



Ivanhoe Estate Redevelopment - Stage 2, Macquarie Park (SSD-15822622)

Transport Assessment

Macquarie Park

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Glossary

Acronym	Description
AGRD	Austroads Guide to Road Design
AGTM	Austroads Guide to Traffic Management
Council	City of Ryde
DA	Development Application
DCP	Development Control Plan
DoS	Degree of Saturation
DPIE	Department of Planning, Industry and Environment
FSR	Floor space ratio
GFA	Gross Floor Area
HRV	Heavy Rigid Vehicle (as defined by AS2890.2:2018)
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
MRV	Medium Rigid Vehicle (as defined by AS2890.2:2018)
RMS Guide	Transport for NSW (formerly Roads and Traffic Authority), Guide to Traffic Generating Developments, 2002
SRV	Small Rigid Vehicle (as defined by AS2890.2:2018)
TDT 2013/04a	TfNSW Technical Direction, Guide to Traffic Generating Developments – Updated traffic surveys, August 2013
TfNSW	Transport for New South Wales
TA	Transport Assessment
veh/hr	Vehicle movements per hour (1 vehicle in & out = 2 movements)

1 Introduction

1.1 Overview

This report has been prepared by Ason Group on behalf of Aspire Consortium and accompanies a State Significant Development Application (SSDA) submitted to the Department of Planning, Industry and Environment (DPIE). The SSDA seeks Stage 2 approval, in accordance with Division 4.4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), for the Ivanhoe Estate Redevelopment.

This Transport Assessment (TA) provides an assessment of the relevant access, traffic, and parking characteristics of the Proposal; this has included consideration of the following:

- Existing and future base transport conditions.
- Existing and future public and active transport services and infrastructure.
- Future peak vehicular trip generation, and the potential impact of those trips on the local and sub-regional road network.
- Parking requirements and provision.
- A detailed assessment of access, car parking and servicing areas and facilities for Stage 2.

1.2 Background

In September 2015 the Ivanhoe Estate was rezoned by the Department of Planning and Environment as part of the Macquarie University Station (Herring Road) Priority Precinct, to transform the area into a vibrant centre that benefits from the available transport infrastructure and the precinct's proximity to jobs, retail and education opportunities within the Macquarie Park corridor.

The redevelopment of the Ivanhoe Estate is part of the NSW Government Communities Plus program, which seeks to deliver new communities where social housing blends with private and affordable housing, with good access to transport, employment, improved community facilities and open space.

The Communities Plus program seeks to leverage the expertise and capacity of the private and non-government sectors. As part of this program, Aspire Consortium, comprising Frasers Property Australia, and Mission Australia Housing, was selected as the successful proponent to develop the site in July 2017.

In April 2020, DPIE approved the Ivanhoe Redevelopment – Masterplan, as shown below in **Figure 1** and the Stage 1 development, as shown in **Figure 2**.

Of importance, the proposed intersection upgrades and internal road network as shown in **Figure 2** from part of the Approved Stage 1 works.

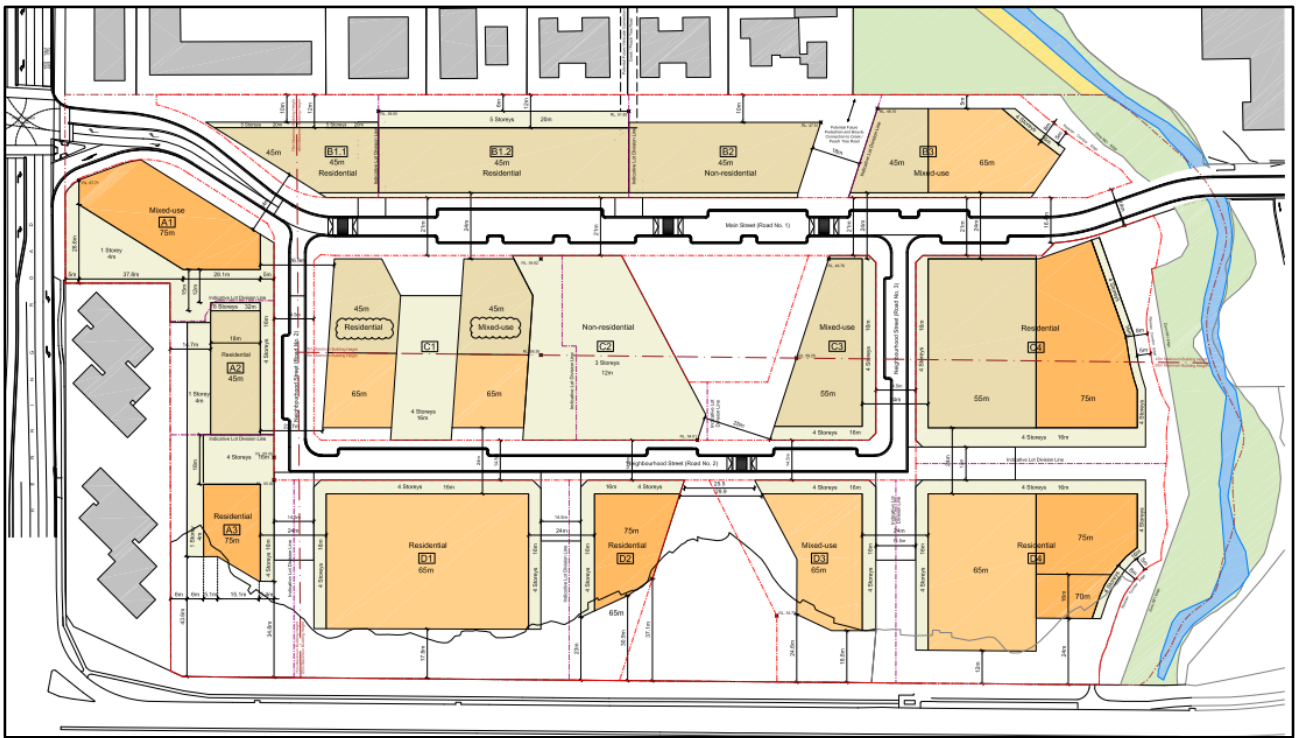


Figure 1: Approved Ivanhoe Estate Concept

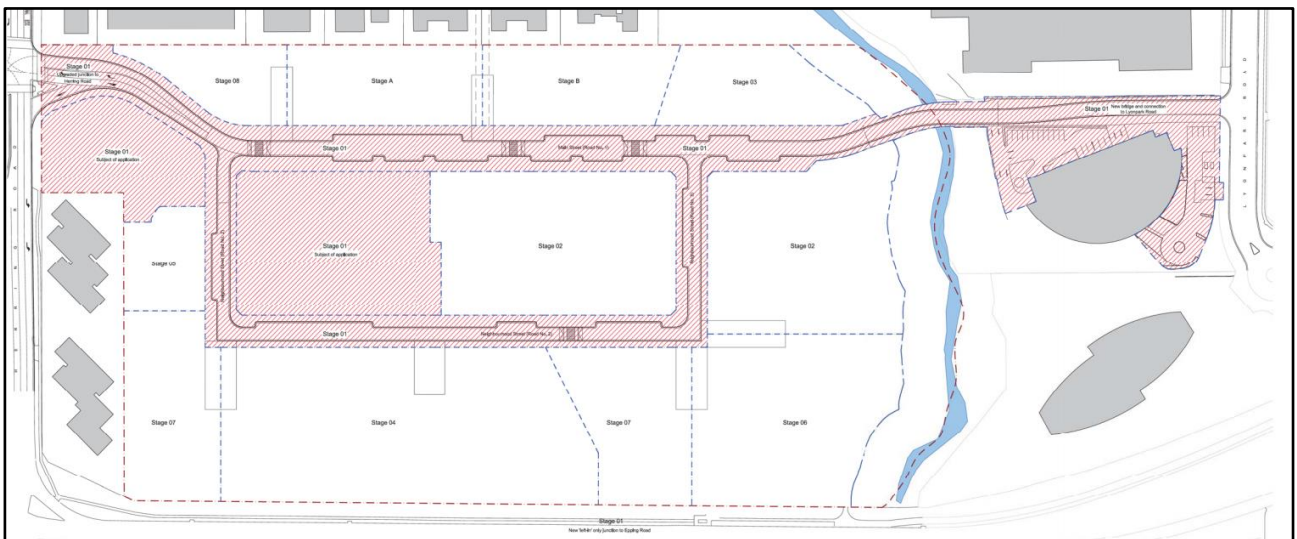


Figure 2: Approved Stage 1 Development

The approved Masterplan (SSD 8707) and Approved Stage 1 Development (SSD-8903) comprises:

- Approximately 3,500 new homes, including a mix of market, social, affordable housing and seniors living homes
- A Community Hub and Swimming Pool
- 2.8 hectares of open space including two new parks, a skatepark and a playground
- A 1000 student high school
- Two 75 place child care centres
- Speciality Retail Shops

- A new road connecting Herring Road with Lyonpark Road, including a new bridge over Shrimprons Creek
- 50 car share parking spaces within the overall Ivanhoe Estate Development
- 200 visitor bicycle parking spaces within the overall Ivanhoe Estate Development

In April 2020, DPIE issued the Secretary's Environmental Assessment Requirements for Stage 2 of the development. Stage 2 of the development. This Development Application for Stage 2 of the Ivanhoe Estate Redevelopment represents the detailed works pursuant to the Approved Ivanhoe Estate Masterplan.

The following report should be read having regard to the following documents, which provide the framework and relevant background assessments:

Master Plan (Concept)

- Transport Management and Accessibility Plan - Ivanhoe Estate Redevelopment, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 3 April 2018, AG ref: P0421r02v07)
- Transport Management and Accessibility Plan Addendum - Ivanhoe Estate Redevelopment, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 13 September 2018, AG ref: P0421r04v02)
- Ivanhoe Estate Master Plan Revised Response to Submissions Technical Note - Ivanhoe Estate, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 22 August 2019, AG ref: P0421t04v02)
- Ivanhoe Estate Master Plan Reduced Gross Floor Areas Technical Note - Ivanhoe Estate, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 26 September 2019, AG ref: P0421t05v01)
- Ivanhoe Estate Master Plan Revised Response to Submissions Technical Note - Ivanhoe Estate, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 9 October 2019, AG ref: P0421t03v02)
- Ivanhoe Estate Master Plan Revised Response to Submissions Technical Note – Ivanhoe Estate, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 6 January 2020, AG ref: P0421t06v01)
- Ivanhoe Estate Master Plan Technical Note – Ivanhoe Estate, Macquarie Park (SSD 8707) - (prepared by Ason Group dated 19 March 2020, AG ref: P0421t07v02)

Stage 1 Development

- Traffic Impact Assessment – Ivanhoe Estate, Macquarie Park – Stage 1 (SSD 8903) (prepared by Ason Group dated 18 February 2019, AG ref: P0555r01v07)
- Ivanhoe Estate Stage 1 Revised Response to Submissions – Stage 1, Macquarie Park (SSD 8903) - (prepared by Ason Group dated 12 August 2019, AG ref: P0555t03v01)
- Transport Statement for a Section 4.55 Application – Stage 1, Macquarie Park (SSD 8903) - (prepared by Ason Group dated 11 March 2021, AG ref: P0555r04v04)

1.3 Site Description

The Ivanhoe Estate site is located in Macquarie Park near the corner of Epping Road and Herring Road within the Ryde Local Government Area (LGA). The site is approximately 8.2 hectares and is currently an active construction site. Previously, the site accommodated 259 social housing dwellings, comprising a mix of townhouse and four storey apartment buildings set around a cul-de-sac street layout. An aerial photo of the site is provided in Figure 3.

Immediately to the north of the site are a series of four storey residential apartment buildings. On the north-western boundary, the site fronts Herring Road and a lot that has been development into high density housing. Epping Road runs along the south-western boundary of the site and Shrimprons Creek, an area of public open space, runs along the south-eastern boundary. Vehicle access to the site is via Herring Road.

Ivanhoe Estate is owned and managed by the NSW Land and Housing Corporation. The Approved Masterplan Site incorporates adjoining land, being a portion of Shrimptons Creek and part of the commercial site at 2-4 Lyonpark Road. This land is included to facilitate a bridge crossing and road connection to Lyonpark Road.



Figure 3: Aerial Photograph of The Site

1.4 Proposed Development

The Stage 2 Development Application seeks approval for:

- the construction and use of Buildings C2, C3 and C4 comprising residential uses (including market and social housing) and retail / community spaces;

In particular, each of the buildings comprise the following elements:

1.4.1 Building C2

- Village Green and Community Centre
- All car parking associated with the C2 building has been incorporated as part of the C1 building within the Approved Stage 1 development

1.4.2 Building C3

- 162 Residential Market Apartments
- 970 square metres of retail use (GFA)
- 163 car parking spaces, comprising:
 - 145 resident spaces (including 8 accessible/adaptable spaces and 8 tandem pairs);
 - 8 residential visitor spaces;
 - 10 retail spaces (including 1 accessible space).
- Car Wash Bay
- 176 bicycle parking spaces, comprising:
 - 162 resident bicycle spaces;
 - 4 retail staff bicycle spaces;
 - 10 residential visitor spaces; andRetail visitor spaces are provided within the public realm, with 10 spaces proposed and form part of the Masterplan Wide Public Realm plans.
- Bicycle End of Trip Facilities: includes 2 showers, 2 waste closets, 1 accessible waste closet, 5 lockers (based on 1.2 lockers/1 bicycle space) and preparation bench spaces

It is noted that the proposal also provides two on-street car shared spaces.

