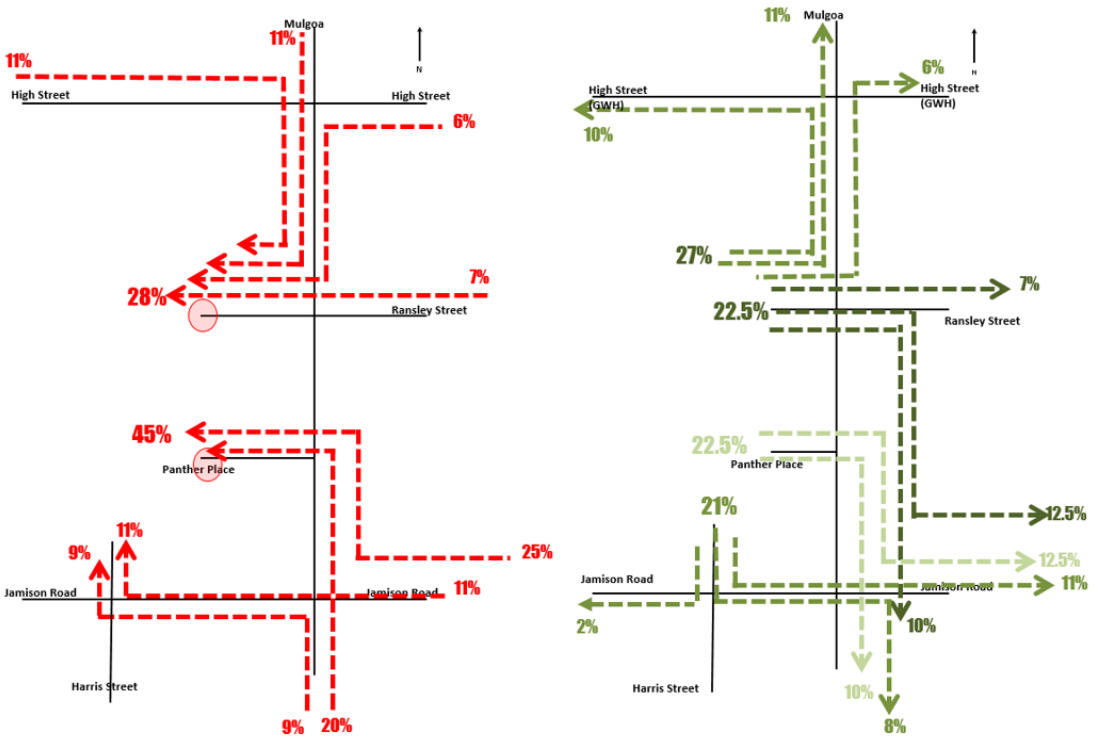
Table 1 - Summary of Scenarios for traffic modelling **Rev 9**

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	*Western Sydney Conference and Community Centre*			
			• 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	*Western Sydney Conference and Community Centre*			
			• Hotel	190 rooms	12,079 m^2	0.5 trips / room *
3 (Stage 3)	2021	Lot 4	*Western Sydney Conference and Community Centre*			
			• 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	*Commercial Office and indoor recreation*			
			• 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



Traffic Distribution To/From the Penrith Panthers Site

Appendix B

Turning Path Plans

Convex mirrors

LEGEND

NOT TO SCALE

DIRECTION OF TRAVEL

300mm clearance

Vehicle body

B99 STANDARDS 2004 (AU_NZ)

B99	meters	B85	meters
Width	: 1.94	Width	: 1.87
Track	: 1.84	Track	: 1.77
Lock to Lock Time	: 6.0	Lock to Lock Time	: 6.0
Steering Angle	: 33.9	Steering Angle	: 34.1

PRELIMINARY DRAFT

TURNER STUDIO ARCHITECTS

PROPOSED MIXED DEVELOPMENT, PANTHERS NORTH PRECINCT, PENRITH

SWEPT PATH ANALYSIS - B85/B99 Vehicle
Building D - E Basement Level

21-25061-SK20 **REV B** 13/06/2019

Convex mirrors

adjust CWB to suit turn path clearance

LEGEND

DIRECTION OF TRAVEL

300mm clearance

Vehicle body

B85 STANDARDS 2004 (AU_NZ)

NOT TO SCALE

	B85	B99
	meters	meters
Width	: 1.87	: 1.94
Track	: 1.77	: 1.84
Lock to Lock Time	: 6.0	: 6.0
Steering Angle	: 34.1	: 33.9