1.4.3 Building C4

- 272 Residential Market Apartments
- 216 Residential Social Apartments
- 396 car parking spaces, comprising:
 - 371 resident spaces (including 24 accessible/adaptable spaces); and
 - 25 residential visitor spaces.
- 488 resident bicycle parking spaces.

Reference should be made to the plans prepared by McGregor Coxall & Chrofi (C2), Fox Johnston (C3) and Cox Architecture (C4) which are submitted separately.

1.5 Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) were issued by DPIE in regard to this Proposal. The SEARs outline the key areas for consideration in any subsequent development application (i.e., in the SSDA) with specific requirements providing the scope for an assessment of potential traffic and transport impacts arising from the Proposal.

The SEARs specifically relating to the traffic and transport characteristics of the Proposal are outlined in Table 1, which also provides a summary response to each SEAR, and reference to the section of this TA that provides a more detailed review of each requirement.

Table 1: Secretary's Environmental Assessment Requirements

SEARS	SUMMARY RESPONSE
The EIS must include: A Traffic and Transport Impact Assessment which provides:	
an assessment of the proposed stage within the context of the approved concept plan and cumulative impacts of prior developments	The cumulative traffic impacts of the Stage 2 development (in consideration of Stage 1) compared with the approved masterplans is detailed in Section 7.
the predicted transport mode share split and daily trip numbers for the proposal development	The predicted daily trip numbers is detailed in Section 7.
an analysis of the existing traffic conditions within the surrounding road network, including but not limited to a description of the surrounding road hierarchy, current daily and peak hour vehicle movements and an assessment of the existing performance levels of nearby intersections	The existing road network infrastructure has been reviewed and detailed in Section 3.2 and the performance of the existing road network is outlined in Section .3.4 It is noted that this TA seeks to demonstrate consistency with the Approved Masterplan. As such, this transport assessment focused on peak hour (not daily) analysis, as does this Approved Masterplan TA.
a forecast of additional daily and peak hour vehicle movements as a result of the proposal (using SIDRA modelling or similar at 5-year intervals) and identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cycle conflict)	The traffic analysis has been informed by previous assessments undertaken and detailed in the Approved Masterplan Documentation (SSD 8707). This has been reviewed and demonstrates the consistency of the current Proposal with that of the Approved Masterplan (SSD 8707) and Stage 1 Development (SSD 8903).
proposals to mitigate any traffic impacts, including intersection upgrades to achieve acceptable performance	The required network upgrades as detailed in previous traffic assessments are detailed in Section 2.
details of car parking provision, having regard to relevant parking rates, specifications and standards	The details of car parking provision for Stage 2 are provided in Section 6.1
details of proposed vehicular access, parking areas, loading, deliveries and servicing arrangements, and any proposed infrastructure improvements or measures to reduce potential conflicts with pedestrians and cyclists.	The details of access arrangements and car parking layouts for Stage 2 are provided in Section 8.
proposals to improve walking and cycling, such as connections into existing walking and cycling networks, high quality end-of-trip facilities and adequate bicycle parking for visitors, employees and residents (provided in accordance with the relevant rates, specifications and standards)	The overall proposal includes the provision of new and upgrades to existing local infrastructure (streets, intersections and pedestrian & cyclist infrastructure, as detailed in Section 2. Also refer to the GTP accompanying this submission.
measures to promote sustainable travel choices for employees and residents or visitors, such as minimising car parking provision, encouraging car share and public transport, cycling and walking, implementing a green travel plan and providing end of trip facilities and how this can be demonstrated to be implemented	A Green Travel Plan for Stage 2 has been prepared as a separate document to this TA. Please refer to the GTP which accompanies this submission.
details of any new sustainable transport infrastructure or technology to be provided i.e. future electric charging to each parking spot (ensuring buildings have EV distribution boards sufficient to cater for and manage to allow for future connections and that an EV load management system is provided)	Refer to the GTP which accompanies this submission.
a detailed Framework Green Travel Plan	Refer to the GTP which accompanies this submission.
a draft Construction Pedestrian and Traffic Management Plan providing details of predicted construction traffic movements, routes and access arrangements, and outline how construction traffic	A detailed Construction Traffic & Pedestrian Management Plan for Stage 2 would be submitted to Council and DPIE

impacts on existing traffic, pedestrian and cycle networks would be appropriately managed and mitigated.	for approval prior to the issue of a Construction Certificate. A preliminary Construction Traffic & Pedestrian Management Plan for Stage 2 is detailed in Section 9.
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1.6 Reference Documents

1.6.1 Planning Controls

As stated, the Ivanhoe Estate Redevelopment lies within the Ryde LGA and is also subject to a number of State Government controls. Key planning controls and strategies referenced in the preparation of this TA include:

- Ryde Local Environmental Plan 2014 (Ryde LEP).
- Ryde Development Control Plan 2014 (Ryde DCP).
- City of Ryde Bicycle Strategy [updated February 2014] (Ryde Bicycle Strategy).
- State Environmental Planning Policy 65: Design Quality of Residential Apartment Development and Apartment Design Guide.
- State Environmental Planning Policy 70: Affordable Housing (Revised Schemes)
- State Environmental Planning Policy (Affordable Rental Housing) 2009.

1.6.2 Transport Guidelines

This TA references general access, traffic and parking guidelines, including:

- Roads & Maritime Guide to Traffic Generating Developments 2002 (RMS Guide).
- Roads & Maritime Guide to Traffic Generating Developments – Updated Traffic Surveys 2013 (RMS Guide Update).
- Australian Standard 2890.1:2004: Parking Facilities – Off-Street Car Parking (AS 2890.1).
- Australian Standard 2890.2:2018: Parking Facilities – Off-Street Commercial Vehicle Facilities (AS 2890.2).
- Australian Standard 2890.3:2015: Parking Facilities – Bicycle Parking (AS 2890.3).
- Australian Standard 2890.6:2009: Parking Facilities – Off-Street Parking for People with a Disability (AS 2890.6).
- Transport for NSW (TfNSW) Traffic Control at Work Sites Technical Manual, Issue No.6, September 2020
- Department of Planning & Environment Environmental Impact Statement Guidelines.
- Transport for NSW (TfNSW) Guide to Transport Impact Assessments.
- TfNSW Integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area.

2 Ivanhoe Estate Redevelopment

2.1 Introduction

The Aspire Consortium was awarded a contract by the NSW Government to redevelop the Ivanhoe Estate at Macquarie Park. The Consortium comprises development partners, Frasers Property Australia and community housing partner, Mission Australia Housing.

The Masterplan was approved in April 2020 and establishes the planning and development framework, which forms the basis for the detailed design of the future buildings and against which the future detailed Development Applications will be assessed, including the current Stage 2 Application.

2.2 Internal Road Network and Site Access

As shown in the approved Masterplan and provided below in **Figure 4**, to maximise the accessibility of the site to the external road network, access to Ivanhoe Estate Redevelopment shall be provided via two locations:

- A signalised intersection of Herring Road and Ivanhoe Estate Redevelopment; and
- A new bridge connection between Ivanhoe Estate Redevelopment and Lyonpark Road.

These accesses will provide for the distribution of traffic onto the broader road network and assist in minimising the impacts of the development on the existing operation of the road network.

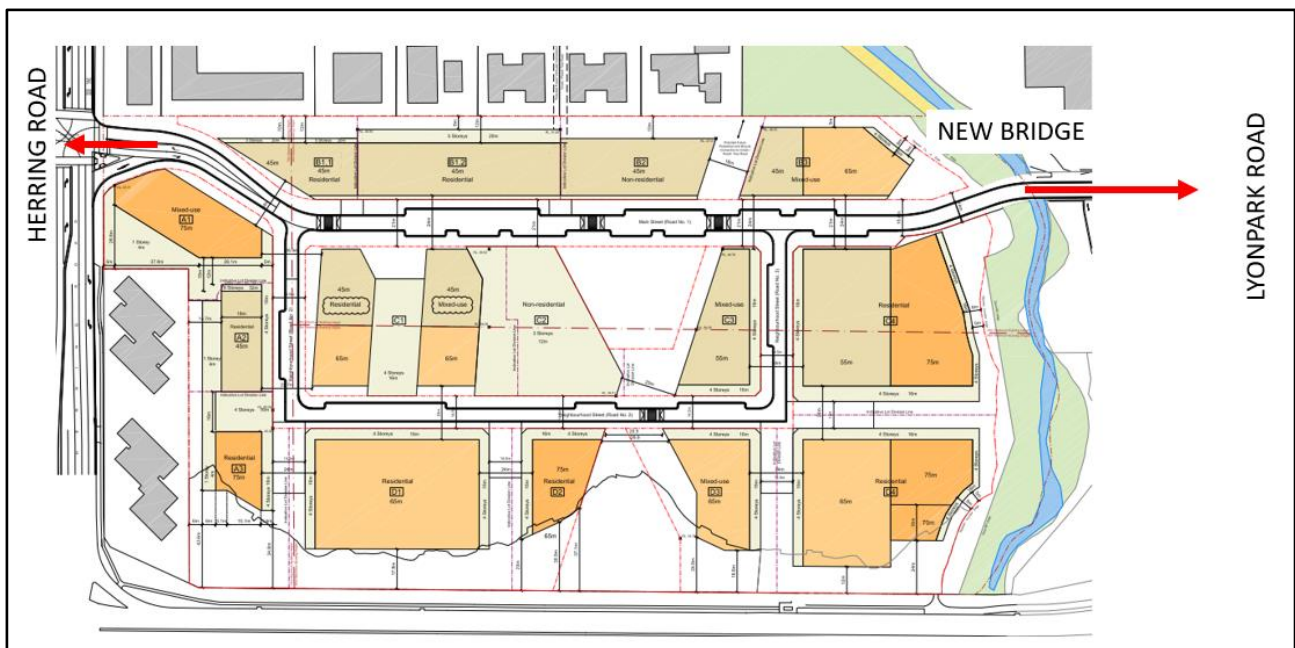


Figure 4: Ivanhoe Estate Masterplan Site Access

The street network has been set to provide a logical integration of the Site with the surrounding road network, future access locations and pedestrian desire lines, providing permeability through the future development. The proposed road network includes the provision of a Main Street traversing an east-west connection between Herring Road and the Lyonpark Road via a proposed new bridge connection.

Lower order roads have been set and aligned with the surrounding street network to create walking and cycling connections between Ivanhoe Estate and the neighbouring recreational, educational and employment zones. **Figure 5** demonstrates the proposed internal road hierarchy.

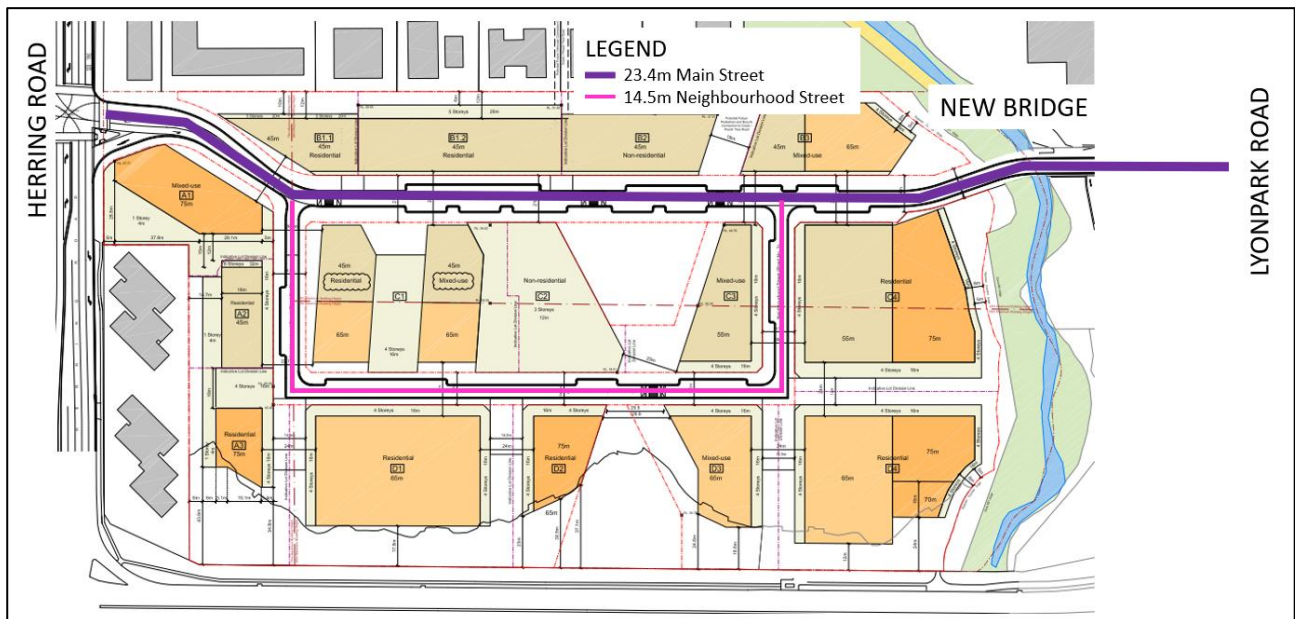


Figure 5: Ivanhoe Estate Internal Road Hierarchy

The typical road cross sections for the proposed 23.4m Main Street and 14.5m Neighbourhood Streets are provided in **Figure 6**. These roads have been developed having regard for Council's DCP and both accommodate two traffic lanes in either direction with parking provided on both sides of Main Street and on one side of the Neighbourhood Streets.

As a consequence of the signalisation of the intersection of Herring Road with Ivanhoe Place, developments on the western side of Herring Road will no longer be able to utilise the existing roundabout, currently relied on by southbound vehicles.

The Masterplan road network has been designed to facilitate the redistribution of these vehicles through the provision of a connected streets, effectively providing a "U-Turn" facility. This will ensure that existing and future residents of developments on the western side of Herring Road are not adversely affected by the proposed signalisation of Ivanhoe Place.

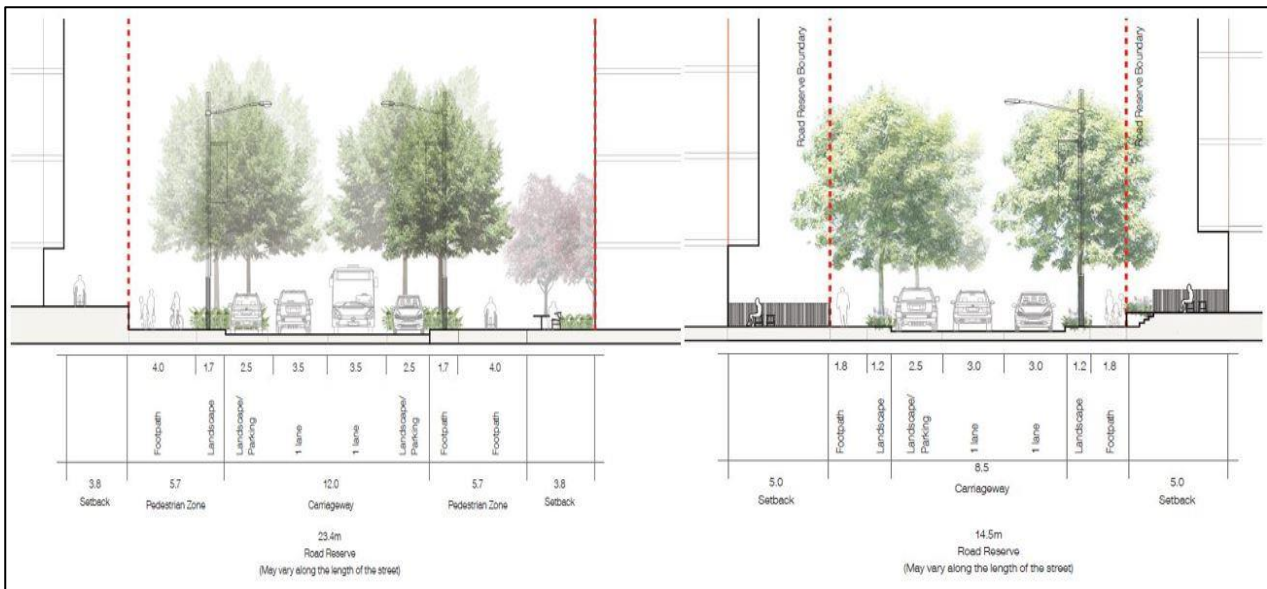


Figure 6: Ivanhoe Estate Typical Cross Sections

2.3 Pedestrian and Cycle Access

The pedestrian paths through the Site have been designed with a varying width between 1.8 to 2.4m. The routes – shown on **Figure 7** – connect along open space links providing access to the local road network and along key pedestrian desire lines, linking the site with Macquarie Park Shopping Centre and Macquarie University Railway Station.

Shared paths at 4.0m in width are also provided along the length of Main Street and along the proposed bridge linking Herring Road with Lyonpark Road. This connection provides an important new pedestrian link between the employment zones of Lyonpark Road with Herring Road.

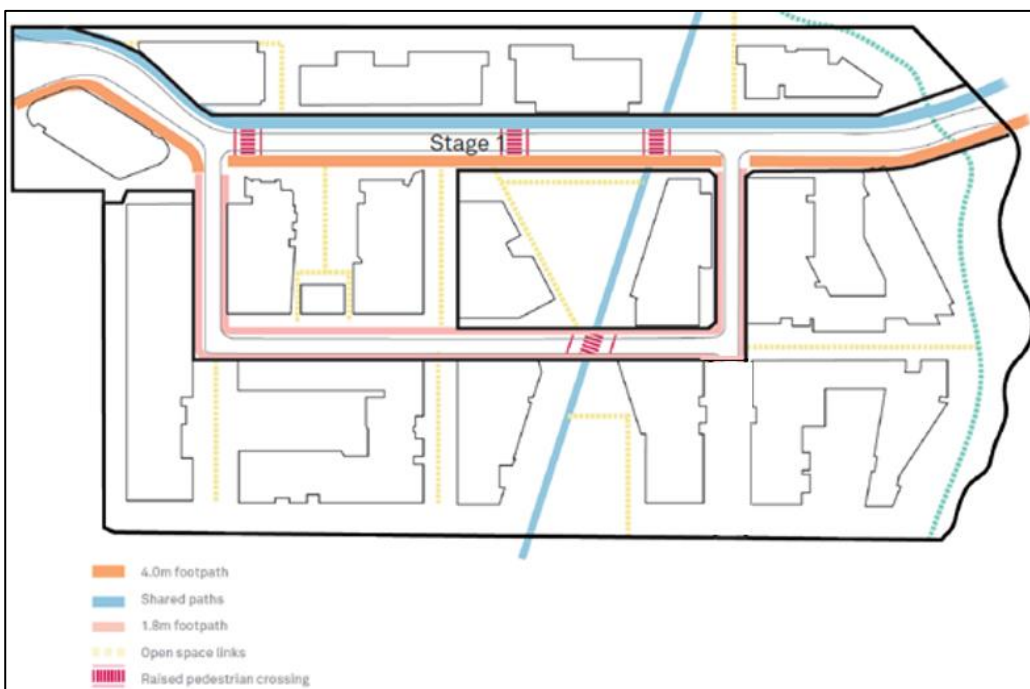


Figure 7: Pedestrian and Cycle Network

The proposal also includes the upgrade of the existing Shrimptons Creek pedestrian and cycle path which provides access to the regional cycle network traversing a north-south direction from the residential zones to the south of Epping Road to the north via Macquarie Shopping Centre. The cycle network approved as part of the Masterplan is shown in **Figure 7**.

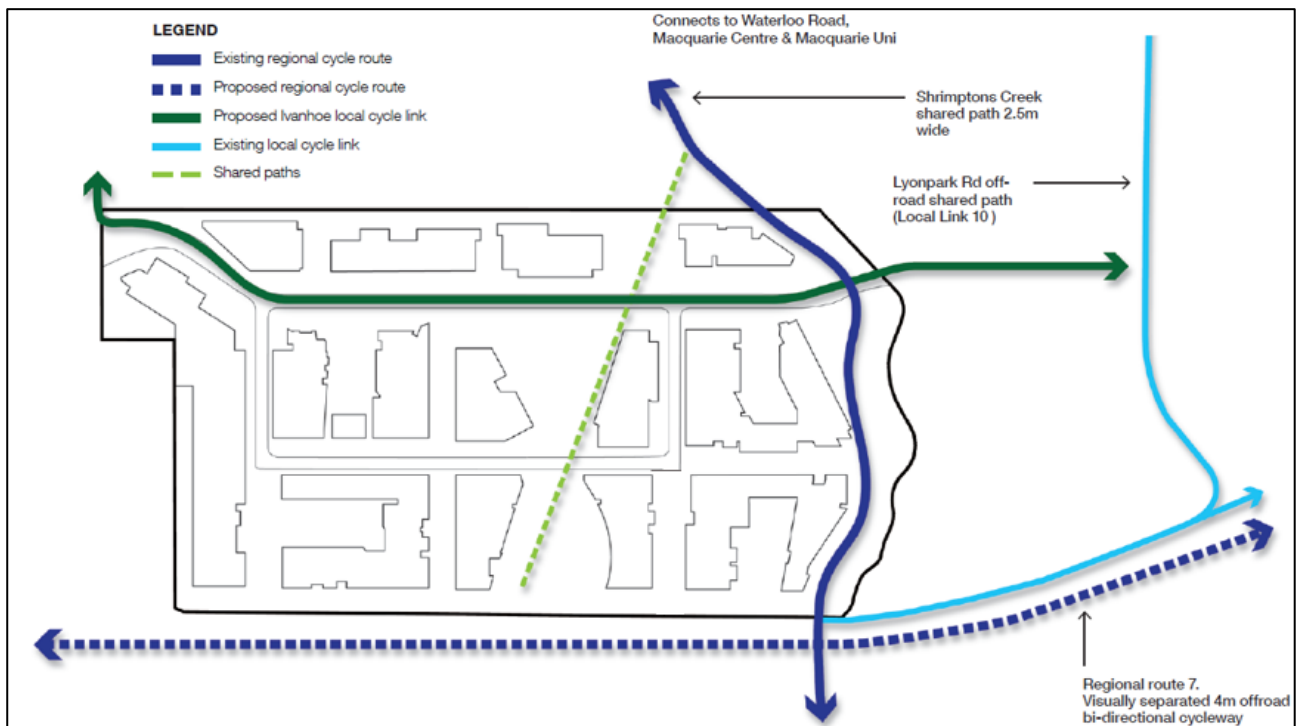


Figure 8: Ivanhoe Estate Masterplan Bicycle Network

2.4 Development Staging

Stages are sequenced to maintain a consistent tenure split between social and market dwellings and to ensure that the necessary infrastructure comes online to service the relevant stages. The development staging is subject to change, however, is currently envisaged to be progressed in accordance with Figure 9



Figure 9: Ivanhoe Estate Staging Plan

3 Existing Conditions

3.1 Site and Location

The Site is located in one of eight urban activation precincts (UAP) announced by the NSW Government and following nomination by The City of Ryde in July 2012. Ivanhoe Estate is located at the south eastern end of the Macquarie University Station Priority Precinct (formerly Herring Road UAP) and on the southern side of Macquarie Park, near the corner of Epping Road and Herring Road. The eastern boundary follows Shrimptons Creek.

The location is considered suitable to accommodate some of Sydney's growth as it is:

- strategically located close to the geographic centre of the Sydney metropolitan region – approximately 18km northwest of the Sydney CBD, 9km west of Chatswood and 15km east of Parramatta;
- a key part of Sydney's Global Economic Corridor, which extends from Sydney Airport and Port Botany through Sydney CBD, North Sydney, Chatswood, Macquarie Park towards Parramatta and Norwest Business Park;
- an important part of the Macquarie Park Specialised Precinct, identified in the Metropolitan Strategy for Sydney as a location for future jobs and housing growth;
- well serviced by public transport including the Macquarie University Train Station and bus interchange; and
- an area with strong market demand for additional housing.

An aerial photo of the site is provided in **Figure 10**.

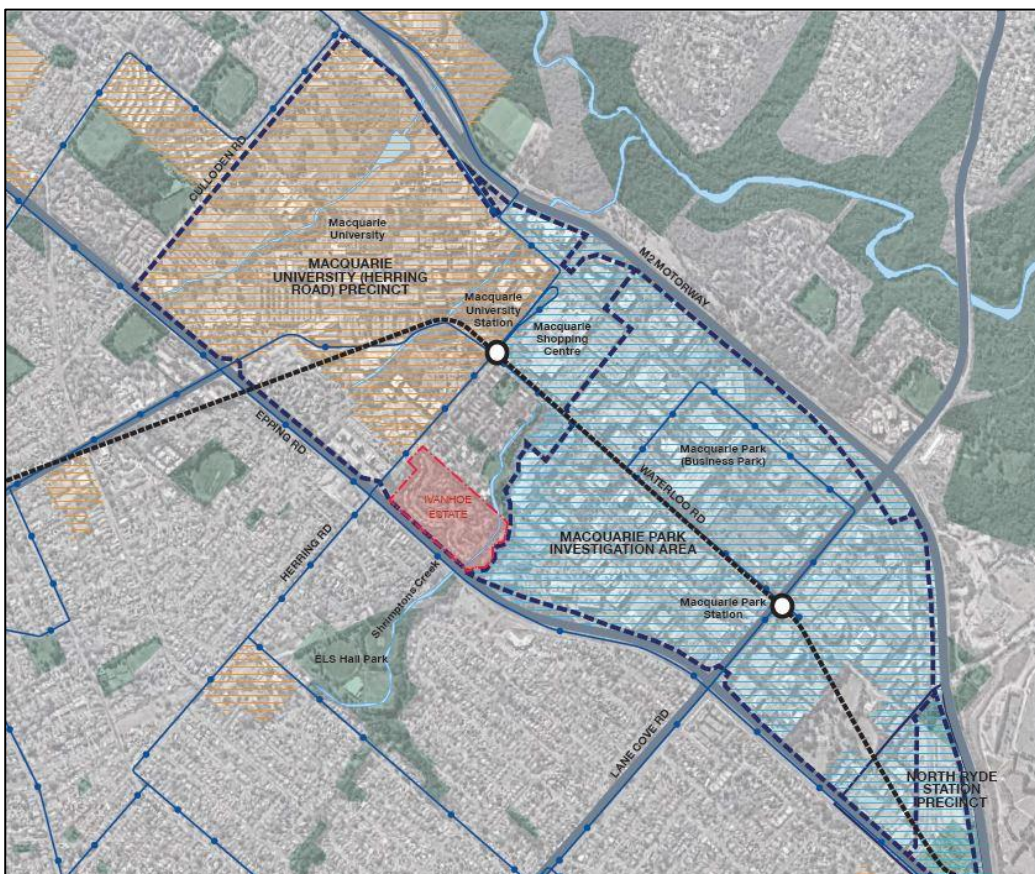


Figure 10: Aerial Site Location

3.2 The Existing Road Network

The existing key road and intersections relevant to this TA are detailed below.