PRELIMINARY DRAFT

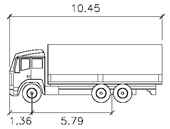
TURNER STUDIO ARCHITECTS

PROPOSED MIXED DEVELOPMENT, PANTHERS NORTH PRECINCT, PENRITH

SWEPT PATH ANALYSIS - B85/B99 Vehicle
Building G Basement Level

21-25061-SK21 **REV B** 13/06/2019

LEGEND



10.5 – COLLEX CARBAGE

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

NOT TO SCALE

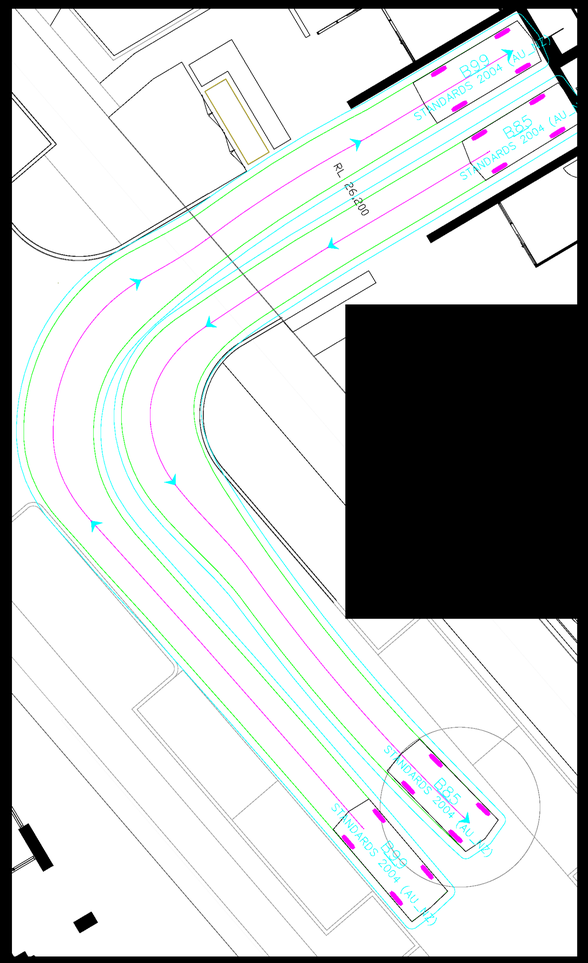
PRELIMINARY DRAFT

TURNER STUDIO ARCHITECTS

PROPOSED MIXED DEVELOPMENT, PANTHERS NORTH PRECINCT, PENRITH

SWEPT PATH ANALYSIS - Collex GarbageVehicle
Building D Basement Level

21-25061-SK22 **REV B** 13/06/2019



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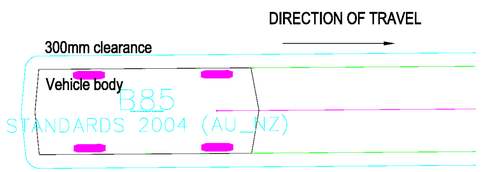

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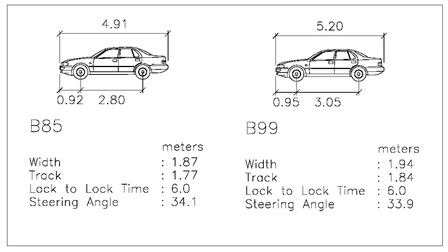


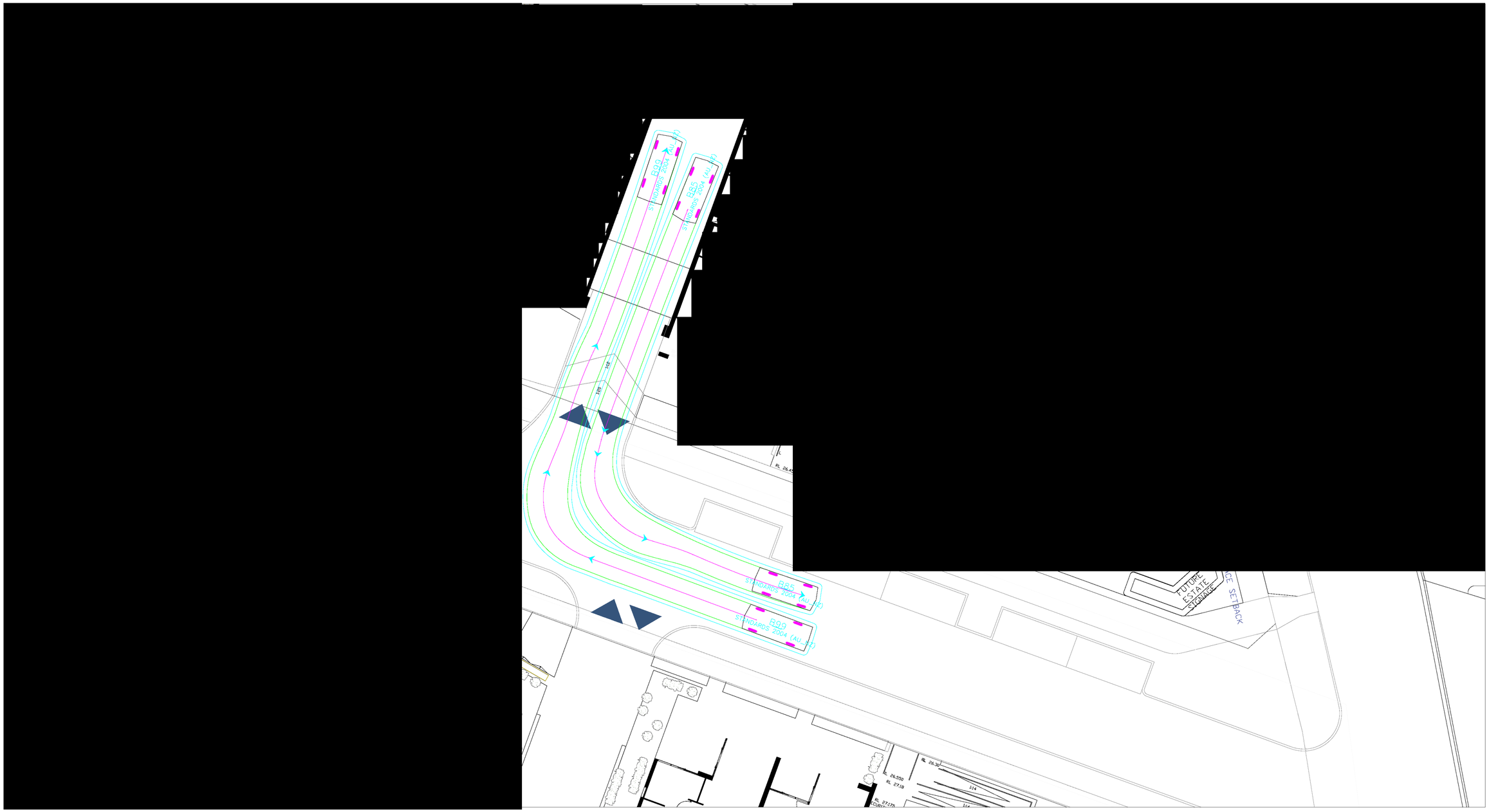
PRELIMINARY DRAFT

TURNER STUDIO ARCHITECTS

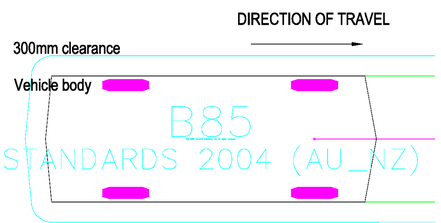
PROPOSED MIXED DEVELOPMENT, PANTHERS NORTH PRECINCT, PENRITH

SWEPT PATH ANALYSIS - B85/B99 Vehicle
Building G Ground Level

21-25061-SK24 **REV B** 13/06/2019



LEGEND



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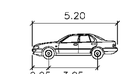
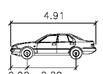


B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

PRELIMINARY DRAFT

TURNER STUDIO ARCHITECTS

PROPOSED MIXED DEVELOPMENT, PANTHERS NORTH PRECINCT, PENRITH

SWEPT PATH ANALYSIS - B85 / B99 Vehicle
Building D Ground Level

21-25061-SK25 **REV B** 13/06/2019

9. Appendix D Waste Management Plan

ESQ1818, Stages 2A, 2B & 3, Residential Development, Panthers North Precinct, Ransley Street, Penrith

JUNE 2019

Operational Waste Management Plan

WASTE AUDIT AND CONSULTANCY SERVICES
Level 21 / 133 Castlereagh Street
Sydney, NSW 2000

[redacted]

This report contains confidential information. It has been compiled by Waste Audit and Consultancy Services (Aust) Pty Ltd for the ESQ1818 Mixed Use Development.

This Waste Management Plan is not a substitute for legal advice on the relevant environmental legislation, which applies to the developers, its contractors or other bodies. Accordingly, Waste Audit and Consultancy Services (Aust) Pty Ltd will not be liable for any loss or damage that may arise out of this project, other than loss or damage caused as a direct result of Waste Audit and Consultancy Services (Aust) Pty Ltd's negligence.