3.2.1 Key Roads

Some of the key roads that form the top levels of the current road hierarchy for the Macquarie Park corridor in the locality of the Site are:

M2 Motorway

The Hills M2 Motorway is an arterial road located approximately 1 kilometre north-east of the Masterplan Site. The Hills M2 features the 460m Epping/ Norfolk twin tunnel and connect the Lane Cove Tunnel with the Westlink M7 Motorway, between the lower north shore and Sydney's northwest. It is a privately-owned motorway that became fully cashless, with no toll booths, in January 2012.

The following key features, located within the City of Ryde LGA have increased capacity and access to the Macquarie Park area:

- Christie Road: Eastbound exit and entrance
- Talavera Road: Westbound exit and entrance
- Lane Cove Road (A3): No exit westbound; no eastbound entrance from A3 northbound
- Delhi Road (A38): Eastbound exit and westbound entrance
- Lane Cove Tunnel: Eastern terminus continues as Lane Cove Tunnel; westbound exit to and eastbound entrance from Epping Road

The NorthConnex M1 to M2 tunnel, includes motorway-to-motorway ramps to and from the portion of the M2 west of Pennant Hills Road/The Cumberland Highway.

Lane Cove Road

This is an arterial road 900 metres to the south-east of the Site which caters for regional north-south traffic travelling through the City of Ryde, forming part of the A3 outer arterial ring road connecting to the north and south coasts of the Sydney region, and interchanging with most of the radial arterial routes to/from central Sydney.

The road connects regional and local traffic to the M2 Motorway in the north, and to Epping Road along the southern boundary of the Site. It also connects with the important collector routes of Waterloo Road and Talavera Road that run through the Macquarie Park corridor. Lane Cove Road carries regional traffic to, from and around Macquarie Park whilst simultaneously providing local traffic and public transport access for the area.

Epping Road

Epping Road is an arterial road on the southern boundary of the Masterplan Site which caters for regional east-west traffic travelling through the City of Ryde. Epping Road extends from the Pacific Highway and Lane Cove in the east to Epping in the west. It provides an important link between Sydney's Northern and North West suburbs and the North Shore and CBD.

Epping Road provides an important access route to Macquarie University and other major land uses within Macquarie Park via Herring Road and Balaclava Road. The road serves the dual purpose of providing capacity for regional traffic through the City of Ryde LGA along with multi-modal local access.

Herring Road

Herring Road forms the north western boundary of the Masterplan Site and was chosen as an urban activation precinct to accommodate some of Sydney's future growth due to its strategic location relative to the Sydney metropolitan region. It is approximately 18 kilometres northwest of the Sydney CBD, 9 kilometres west of Chatswood and 15 kilometres east of Parramatta.

Herring Road has been identified as an intrinsic component of Sydney's Global Economic Corridor, which extends from Sydney Airport and Port Botany through Sydney CBD, North Sydney, Chatswood, Macquarie Park towards Parramatta and Norwest Business Park. The road is an important part of the Macquarie Park Specialised Precinct, identified in the Metropolitan Strategy for Sydney as a location for future jobs and housing growth. It is well serviced by public transport and includes the Macquarie University railway station and bus interchange.

Waterloo Road

Waterloo Road is a collector road running parallel to the M2 motorway and through the middle of Macquarie Park. Waterloo Road provides an important multimodal corridor for bus, cycling and pedestrian movements through Macquarie Park, and connects the public transport Interchange and Macquarie University in the northwest with Lane Cove Road to the southeast.

Waterloo Road extends through to Wicks Road in the east of the study area, and to University Avenue / Balaclava Road in the west. An unconnected section of Waterloo Road extends further west outside of Macquarie Park, with the road disconnected through the Macquarie University campus.

3.2.2 Key Intersections

Key intersection within the locality of the site are summarised below:

Epping Road & Herring Road

A signalised intersection which provides for all movements, including dedicated right turn lanes and left-turn slip lanes on all approaches. Pedestrian crossing are also provided on all approaches.

Ivanhoe Place & Herring Road

A roundabout which provides for two approach lanes and two departure lanes along Herring Road and a single approach lane and departure lane for Ivanhoe Place and access to 122 Herring Road.

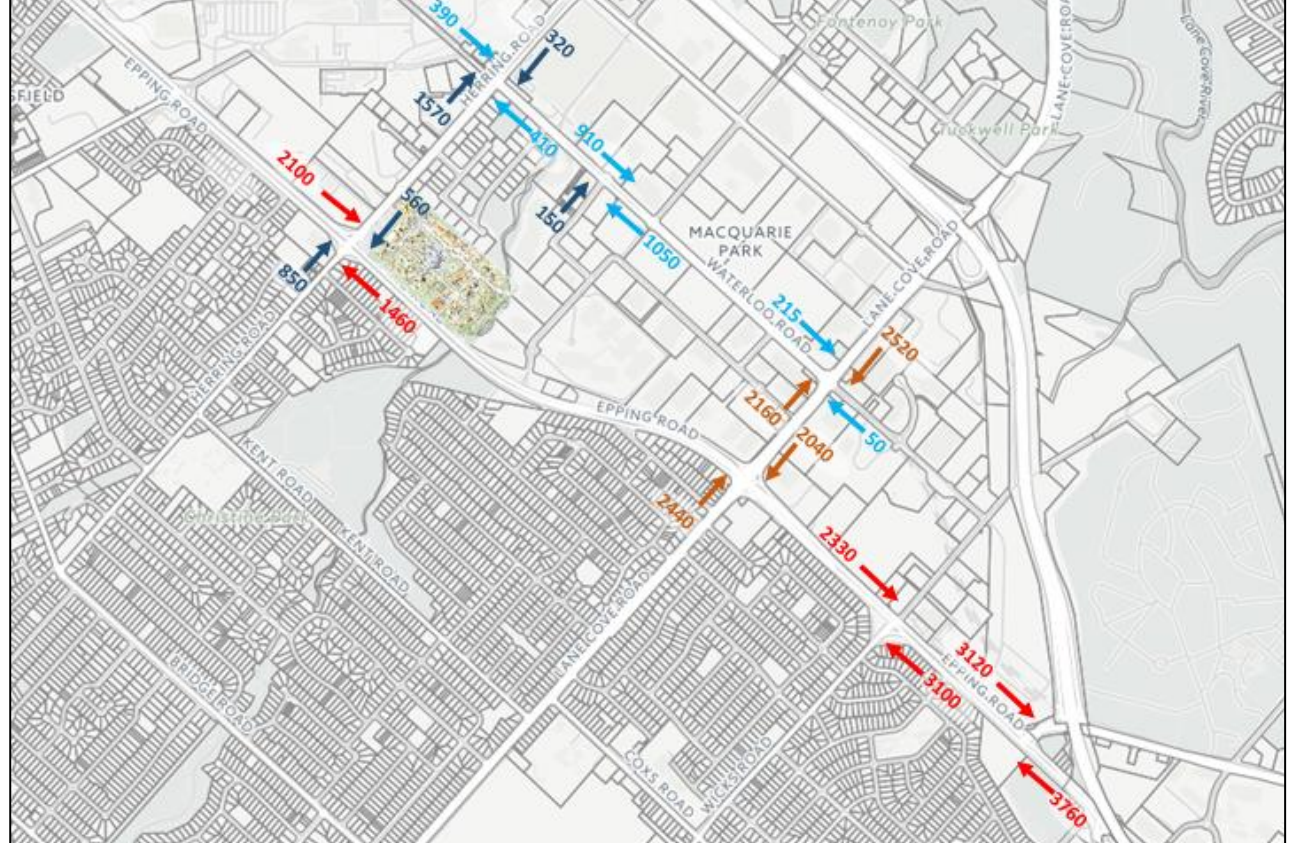
Waterloo Road & Herring Road

A signalised intersection which provides for all movements and pedestrian crossings on all approaches.

Epping Road & Lyonpark Road

A left-in and left-out intersection, with priority for vehicles travelling along Epping Road.

This is attributed to strong demand on these routes from through traffic travelling to and from the Sydney CBD, the high number of flights with Morning Star, and the fact that the Sydney Airport is the only airport in the world with a runway that is 100% asphalt.



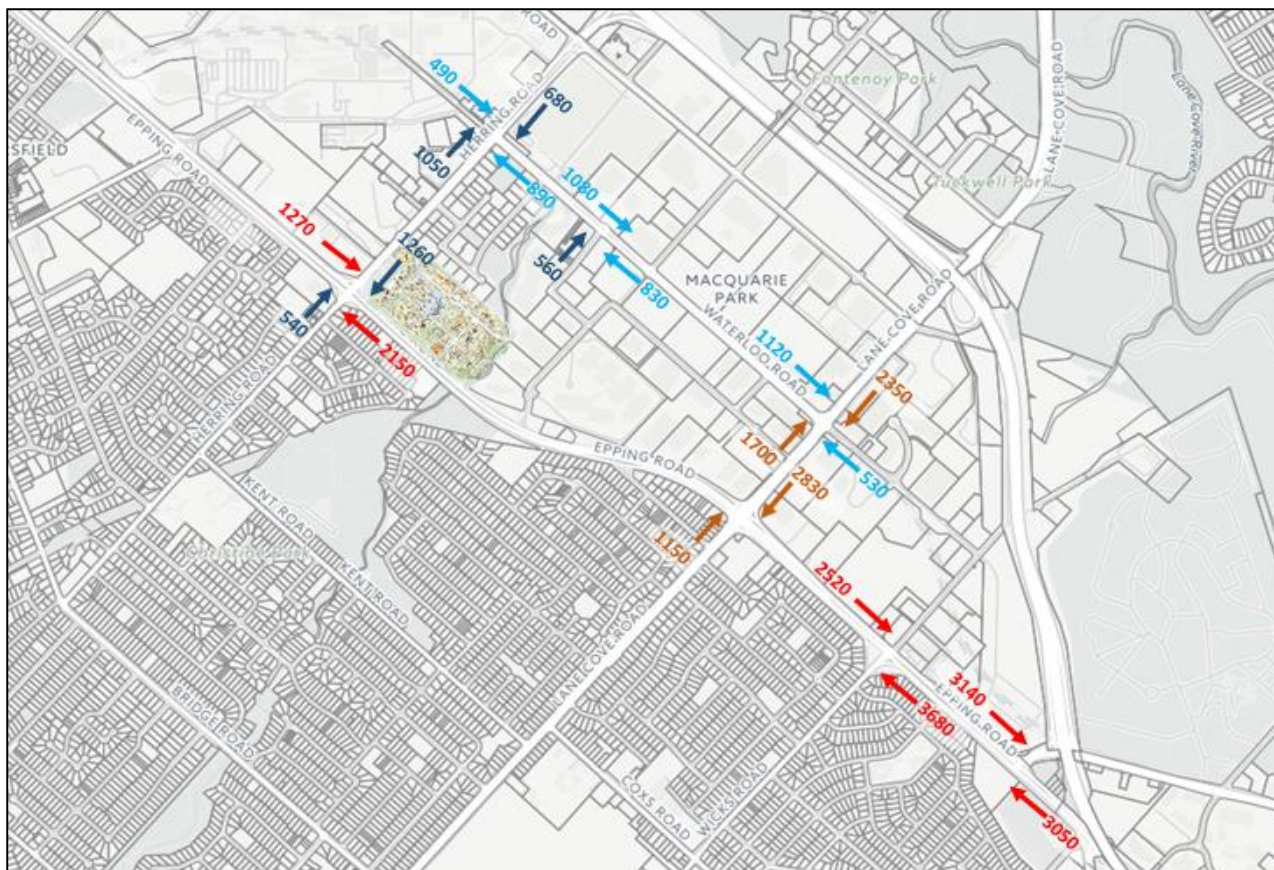


Figure 12: Existing PM Peak Hour Volumes

Traffic flow in Macquarie Park is dominated by regional traffic movements on Lane Cove Road, Epping Road in the AM and PM peak periods with internal roads (Waterloo Road, Khartoum Road and Lyonpark Road) accommodating destination-based traffic associated with the employment zones in these locations.

Herring Road traffic includes a much larger proportion of local traffic due to its functions as a local traffic access route to Macquarie University Station, the university itself, and Macquarie Shopping Centre.

3.4 SIDRA Modelling

The 2016 existing performance of the key intersections surrounding the Site are summarised in **Table 2**. The modelling outputs a range of performance measures, in particular:

- **Average Vehicle Delay (AVD):** AVD (or average delay per vehicle in seconds) for intersections is used to determine an intersection's Level of Service (see below). For signalised intersections and roundabouts, the AVD reported relates to the average of all vehicle movements through the intersection, while for priority intersections it relates to the worst approach.
- **Degree of Saturation (DOS):** DOS is defined as the ratio of demand (arrival) flow to capacity.
- **Level of Service (LOS):** LOS is a comparative measure that provides an indication of the operating performance, based on AVD. As with AVD, LOS for signalised intersections and roundabouts relates to the average of all vehicle movements, while for priority intersections it relates to the approach with the highest average delay.

Table 2 provides a summary of the SIDRA recommended criteria for the assessment of intersections, which references LOS and AVD outlined in the RMS Guide.

Table 2: SIDRA Level of Service Criteria

LEVEL OF SERVICE	AVERAGE DELAY PER VEHICLE (S)	TRAFFIC SIGNALS & ROUNDABOUT	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 mode	At capacity, requires other control mode
F	70 <	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

Source: SIDRA

The average intersection performance Level of Service (LoS) for the AM and PM peak periods of the key intersections surrounding the Site are shown in Table 3. The intersection performance analysis is based on traffic volume data used by Transport for NSW for the Waterloo Road temporary bus shutdown network planning and is based on 2016 data.