Table of contents

1. Introduction

This Waste Management Plan (WMP) has been prepared to accompany a Development Application for the ESQ1818 Stages 2A, 2B & 3, Residential Development for Buildings C, D, E, F and G. This stage of the development consists of 328 residential apartments and 1,215 m^2 of retail premises.

The following diagram illustrates the location of Stages 2A, 2B & 3, with the other Stages either had a Development Application submitted or will at a later time.

Waste audit and management strategies are recommended for new developments to provide support for the building design and promote strong sustainability outcomes for the building. All recommended waste management plans will comply with council codes and any statutory requirements. The waste management plan has three key objectives:

1. ***Ensure waste is managed to reduce the amount of waste and recyclables to land fill*** by assisting staff and visitors to the buildings to segregate appropriate materials that can be recycled; displaying signage to remind and encourage recycling practices; and through placement of recycling and waste bins to reinforce these messages.

2. ***Recover, reuse and recycle*** generated waste wherever possible.

3. ***Compliance*** with all relevant codes and policies.

This Plan has been developed with reference to the Penrith City Council's Development Control Plan 2014: Section C5 Waste Management (including Residential Flat Building Waste Management Guidelines), and Appendix F5 Technical Information.

2. Waste Generation

2.1 Waste Streams

Based on the number of apartments for this development (as per Section 1), the following are the predominant waste streams that would be expected on a regular basis:

- Paper/cardboard recycling;
- Comingled recycling (glass and plastic container); and
- General waste.

Paper, Cardboard and Commingled recycling will be consolidated into the one bin – this is to ensure that the system is economically viable. However, once the waste contractor has been appointed this may be reviewed depending on management costs and potential for rebates for materials.

Other wastes may be generated, but these would be irregular in terms of when generated and as such the quantities not able to be estimated. These would be materials such as furniture, e-waste, and other materials. Space will be provided for recycling of these other streams as required.

In addition, residents will be able to access Councils hard waste collection.

2.2 Waste Generation Estimates

Calculations for the types and quantities of waste that will be generated are based on the estimates are provided in the City of Penrith's *Development Control Plan 2014: Appendix F5 Technical Information*. In addition, averages for quantity of waste generated and composition as determined by industry data (ie., data/information provided by WACS' waste audits conducted in a broad range of sectors).

The following table shows the estimated waste generated for the development – these estimates are based on averages for quantity of waste generated and composition as determined by industry data (ie., data/information provided by WACS' waste audits conducted in a broad range of sectors) as well as consideration of waste management requirements as specified by the City of Penrith.

2.3 Residential Development

These estimates are based on averages for quantity of waste generated and composition as determined by industry data (ie., data/information provided by WACS' waste audits conducted in a broad range of sectors) as well as consideration of waste generation rates as indicated by Penrith City Council.

Waste generation estimate - residential

Building	General Waste/week (L)	Recyclables/week (L)	Total/week (L)
F & G	11,840	5,920	17,760
D & E	7,840	3,920	11,760
C	6,560	3,280	9,840

For the retail sector, the following is the estimated generation rate per week

Waste generation estimate - retail

Classification	General Waste/week (L)	Recyclables/week (L)	Total/week (L)
Retail	608	608	1,215

3. Waste Management Storage Calculations

The following table show the recommended waste storage requirements (based on 1100 litre mobile garbage bins). This is based on Council's requirement for:

- Waste – 1 x 1100 litre MGB per 18 apartments
- Recycling – 1 x 1100 litre MGB per 18 apartments

In addition, there should be an allowance of 30% space for bin movement (within each storage room), and a minimum 8.0m^2 for bulky goods.

Based on Council's bin requirements the following summarises the number of1100 litre MGB required per building:

Chute room bin requirements

Stream	Building		
	F & G	D & E	C
Waste	8	5	5
Recycling	8	5	5
Service Bins	8	8	4

In regards to storage space for "bulky waste", Council requires space based on the calculation of Number dwellings x 8.0m^2 divided by 52. This results in a bulky waste space requirement for the following buildings. This is for the following buildings:

C – 13 m^2

D & E – 15 m^2

F & G – 23 m^2

4. Waste Management Systems

4.1 Apartments

The following summarises the recommended waste and recycling systems that will be implemented for the buildings. These recommendations are based on the City of Penrith's requirements and systems implemented for similar developments (and tenants).

To ensure that the proposed management actions occur management requirements will be contained within the Strata By-laws as well as within the service contract for the maintenance/cleaning contractor(s).