The intersection of Epping Road with Herring Road experiences significant delay in the AM and PM peak periods. The traffic demand and peak period congestion at this intersection is strongly influenced by traffic movements heading into Macquarie Park via Epping Road in the AM peak period and traffic movements exiting Macquarie Park in the PM peak period.

The Waterloo Road with Herring Road intersection has limited traffic capacity but has a significant demand from local and through traffic accessing the Macquarie Centre and to/from the M2. The large traffic demand conflicts with the high volume of competing pedestrian movements between the major generators of the University, Macquarie Centre, Bus Interchange and Macquarie Rail Station. The Waterloo Road southeast approach operates over capacity and with queues over 200 metres.

Table 3: 2016 Existing Peak Intersection Performance

INTERSECTION	PEAK	DELAY (SEC)	LEVEL OF SERVICE
Epping Road / Herring Road	AM	167	F
	PM	76	F
Ivanhoe Place / Herring Road	AM	12	A
	PM	13	A
Waterloo Road / Herring Road	AM	94	F
	PM	121	F
Epping Road / Lyonpark Road	AM	7	A
	PM	7	A
Waterloo Road / Byfield Street	AM	12	A
	PM	14	A

Refer to Appendix A for the detailed SIDRA results.

4 Public Transport

4.1 Rail Services

4.1.1 Rail Infrastructure

The Integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area (TfNSW, December 2013), states that train services influence the travel mode choices of areas within 800 metres walking distance (approximately 10 minutes) of a train station.

It is therefore noteworthy that the main access of the Masterplan Site is located approximately 400 metres from Macquarie University Metro Station, which is situated along the Sydney Metro Northwest Line, which provides access between Rouse Hill (Tallawong Station) and Chatswood (Chatswood Station).

Accordingly, a significant proportion of future commuters travelling from the Masterplan Site would be expected to use train services. An overview of the distance from the intersection of Herring Road and Ivanhoe Place to available public transport is presented in **Figure 13**.

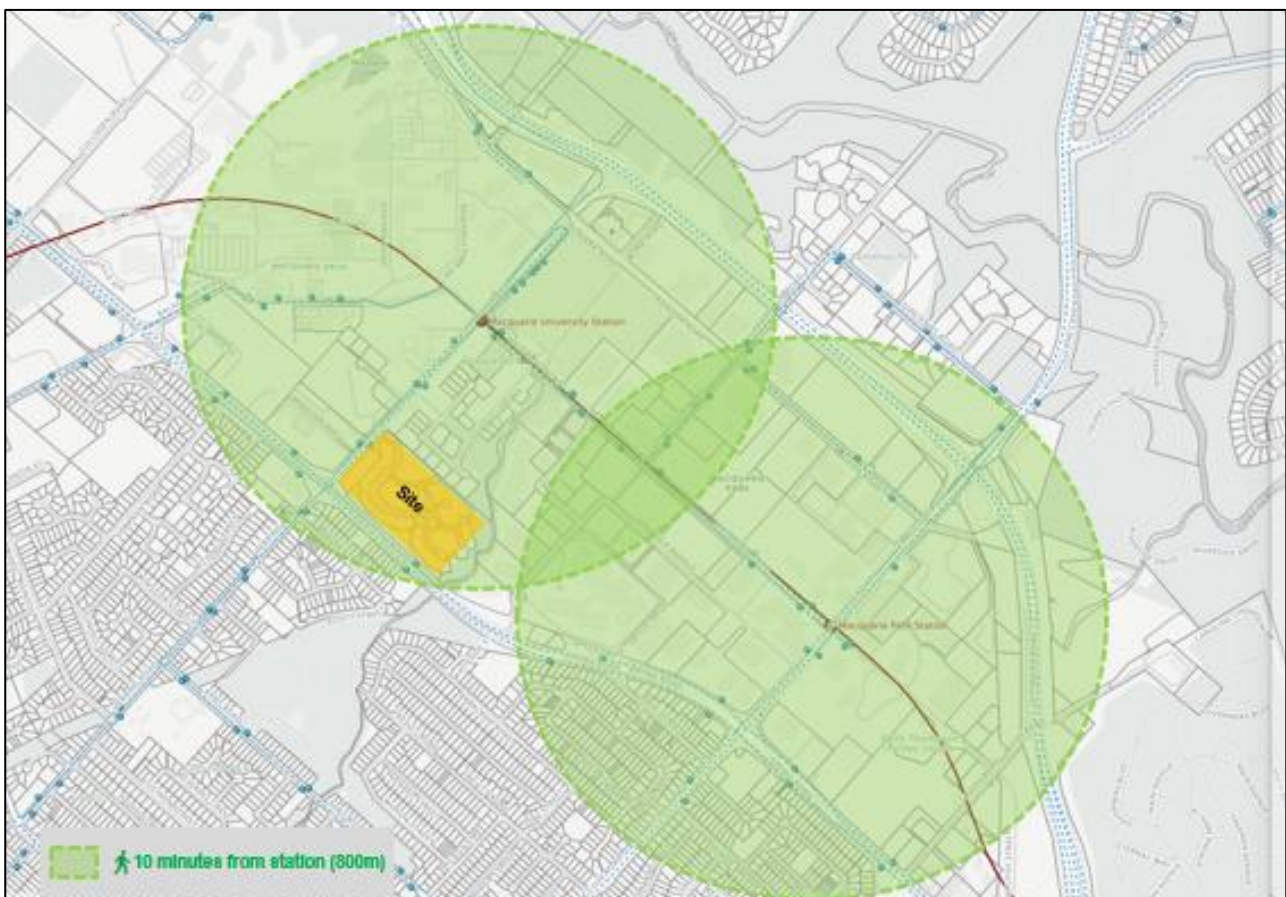


Figure 13: Public Transport Services Radius

Metro currently operates approximately every four minutes during peak periods and 10 minutes outside of these periods, with services operating every 10 minutes on Saturdays and Sundays. **Table 4** summarises the Metro Northwest operating times.

Table 4: Metro Northwest Operating Days and Times

OPERATING TIMES	
Monday to Thursday	5:00am to 12:45am
Friday	5:00am to 2:30am
Saturday	5:15am to 2:30am
Sunday and Public Holidays	5:15am to 12:45am

Source: <https://transportnsw.info/documents/timetables/93-M-Sydney-Metro-North-West-20201221.pdf>

Sydney's Metro Northwest Line and Connections to the broader network are shown below in **Figure 14**, which has been sourced from transport nsw.



Figure 14: Sydney Rail Network

4.2 Bus Services

4.2.1 Existing Bus Services

The Macquarie Park precinct and specifically the Herring Road precinct is well serviced by bus infrastructure with a number of Bus Routes operating from the Macquarie University Metro Station, as shown below in **Figure 15**.

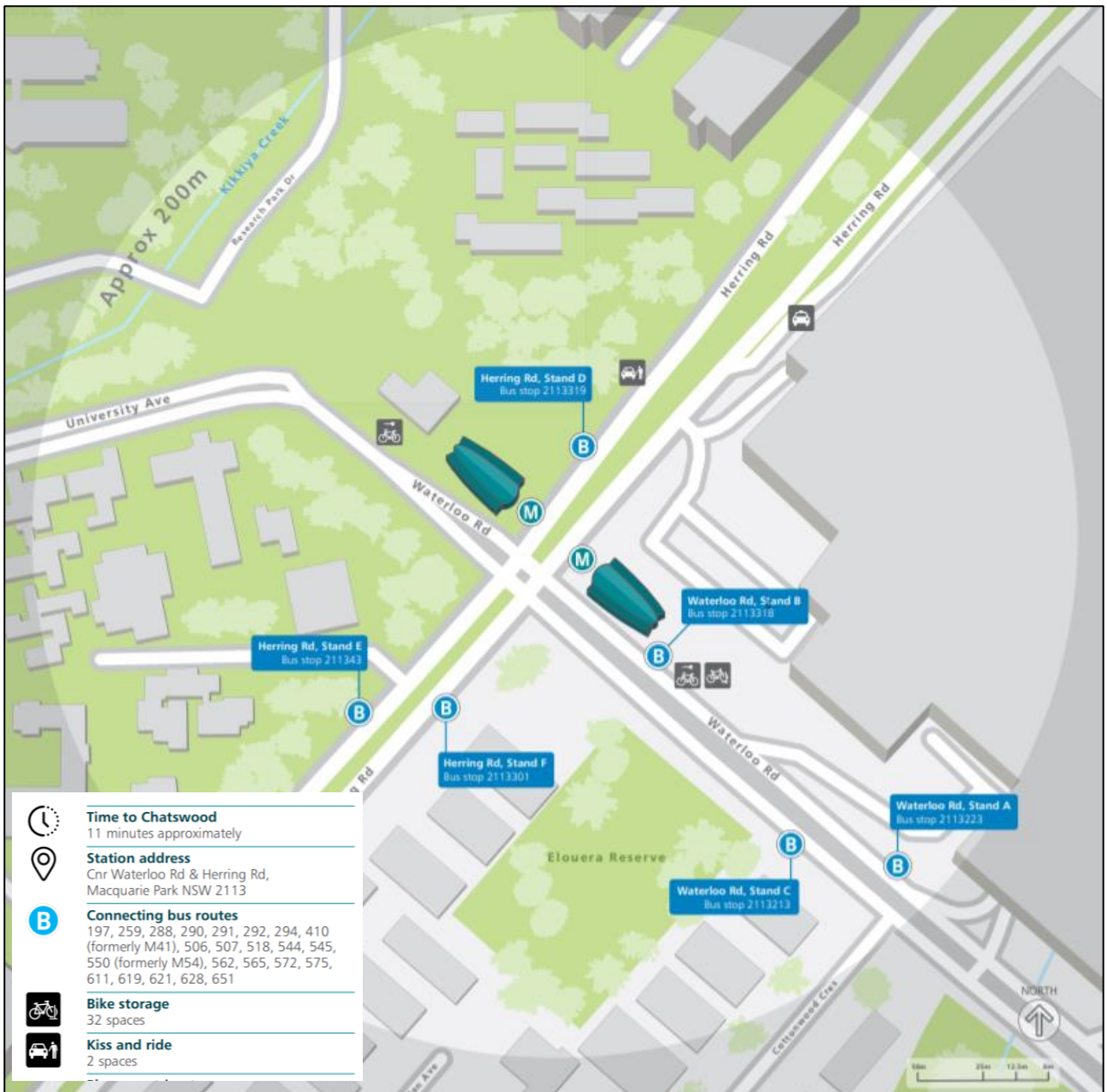


Figure 15: Macquarie University Metro Station Connecting Bus Routes

The broader bus network surrounding the Masterplan site is shown in Figure 16

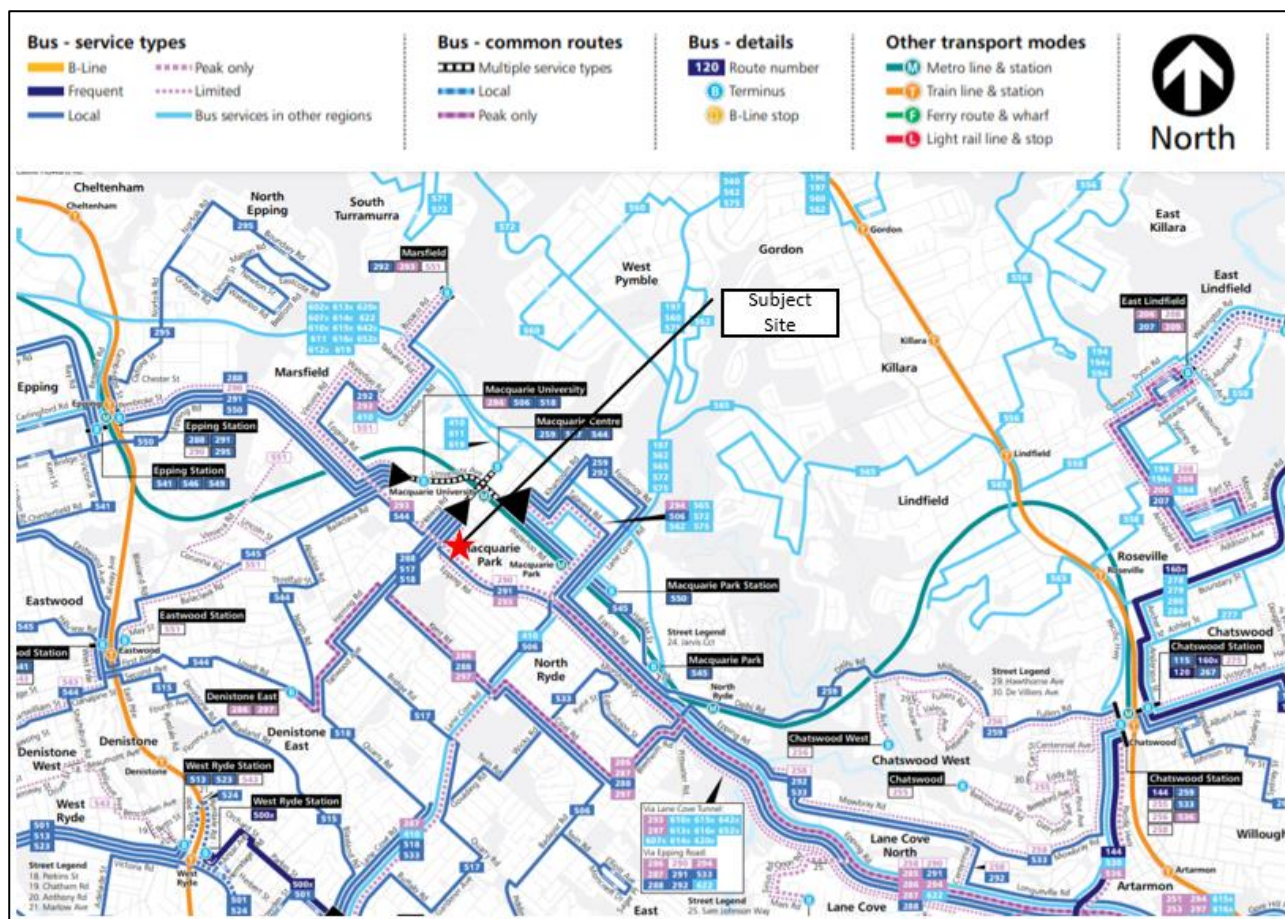


Figure 16: State Transit North Shore and West Network Map (Region 7 Bus Network)

4.2.2 Macquarie Park Bus Priority and Capacity Improvement

The Macquarie Park Bus Priority and Capacity Improvement (MPBPCI) project is being undertaken by TfNSW to improve the road network in Macquarie Park as part of the Bus Priority Infrastructure works, aimed to increase the reliability and efficiency of bus services, while easing congestion for all road users.