Essentially all wastes and recyclables will be collected by the Council or qualified waste contractor from the dedicated storage room located in the Basement or Ground Level of the development. Note that Building F & G waste/recyclables will be transported to the storage room located in Building D & E. Waste and Recycling will be collected from the Storage Rooms where the service trucks can park alongside whilst servicing the bins.

The buildings will utilise a dual chute system which will be accessible from each residential level and will terminate in one of the Basement or Ground Level waste storage rooms.

A dual chute access or RESI bin room will be provided for residents on each floor of the buildings. The chute system allows both general waste and recyclables to be deposited into the chute – (refer to Appendix C for indicative chute information).

A compactor unit for the general waste will not be provided as this will result in MGB being too heavy for servicing by Council (as well as transporting from waste room to collection room)

General waste will be collected under the chute into 1100 litre MGB. These and the waste bins will be transported to the ground level by cleaning staff (via a lift), for collection by Council. In addition, a motorised "tug" will be provided to assist in the safe movement of the bins. An example is illustrated below.

Building management/onsite cleaning staff will be responsible for monitoring all chute waste rooms and transporting full bins (as required), to the central waste rooms located in the Basement or Ground Floor.

Wastes/recyclables generated in Building F & G will be disposed of via the chute for waste or via the bins for recyclables. The bins for these streams will then be transported to the storage area in Building D & E.

The following represents the types of bins that will be used for the residential aspect of the development:

Residents will be briefed on the proper use of the chute system and any contamination of the recycling stream will be monitored and reported by cleaners/building management as it is imperative that the recycling stream remain free of contamination to ensure compliance with collection protocols. Residents will be encouraged to maximise the separation of general waste and mixed recyclables within their apartments to aid the proper disposal of all materials.

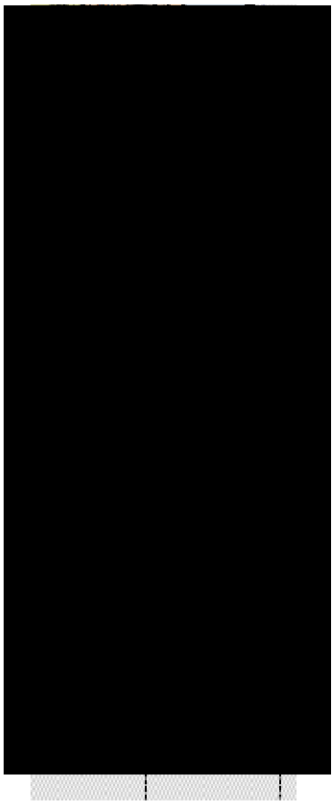
Prior to each collection, building management/onsite cleaning staff will transfer all bins from the waste storage room to the central bin consolidation area. The service vehicle will service the bins from this area and it will be the responsibility of building management/onsite cleaning staff to return the bins to the waste rooms as required.

Items such as furniture/whitegoods stored within the bulky items storage cage/room will be managed by building management and offered to other residents for reuse if desired. If items remain unclaimed, appropriate collection organisations will be called to collect the items for recycling/reuse as required. Bulky goods storage rooms and bulky goods trailer bays have been provided for, and are located adjacent to the turntable for the waste collection vehicle. Bulky goods will be stored in the basement beneath the respective building, it will then be transported to the central facility beneath building D for final collection. This enables efficiency for management and collection.

The following diagrams illustrate some of the chute rooms that are located in the Basement. The wastes from these room will be transported to the Basement or Ground Level storage rooms for collection by Council/contractors

The following illustrates one of the Basement waste/recycling room that will be used to consolidate bins and for servicing. There is a turntable to allow the collection vehicle to enter and exit in a forward direction.

The following diagram illustrates the "swept path" for the waste collection vehicle. Council has advised that the collection vehicle will be a "small rigid vehicle" under AS2890.2 (3.5m height, 9.67m length and 17m sweep).



Appendix A contains illustrations of other waste management equipment that could be used within the buildings. The pictures provide examples of the different options for equipment such as MGB,

bins placed within the commercial areas, tugs for transporting bins, trolley unit and a wheelie-safe trolley.

Signage will be a crucial element of the waste management system. Appendix B contains examples of signage. These are the type of signs that should be used throughout the buildings and waste storage area. Other signs can be accessed from the NSW EPA website at: http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm.

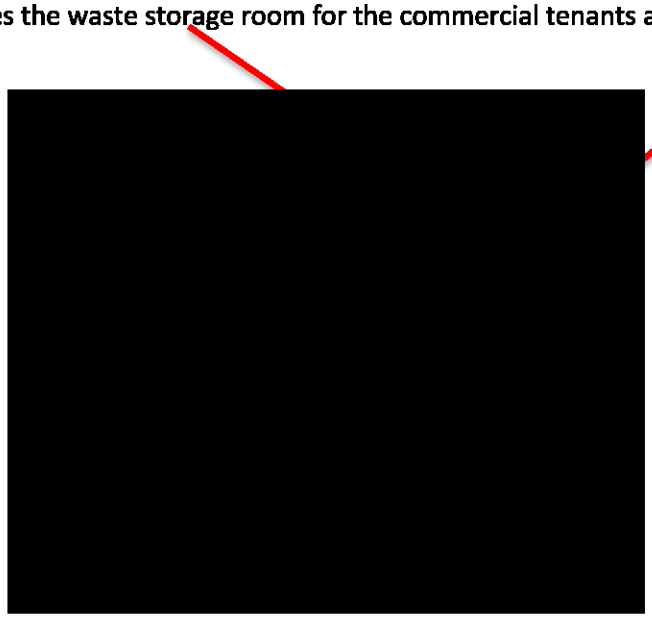
4.2 Commercial Tenants

The commercial tenancies will be designed so as to allow effective segregation of recyclables. These tenancies will (depending on the types of wastes/recyclables generated) be provided with sufficient smaller bins to allow for effective segregation of wastes/recyclables. This will include:

- Paper and Cardboard recycling
- Comingled recycling
- General waste

Waste and recycling collection services for the commercial tenancies will be provided by a commercial waste contractor (TBA). Utilising a commercial waste contractor affords the tenants greater flexibility regarding collection schedules and the appropriate collection frequencies will be determined in consultation with the waste contractor once appointed – however once operational, collection schedules may need to be adjusted accordingly depending on actual waste generation.

The following illustrates the waste storage room for the commercial tenants and the turntable for the collection vehicle.



In addition, tenants will be provided with ad hoc recycling systems such as e-waste; batteries; mobile phones etc. Systems for these streams will be located within each tenancy or in common areas or be available upon request from building management.

Signage will be a crucial element of the waste management system. Appendix B contains examples of signage. These are the type of signs that should be used throughout the retail tenancies and waste storage area(s).

4.3 Collection Frequency

The residential waste bins are emptied twice weekly and recycling bins are emptied weekly by the contractors directly from the bin storage area[1]. However, as indicated above collection frequencies for the commercial tenancies may be adjusted once tenant's generation rates are reviewed.

4.4 Storage

In keeping with best practice sustainability programs, all waste areas and waste and recycling bins will be clearly differentiated through appropriate signage and colour coding to Australia Standards to reflect the materials contained.

There will be a need to ensure that there is sufficient space to allow for bin movement. As a general rule, it is recommended that an additional 30%of the estimated footprint for bins be allocated to this and this has been factored into the waste storage area space calculations.

The waste areas will be accessed by cleaning staff only.

The waste and recycling bins will be colour coded and clearly signed. Each stream will be located in a designated area. This will assist in easy identification of correct bins by those with authorised access.

Photographs 1 & 2 - Examples of waste room colour coding

The waste room will contain the following to minimise odours, deter vermin, protect surrounding areas, and make it a user-friendly and safe area:

- waste room floor to be sealed with a two pack epoxy;
- waste room walls and floor surface is flat and even;

[1] https://www.penrithcity.nsw.gov.au/Waste-and-Environment/Waste/Bin-services/#About%20the%20C&R%20Service

- all corners coved and sealed 100mm up, this is to eliminate build-up of dirt;
- a water facility with hose cock must be provided for washing the bins;
- any waste water discharge from bin washing must be drained to sewer in accordance with the relevant water board;
- tap height of 1.6m;
- storm water access preventatives (grate);
- all walls painted with light colour and washable paint;
- equipment electric outlets to be installed 1700mm above floor levels;
- the room must be mechanically ventilated;
- light switch installed at height of 1.6m;
- waste rooms must be well lit (sensor lighting recommended);
- optional automatic odour and pest control system installed to eliminate all pest types and assist with odour reduction – this process generally takes place at building handover – building management make the decision to install;
- all personnel doors are hinged and self-closing;
- waste collection area must hold all bins – bin movements should be with ease of access;
- conform to the Building Code of Australia, Australian Standards and local laws; and
- childproofing and public/operator safety shall be assessed and ensured.

Occupational Health and Safety issues such as slippery floors in waste rooms and the weight of the waste and recycling receptacles will need to be monitored. Cleaners will monitor the bin storage area and all spills will be attended to immediately by cleaners.