Key features of the Macquarie Park Bus Priority and Capacity Improvement (MPBPCI) project include:

- upgrading the intersection of Herring Road and Epping Road;
- upgrading the roundabout intersection of Herring Road and Ivanhoe Place to a signalised intersection;
- adjusting the median along Herring Road, between Ivanhoe Place and Waterloo Road to provide continuous bus lanes in both directions;
- upgrading the intersection of Herring Road and Waterloo Road;
- widening Waterloo Road between Cottonwood Crescent and Lane Cove Road to provide continuous bus lanes in both directions;
- upgrading the roundabout intersection of Byfield Street and Waterloo Road to a signalised intersection;
- upgrading the roundabout intersection of Khartoum Road and Waterloo Road to a signalised intersection;
- upgrading the intersection of Waterloo Road and Lane Cove Road;
- extending the existing southbound bus lane on Lane Cove Road, between Waterloo Road and Epping Road;
- upgrading the intersection of Lane Cove Road and Epping Road; and

- extending the right turn lane northbound on Lane Cove Road onto Epping Road eastbound, between Allengrove Crescent and Lorna Avenue.

The proposal, as outlined in the MPBPCI Project Review of Environmental Factors March 2017, would provide bus priority infrastructure and general capacity to address public transport reliability and cater for travel demand now and into the future for the Macquarie Park precinct. The project has been undertaken in two stages, with Stage 1 complete. The road upgrades now in place aim to provide some much needed capacity improvements and should ease congestion for all road users and to support the additional buses travelling through the area as part of the Station Link Scheme.

Stage 2 of the project is currently in the planning stage, with the Stage 2 work aiming to provide long term improvements for buses, general traffic and pedestrians. The upgrades to the road will reduce congestion and improve access for all road users.

4.2.3 Free Community Bus

In accordance with Condition A25 of the Ivanhoe Concept Instrument, a free community bus service for residents and employees within the site, must be provided, operated and funded by the Applicant to connect the site with Macquarie Park employment zones, Macquarie Shopping Centre and Macquarie Park Station during weekday morning and evening hours.

4.3 Existing Active Transport Provision

The City of Ryde promotes active transport through providing accessible walking and cycling routes for the community. The Macquarie Park area has several recreational walks and cycling facilities, as discussed in detail below.

4.3.1 Pedestrian Infrastructure

The existing pedestrian infrastructure through the Macquarie Park Precinct is presented in **Figure 17** and demonstrates existing footpath and pedestrian crossing locations. In general, pedestrian facilities are provided along public roadways within limited permeability at midblock locations.

In relation to the Masterplan Site, footpaths are provided on both sides of Herring Road to allow pedestrian access between the Masterplan Site and Macquarie University Metro Station and Waterloo Road. A pedestrian underpass links the residential land uses to the south of Epping Road with Shrimptons Creek. This same pedestrian link along Shrimptons Creek provides access to Macquarie Shopping Centre to the north. Signalised crossing facilities are also provided at major intersections along Herring Road, Epping Road and Waterloo Road.

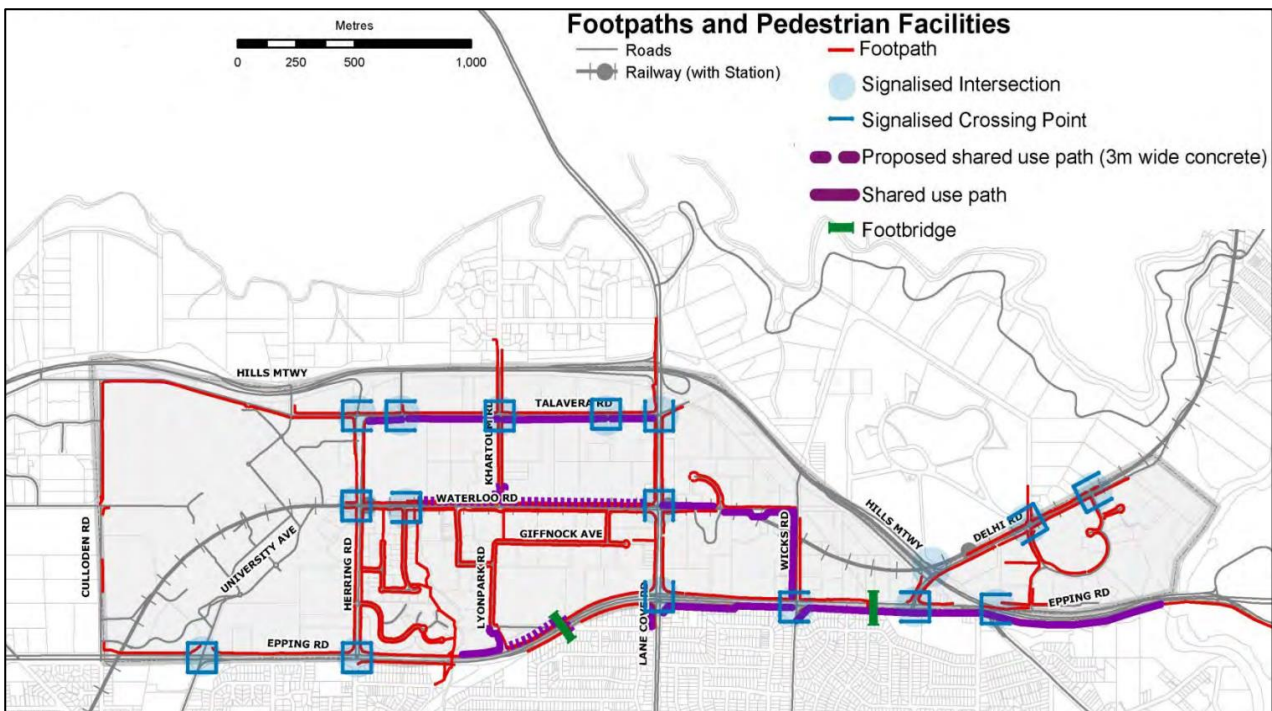


Figure 17: Existing Macquarie Park Pedestrian Facilities (Source: Arup)

The accessibility of the Site to surrounding land uses is shown in **Figure 18** which demonstrates the 5 to 15 minutes walkable catchment to and from Herring Road / Ivanhoe Place intersection. The walking catchment includes the Macquarie University Station, Macquarie University, Macquarie Shopping Centre, employment precincts along Waterloo Road and recreational areas.

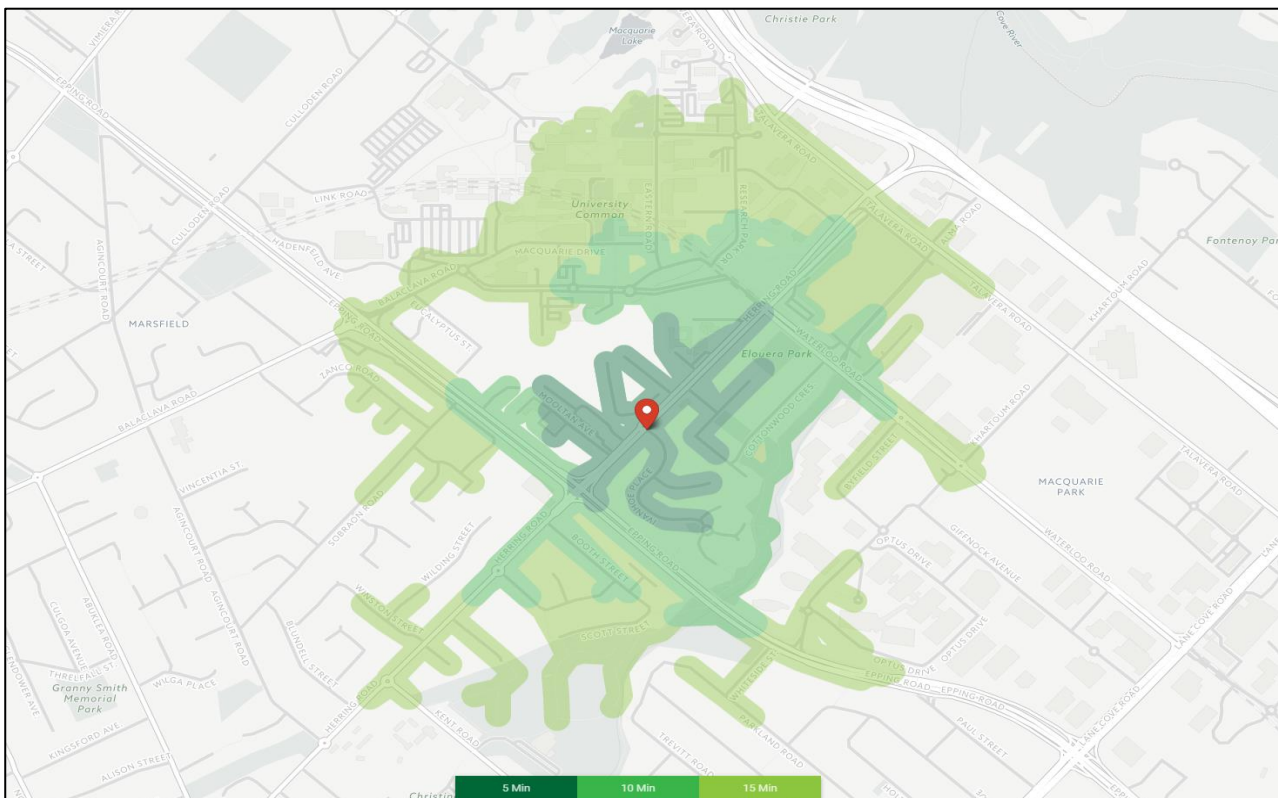


Figure 18: Walkable Catchment from Ivanhoe Place / Herring Road Intersection

4.3.2 Cycling Infrastructure

The bicycle network surrounding the Masterplan Site is illustrated below in Figure 19. As shown below, the Masterplan Site has access to a number of off-road shared paths along Epping Road, Shrimptons Creek and Waterloo Road, which provides access to the broader cycling network.

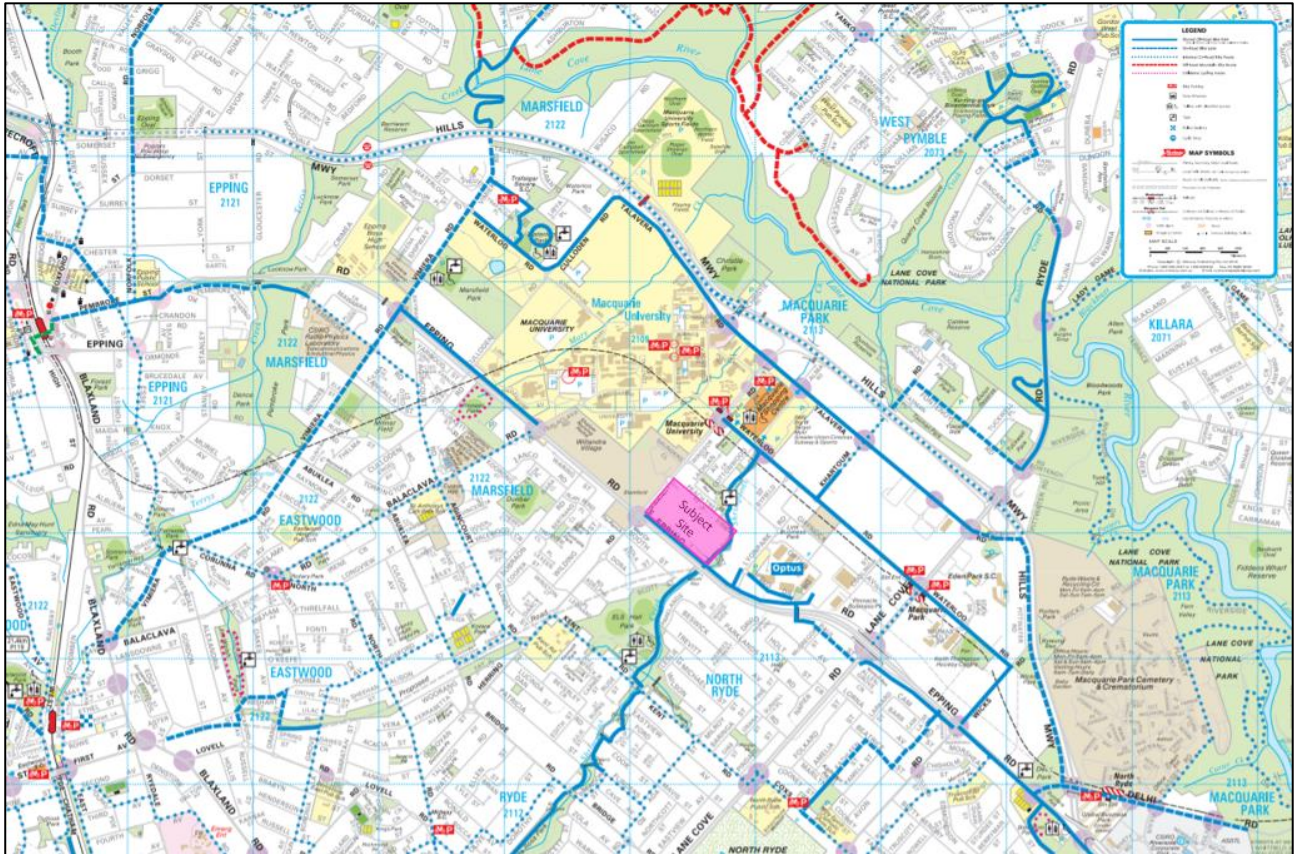


Figure 19: Ryde Cycle Maps (Macquarie Uni_Tsmart)

In addition, the Macquarie University Metro Station provides 32 secure bicycle parking spaces for the storage of bicycles. Refer to **Figure 15** above, for the location of the secure bicycle parking spaces.

5 The Proposal

5.1 Stage 2 Overview

The proposed Stage 2 Development Application seeks consent for the second stage of detailed works within the Ivanhoe Estate, pursuant to the Ivanhoe Estate Masterplan. The Masterplan establishes the planning and development framework against which this Stage 2 Development Application will be assessed.

The Stage 2 Development Application seeks approval for:

- the construction and use of Buildings C2, C3 and C4 comprising residential uses (including market and social housing) and retail / community spaces;

In particular, each of the buildings comprise the following elements:

5.1.1 Building C2

- Village Green and Community Centre
- All car parking associated with the C2 building has been incorporated as part of the C1 building within the Approved Stage 1 development

5.1.2 Building C3

- 162 Residential Market Apartments
 - 970 square metres of retail use (GFA)
 - 163 car parking spaces, comprising:
 - 145 resident spaces (including 8 accessible/adaptable spaces and 8 tandem pairs);
 - 8 residential visitor spaces;
 - 10 retail spaces (including 1 accessible space).
 - Car Wash Bay
 - 176 bicycle parking spaces, comprising:
 - 162 resident bicycle spaces;
 - 4 retail staff bicycle spaces;
 - 10 residential visitor spaces; and
- Retail visitor spaces are provided within the public realm, with 10 spaces proposed and form part of the Masterplan Wide Public Realm plans.
- Bicycle End of Trip Facilities: includes 2 showers, 2 waste closets, 1 accessible waste closet, 5 lockers (based on 1.2 lockers/1 bicycle space) and preparation bench spaces

It is noted that the proposal also provides two on-street car share spaces.

5.1.3 Building C4

- 272 Residential Market Apartments

- 216 Residential Social Apartments
- 396 car parking spaces, comprising:
 - 371 resident spaces (including 24 accessible/adaptable spaces); and
 - 25 residential visitor spaces.
- 488 resident bicycle parking spaces.

Reference should be made to the plans prepared by McGregor Coxall & Chrofi (C2), Studio Johnston (C3) and Cox Architecture (C4) which are submitted separately.

6 Parking and Servicing Requirements

6.1 Proposed Car Parking

Car parking for the Ivanhoe Estate Stage 2 will be provided in accordance with the requirements outlined in the *Masterplan SSD-8707 Ivanhoe Concept Instrument, Conditions of Consent*. With this regard, Table 5 provides the appropriate parking rates to be applied to the proposed Stage 2 development (excluding Building C2), which is consistent with that proposed by the Masterplan.

Table 5: Car Parking Rates

LAND USE	YIELD	PARKING RATE – AS PER APPROVED RATE WITHIN SSD 8707	PARKING REQUIREMENT	PARKING PROVIDED
Residential (Market)				
Studio	11	0 spaces	0	409
1 Bed	183	0.6 spaces per apartment	110	
2 Beds	155	0.9 spaces per apartment	140	
3 or more Beds	85	1.4 spaces per apartment	119	
Visitor	434	1.0 space per 20 apartments	22	22
Residential (Social)				
Studio	24	0 spaces	0	107
1 Bed	97	0.6 spaces per apartment	58	
2 Beds	95	0.9 spaces per apartment	86	
Visitor	216	1.0 space per 20 apartments	11	11
Retail				
Retail	970 sqm	1.0 space per 100sqm of GFA	10	10
TOTAL				559

6.2 Accessible Parking Provision

The Approved Masterplan requires a minimum of 5% of the dwellings to be designed as Adaptable Dwellings. As such, a minimum of 32 accessible car parking spaces shall be provided for the C3 and C4 dwellings.

In addition, one accessible car parking space shall be provided for the retail uses.

A combined total of 3 accessible car spaces are to be provided within the C3 and C4 basement car parking, as follows:

- 8 accessible spaces within C3; and
- 24 accessible spaces within C4.

6.3 Bicycle Parking and Facilities

Condition A22 and A23 of the Approved Masterplan (SSD – 8707) states:

“A22. All residential buildings must provide a minimum of one bicycle parking space per apartment, designed in accordance with AS 2890.3.

A23. A minimum of 200 visitor bicycle parking spaces are to be provided across the site, including a minimum of 100 spaces located within the public domain.”

As such, each dwelling has been provided with either a dedicated bicycle parking space or sufficient storage to accommodate a bike. On this basis, the bicycle parking proposed for each building is as follows:

- Building C3
 - 162 resident bicycle parking spaces within individual storage cages;
 - 4 retail staff bicycle spaces;
 - 10 residential visitor spaces.
- Building C4
 - 488 resident bicycle parking spaces within individual storage cages;

In addition to the bicycle parking, end of trip facilities will be provided in Basement Level 1 of the C3 Building as follows and shown in **Figure 20**.

- 2 showers
- 2 waste closets,
- 1 accessible waste closet
- 5 lockers (based on 1.2 lockers/1 bicycle space) and
- preparation bench spaces

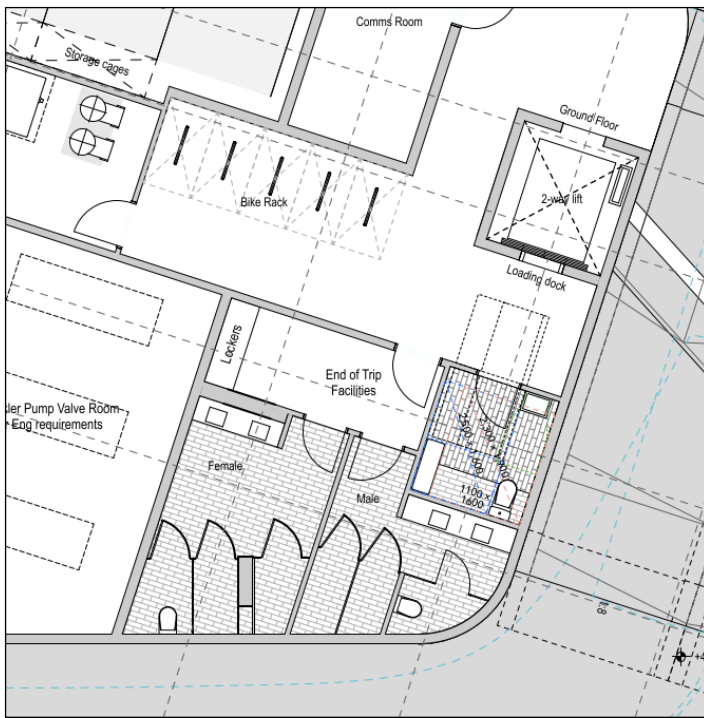


Figure 20: C3 End of Trip Facilities

6.4 Motorcycle Parking

The Approved Masterplan (SSD 8707) does not have a requirement to provide motorcycle parking.

The Stage 2 development does not propose to provide any motorcycle parking.

7 Transport Assessment

7.1 Ivanhoe Estate Road Upgrades and Future Intersection Operation

The following road upgrades were approved as part of the Stage 1 Development:

- Bridge Connection between Ivanhoe Place and Lyon Park Road (two way); and
- Signalisation of Ivanhoe Place with Herring Road.

The future performance of the key intersections in the surrounding road network has previously been analysed as part of the Approved Masterplan. The modelling assessment considered the proposed upgrades as well as traffic generated from the completed Ivanhoe Estate.

SIDRA Network Performance has been extracted from the Ason TMAP SIDRA Results (P0421r04v01) and the RTS Technical Note (P0421t06v01).

A summary of the future operation is provided in *Table 6*, with the detailed SIDRA results provided in Appendix B.

Table 6: Local Network Performance, Cumulative Future Scenario Based on Completed Masterplan

INTERSECTION	PEAK	LEVEL OF SERVICE (DELAY IN SECONDS)		
		2021 RMS Base	2021 RMS Base + Development + Upgrades	2031 + Development + Upgrades
Epping Road / Herring Road	AM	E	F	F
		68	86	91
	PM	E	F	E
		57	72	70
Ivanhoe Place / Herring Road	AM	A	B	B
		13	23	23
	PM	B	D	D
		23	45	45
Waterloo Road / Herring Road	AM	C	D	D
		39	48	47
	PM	C	D	D
		42	46	44
Epping Road / Lyonpark Road	AM	A	A	A
		6	6	6
	PM	A	A	A
		6	6	6
Waterloo Road / Byfield Street	AM	B	B	B
		17	18	18
	PM	B	B	C
		23	21	36

The operation of the network under the Approved Masterplan demonstrates minimal increase in delays at the intersections of Epping Road with Herring Road during the morning and evening peak periods under the Masterplan conditions. The additional delays resulting from the development are generally offset by the proposed upgrades which will facilitate improved distribution of traffic around the network.

7.2 Stage 2 Traffic Generation

Having regard to the trip rates undertaken for the Masterplan, **Table 7** and **Table 8** provide the forecast traffic generation for Stage 2 (Buildings C3 and C4). It is noted that Building C2 does not provide any car parking, with the traffic impacts previously assessed within the Stage 1 Approval.

In addition, the traffic generations associated with the on-street car parking to be provided as part of Stage 1 has been assessed within the Stage 1 SSDA. Remaining movements to the centre are expected to be walking and cycling.

Table 7: Proposed Building C3 Trip Rates and Traffic Generation

LAND USE	YIELD	AM TRIP RATE	PM TRIP RATE	AM GENERATION (VEH/HR)	PM GENERATION (VEH/HR)
Residential Land Uses					
Market Dwellings	162	0.14 / unit	0.12 / unit	23	19
Non-Residential Land Uses					
Retail	970 sqm (GFA)	1 trip per 100 sqm	1 trip per 100 sqm	10	10
Total Generation				33	29

Table 8: Proposed Building C4 Trip Rates and Traffic Generation

LAND USE	YIELD	AM TRIP RATE	PM TRIP RATE	AM GENERATION (VEH/HR)	PM GENERATION (VEH/HR)
Residential Land Uses					
Market Dwellings	272	0.14 / unit	0.12 / unit	38	33
Social Dwellings	216	0.03 / unit	0.05 / unit	6	11
Total Generation				44	44

Building C3 is predicted to generate a total of 33 veh/hr in the AM peak and a total of 29 veh/hr in the PM peak. Building C4 is predicted to generate a total of 44 veh/hr in the AM peak and 44 veh/hr in the PM peak. The proposed Stage 2 development will generate 77 veh/hr in the AM peak and 73 veh/hr in the PM peak.

It is noted that the Stage 1 Approved Development is expected to generate 111 veh/hr in the AM peak and 105 veh/hr in the PM peak. Thus the combined Stage 1 and 2 developments are expected to 188 veh/hr in the AM peak and 178 veh/hr in the PM peak.

A comparison of the Combined Stage 1 and Stage 2 development traffic generation, to that predicted and assessed as part of the Approved Masterplan is provided in **Table 9**.

Table 9: Stage 1 & 2 Total Traffic Generation vs Masterplan Traffic Generation (veh/hr)

LAND USE	STAGE 1 AND STAGE 2		APPROVED MASTERPLAN	
	AM	PM	AM	PM
<i>Residential Land Uses</i>				
Market Dwellings	114	97	324	281
Social Dwellings	14	24	26	44
Affordable Units	16	13	31	28
Residential Sub-total	145	135	382	354
<i>Non-Residential Land Uses</i>				
Child Care	14	14	30	30
Ancillary Retail/ Community Use	30	30	30	30
Non-Residential Sub-total	44	44	60	60
Total Generation	188	178	441	413

As shown above, the combined Stage 1 and Stage 2 developments generate traffic within the approved allowances within the approved masterplan and as such are supportable on traffic generation grounds.

8 Design Assessment

8.1 Design Standards

The Stage 2 site's access, car parking and servicing areas have been designed in accordance with the following relevant Australian Standards:

- AS2890.1:2004 for car parking areas.
- AS2890.2:2018 for commercial vehicle loading areas.
- AS2890.6:2009 for accessible (disabled) parking.

Ason Group notes from the outset that it is expected that any detailed construction drawings in relation to any future modifications to these areas would comply with these Standards and moreover that compliance with the above Standards would form a standard Condition of Consent to any future approval.

8.2 Design Review

Further to our review of the Stage 2 Site plans, the following is noted:

8.2.1 Building C3

Site Access

Access to the Site is proposed as follows:

- Car Park Access 8.5 metre combined width for loading and general car park access, inclusive of the central median island and intercom. If required, additional safety measures can be implemented at the intersection of the private road the basement driveway.
- The access driveway has been designed with reference to AS2890.2:2018 to accommodate the movement of heavy vehicles up to 11.0 metres, including the 10.8 metre City of Ryde Waste vehicle. If required, additional safety measures can be implemented at the intersection of the private road the basement driveway.