A similar design will be incorporated into the chute rooms located on each floor of each building.

4.5 Bin Requirements

Containers located within the development for waste and recycling should be consistent. The following table outlines the colour coding that has been developed by Standards Australia.

Standards Australia waste/recycling container colour coding

Waste Stream	Bin Body Colour	Lid Colour
Paper/cardboard Recycling	Blue	Blue
Commingled Recycling	Green	Yellow
Food Organics	Burgundy	Burgundy
General Waste	Green	Red

5. Education

All tenants and cleaning staff will receive information regarding the waste collection systems including how to use the system, which items are appropriate for each stream and collection regimes.

Large and clear signage will be provided within all waste rooms room and other areas of the development (eg., lobby and on each floor), educating residents on how to recycle – this will be accompanied by a brochure located within each apartment. Appropriate signage and updated information will also be provided.

All waste receptacles will be appropriately signed and additional room signage is usually provided from most waste contractors during implementation of the waste contract. Examples of signage is included in Appendix B.

It is recommended that all signs should;

- Clearly identify the waste/recycling stream;
- Use correct waste/recycling stream colour coding;
- Identify what can and cannot be disposed of in the receptacle; and
- Include highly visual elements to accommodate for individuals with inadequate English literacy.
- As part of the staff induction process, a waste and recycling toolkit will be provided. This toolkit will include the details of each of the systems in place; acceptance criteria for each stream and how each stream is managed.

On a quarterly basis waste and recycling performance reports will be reported back to tenants so that they are aware of their performance and areas for improvement. An active waste monitoring program will be employed. The waste and cleaning contracts will ensure that contractors actively participate in the waste reduction program for the site and meet monthly to identify performance and new opportunities for diversion and avoidance.

6. Ongoing Management

Having suitable systems in place is only one element of an effective waste management system. Compliance by all stakeholders is essential.

Cleaners are a key element in the effectiveness of the systems in place. Prior to acceptance of the cleaning contract, the contractor will be required to demonstrate how the management of waste and recycling will be carried out so as to ensure that segregated materials are placed in the correct systems. This process will be agreed and a training program implemented by the cleaning contractor to ensure full understanding by all cleaners. Monitoring of the system will be carried out by the cleaning supervisor and site management throughout the term of the contract.

In addition, cleaners will be required to feed back to site management any non-compliance issues they observe during their cleaning activities. This may include contamination of recycling; non-participation in the recycling system, or missing or damaged bins. In this way issues can be promptly dealt with by management.

Waste and recycling contractors will be required to report actual volumes collected by stream so that site management can monitor performance and feed this back to stakeholders.

It is highly recommended that a reporting program be set up at the site which would include bin tally sheets that detail the number of bins collected and how full they are at the time of collection, in addition to communication procedures to allow waste contractors to provide feedback regarding contamination and leakage.

All tenants/staff should be educated and made aware of any changes to the existing waste systems.

If a public place recycling system was implemented it would need to be accompanied by clear signage and colour coding to help differentiate the systems. It is likely that staff would also be required to inform the public about the systems and to guide their waste disposal practices.

7. Public Place Recycling

With public open spaces, consideration needs to be taken regarding public place recycling (PPR). General waste and recycling facilities will be provided in public realm areas throughout the precinct. The final number of bins will be determined in consultation with the City of Penrith and Building management.

Simple, colour-coded and consistent representation of common recycling and waste streams makes it easier for people to know how and what to recycle - whether at work, school or a public event. Introducing a public recycling system has environmental, social and financial benefits including:

- Responding to community expectations to 'Do the Right Thing'.
- Reducing the amount of waste sent to landfill and recovering valuable resources to be made into new products.
- Financial benefits over time as materials are diverted from landfill and into recycling.
- Contributing to triple bottom line reporting.

It is important that general waste and recycling bins are always located together in order to make recycling as accessible as general waste disposal. Recycling bins should never be located on their own in isolation from a general waste bin as patrons are likely to contaminate the recycling bin with general waste if there is no other option to dispose their general waste.

The implementation of organics recycling bins is not recommended in public places due to the high levels of contamination commonly observed in such systems.

All bins should be clearly signed and appropriately colour-coded to ensure the streams are readily identifiable. Signage for PPR should be:

- Colour-coded: red for general waste and yellow for recycling
- Large and easily viewed from all angles: this may mean that signs are placed on all sides of the bin or above the bin.
- Simple: don't use jargon (words such as PET, comingled, HDPE and even the recycling triangle can be confusing as this symbol can appear on a number of items that are not necessarily recyclable.
- Unambiguous and uses visual imagery

All public domain waste and recycling bins will be managed and collected by the appointed waste contractor as part of their existing waste and recycling operations (if not specifically addressed in site cleaning/maintenance contracts).

Appendix A – Waste Management Equipment

The following diagrams illustrate colours and sizes of different bins that could be used within the development.

Figure 1 – MGB bin

Figure 2 – MGB bin

Figure 3 – Indicative size of MGB

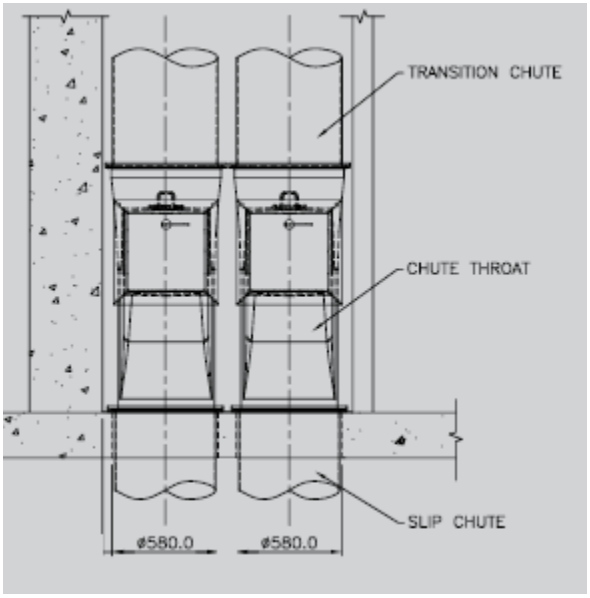
Figures 4, 5, 6 and 7 – Bin movers and tugs

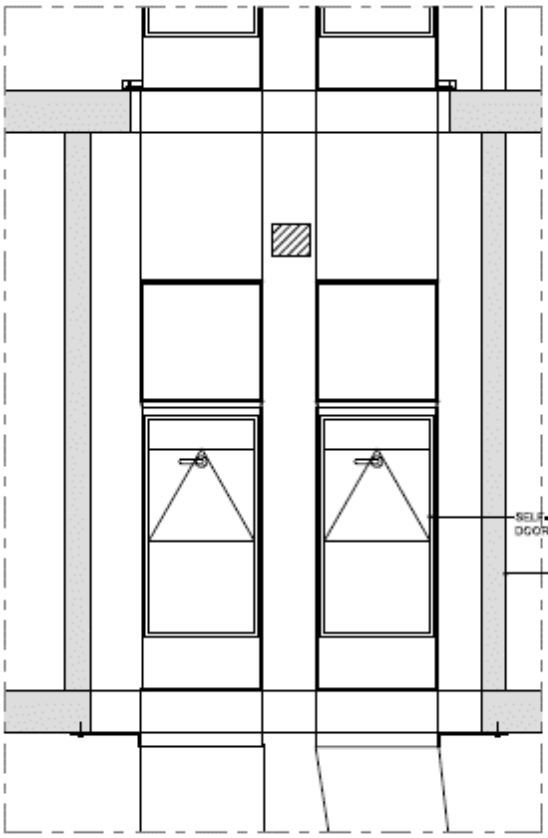
Appendix B – Example Signage

Example wall posters

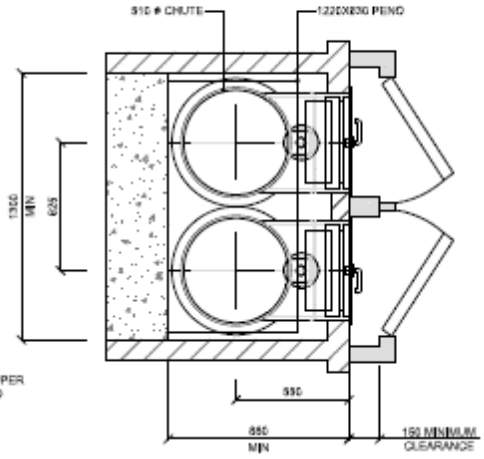
Example bin lid stickers

Appendix C – Indicative Dual Chute Designs





TYPICAL DUAL CHUTE LAYOUT (510Ø)
SCALE 1:20



TYPICAL LLDPE PLASTIC TWIN CHUTE LAYOUT
wIADDED ENCLOSURE (510Ø) (STEEL SIMILAR)
SCALE 1:20

NOTE; ENCLOSURES ARE REQUIRED IF THE CHUTE OPENS DIRECTLY TO A CORRIDOR OR IS NOT LOCATED IN A WASTE ROOM.

Appendix D – Waste Vehicle Dimensions