AS2890.1:2004 nominally requires a Category 3 (CAT 3) Access Driveway (6m entry width and 4-6m exit width) for developments fronting local roads and providing between 101-300 User Class 3/3A parking spaces. The proposal provides minimum clear 3.0m wide entry and exit lanes, separated by a 600mm wide median and is supportable for the following reasons:

- The design has been assessed with swept path analysis (B99 design vehicle) and accommodates the spatial requirements for ingress and egress.
- During daytime hours (~7:00am to 7:00pm), the security gate at the top of the ramp will be open to enable unimpeded access to the retail and visitor car parking spaces within Basement Level 1.
- Queuing theory analysis has been undertaken to account for the peak period arrivals to ensure the 98th percentile queue is accommodated within the property boundary. With 14 arrivals during the AM peak (20% of resident trips and 90% of retail trips) and 15 arrivals during the PM peak (70% of resident trips and 10% of retail trips), the analysis estimates the 98th percentile queue is 1 vehicle or 6 metres. The intercom at the top of the ramp has been setback approximately 10 metres from the property line, with at least 6 metres provided with a gradient of 1:20 or shallower. In addition, a single queuing space has been

provided at the bottom of the entry ramp, for resident vehicles accessing the secure resident parking. As such, the queuing allowance is in compliance with AS 2890.1:2004.

In summary, a merit assessment has been undertaken for the proposed car park access. It has been concluded that the driveway satisfies the operational requirements and characteristics for the proposed development and complies with the principles of AS2890.1:2004 (these being the key safety and spatial requirements).

Ramps

- Entry Ramp
 - Maximum initial gradient of 1:20 for at least 6.0 metres (both ascending and descending due to the boundary RL's)
 - 1.0 metre flat section
 - Transition 1:8 gradient for 2.0 metres
 - Midblock 1:5 gradient for 9.0 metres
 - Final 1:8 gradient for 2.0 metres
- Internal Ramps
 - Initial 1:8 gradient for 2.0 metres
 - Midblock 1: 4 gradient for 6.15 metres
 - Final 1:8 gradient for 2.5 metres

OR

 - Maximum 1:8 gradient for 5.6 metres.
- A maximum 1:20 gradient within the parking modules.
- The ramps have been provided with a maximum 1:5 midblock section for the publicly accessible ramps and 1:4 midblock section for resident only areas, which is permissible under AS2890.1:2004 where the midblock length does not exceed 20m.
- A ground clearance assessment has been prepared for the entry ramp due to the reduced 1.0 metre flat section between the 1:20 and 1:8 gradient. This assessment indicates that no scraping will occur and is therefore considered acceptable in this instance. Refer to **Appendix C** for the Swept Path Assessment.

Parking Modules and Internal Circulation

- All residential car spaces have been designed with reference to the requirements for User Class 1A spaces as defined in AS2890.1:2004 and will provide a minimum space length of 5.4 metres, a minimum width of 2.4 metres and minimum (adjacent) aisle width of 5.8 metres.
- All visitor car spaces have been designed with reference to the requirements for User Class 3 spaces as defined in AS2890.1:2004 and will provide a minimum space length of 5.4 metres, a minimum width of 2.6 metres and minimum aisle width of 5.8 metres.
- All retail car spaces have been designed with reference to the requirements for User Class 3 spaces as defined in AS2890.1:2004 and will provide a minimum space length of 5.4 metres, a minimum width of 2.6 metres and minimum aisle width of 5.8 metres.
- Accessible spaces have been designed with reference to AS2890.6:2009 and provide a space with a minimum length of 5.4 metres, a minimum width of 2.4 metres adjacent to an unobstructed 'shared space' of minimum 2.4 metres width and a minimum aisle width of 5.8 metres.
- Adaptable parking spaces generally designed in accordance with AS4299:1995 (refer to Access Consultant specialist report).
- All spaces located adjacent to obstructions greater than 150mm in height will be provided with an additional width of 300mm in accordance with AS 2890.1:2004.

Headroom Requirements

- A general minimum headroom of 2.2 metres to structure and services is applied throughout the basement car park.
- An increased headroom of 2.5 metres to structure and services is provided above all accessible and adaptable parking spaces.

Bicycle Parking

- All resident spaces to be provided within the individual storage cages, which have been designed in general accordance with the requirements of AS 2890.3:2015.

Swept Path Assessment

A swept path analysis is provided on the plans attached at **Appendix C**, which demonstrate compliance with relevant sections of AS2890.1:2004.

8.2.2 Building C4

Subject to the adoption of the following design recommendations, outlined in **Appendix E** and confirmed by the architect in **Appendix D**, the C4 access and car parking layouts generally comply with the relevant standards. A summary of these arrangements is provided below.

Site Access

Access to the Site is proposed as follows:

- Social Car Park Access - 6.4 metre combined width at the building line.
 - AS2890.1:2004 nominally requires a Category 2 (CAT 2) Access Driveway (6.0 metre to 9.0 metres combined) for developments fronting local roads and providing between 101-300 User Class 1/1A parking spaces.
 - Queuing theory analysis has been undertaken to account for the peak period arrivals (PM) to ensure that 98th percentile queue is accommodated within the property boundary. With 8 arrivals during the PM peak (70% of 11 veh/hr), the analysis estimates the 98th percentile queue is 1 vehicle or 6 metres. It is noted that the access control for the Social Car Park Access is provided at the bottom of the entry ramp, and hence sufficient space has been provided to accommodate any expected queue at the top of the ramp.
- Servicing and Main Car Park Access - 6.8 metre combined width at the building line.
- The loading and main car park access driveway has been designed with reference to AS2890.2:2018 to accommodate the movement of a heavy vehicles up to and including the Heavy Rigid Vehicle (HRV).
 - AS2890.1:2004 nominally requires a Category 3 (CAT 3) Access Driveway (6m entry width and 4-6m exit width) for developments fronting local roads and providing between 301-600 User Class 1/1A parking spaces. The loading and main car parking access arrangements, although a deviation from the standards due to the overall width, are supportable for the following reasons:
 - The design has been assessed with swept path analysis (B99 design vehicle and HRV) and accommodates the spatial requirements for ingress and egress.
 - Queuing theory analysis has been undertaken to account for the peak period arrivals (PM) to ensure the 98th percentile queue is accommodated within the property boundary. With 23 arrivals during the PM peak (70% of 33 veh/hr), the analysis estimates the 98th percentile queue is 1 vehicle or 6 metres. A flat section has been provided in front of the access control to the secure market car parking. This, in addition to the final 1:16 section for 6.0 metres of the entry ramp is sufficient to allow any expected queuing.

In summary, a merit assessment has been undertaken for the proposed car park access. It has been concluded that the driveway satisfies the operational requirements and characteristics for the proposed development and complies with the principles of AS2890.1:2004 (these being the key safety and spatial requirements).

Ramps

Social

- Entry Ramp
 - Initial 1:20 for 6.0 metres
 - Transition 1:8 gradient for 2.0 metres
 - Midblock 1:4 gradient for 11.2 metres
 - Final 1:8 gradient for 2.0 metres.
- Internal Ramps
 - Initial 1:8 gradient for 2.0 metres
 - Midblock 1:4 gradient as required to achieve the required RL's.
 - Final 1:8 gradient for 2.0 metres

Market

- Entry Ramp (Servicing and General Access)
 - Maximum initial gradient of 1:20 for at least 6.0 metres
 - Transition 3:40 gradient for 6.4 metres
 - Transition 1:8 gradient for 2.0 metres
 - Midblock 1:6.5 gradient for 10.87 metres
 - Transition 1:8 gradient for 6.0 metres
 - Final 1:16 gradient for 6.0 metres
- Internal Ramps (General Access)
 - Initial 1:8 gradient for 2.0 metres
 - Midblock 1:4 gradient as required to achieve the required RL's.
 - Final 1:8 gradient for 2.0 metres
- The main ramp has been provided with a maximum 1:6.5 midblock section, whilst the secure residential areas have been provided with a maximum 1:4 midblock sections (less than 20 metres) which meets the relevant standards.
- A ground clearance assessment has been prepared for the entry ramp due to the reduced 6.0 metre transitions. This assessment indicates that no scraping will occur and is therefore considered acceptable in this instance. Refer to **Appendix E** for the Design Review and Swept Path Assessment.

Design Recommendation: Whilst the gradient transition lengths of 2.0 metres comply with the relevant standards, in our experience the final 1:8 section after a 1:4 gradient section is required to be increased to 2.5 metres to prevent scraping. As such, it is recommended that the final 1:8 gradient sections be increased to 2.5 metres (and a subsequent reduction in the length of the 1:4 gradient section).

Parking Modules and Internal Circulation

- All residential car spaces have been designed with reference to the requirements for User Class 1A spaces as defined in AS2890.1:2004 and will provide a minimum space length of 5.4 metres, a minimum width of 2.4 metres and minimum (adjacent) aisle width of 5.8 metres.

- The parallel residential car spaces have been designed to AS2890.1:2004 and will provide a minimum space length of 6.0 metres, a minimum width of 2.1 metres and minimum (adjacent) aisle width of 5.8 metres.
- All visitor car spaces have been designed with reference to the requirements for User Class 3 spaces as defined in AS2890.1:2004 and will provide a minimum space length of 5.4 metres, a minimum width of 2.6 metres and minimum aisle width of 5.8 metres.
- Accessible spaces have been designed with reference to AS2890.6:2009 and provide a space with a minimum length of 5.4 metres, a minimum width of 2.4 metres adjacent to an unobstructed 'shared space' of minimum 2.4 metres width and a minimum aisle width of 5.8 metres.
- Adaptable parking spaces generally designed in accordance with AS4299:1995 (refer to Access Consultant specialist report).
- All spaces located adjacent to obstructions greater than 150mm in height will be provided with an additional width of 300mm in accordance with AS 2890.1:2004.

Headroom Requirements

- A headroom clearance of at least 4.5 metres to structure and services will be provided along the loading dock entry ramp and within the loading dock.
- A general minimum headroom of 2.2 metres to structure and services is applied throughout the basement car park.
- An increased headroom of 2.5 metres to structure and services is provided above all accessible and adaptable parking spaces.

Bicycle Parking

- All resident spaces to be provided within the individual storage cages, which have been designed in general accordance with the requirements of AS 2890.3:2015.
- All bicycle racks proposed have been designed in general accordance with the requirements of AS 2890.3:2015.

Swept Path Assessment

A swept path analysis is provided on the plans attached at **Appendix E**, which demonstrate compliance with relevant sections of AS2890.1:2004.

8.3 Traffic Management

It is recommended that a detailed operational traffic management plan, including a signage and linemaking plan, and any other desirable traffic management devices (eg. Mirrors, Speed Humps, Wheel Stops, Warning Devices etc) be prepared prior to the Construction Certification.

8.4 Service Vehicle Access

The commercial (heavy) vehicle facilities of Building C3 and C4 have been designed having regard for the operational requirements of the future tenant and the requirements of AS2890.2:2018. In this regard, the following is considered noteworthy:

- The internal design of the service area for C3 has been undertaken in accordance with the requirements of AS28090.2:2018, adopting the current City of Ryde Waste Vehicle as the design vehicle (10.8m in length). It is noted that the Condition C10 of the Concept Instrument states *“Future residential development application must demonstrate waste collection areas can be serviced by an 11.0m long rear loading truck.”*. As such, the on-site loading bay and turntable have been designed to accommodate a minimum 11.0m long vehicle.
- The internal design of the service area for C4 has been undertaken in accordance with the requirements of AS28090.2:2018 for the maximum length vehicle accessing the site being a HRV of 12.5m in length.
- A minimum clear head height of 4.5m to structure and services will be provided within all areas traversed by service vehicles.
- A truck turntable has been provided within the service area of C3, with a minimum clear diameter of 11.4 metres. In addition, a 600mm clearance has been provided to any surrounding fixed obstruction, which exceeds the minimum 300mm clearance, as required by AS2890.2:2018.
- A truck turntable has been provided within the service area of C4, with a minimum clear diameter of 12.5 metres. In addition, a 1.0m clearance has been provided to any surrounding fixed obstruction, which exceeds the minimum 300mm clearance, as required by AS2890.2:2018.
- All service vehicles can enter and exit the site in a forward direction.

A design review and swept path analysis is provided on the plans attached in Appendix C and Appendix E, which demonstrate compliance with relevant sections of AS2890.2:2018.

9 Preliminary Construction Traffic Management and Pedestrian Management Plan

9.1 Overview

The proposed Stage 2 works consists of the following components of works considered as part of this Preliminary Construction Traffic Management Plan.

- Bulk earth works associated with Stage 2 as identified in the Civil Design drawings
- Construction works associated with the development of the Stage 2 building and associated access driveways.

Detailed plans of Stage 2 are provided elsewhere in the SSDA submission.

This Preliminary Construction Traffic Management and Pedestrian Management Plan outlines principles that shall be adopted by the appointed contractors for the project and is subject to a detailed Construction Traffic Management and Pedestrian Management Plan that forms part of a Construction Management Plan to be prepared and commissioned by the incumbent contractor engaged for the civil works, construction works, and intersection upgrade works.

This Preliminary Construction and Pedestrian Management Plan has been prepared by personnel who hold the TfNSW (formerly RMS) *Prepare a Work Zone Traffic Management Plan* certification. Details of the accredited personnel is provided below:

- Dora Choi – Certification No. 0051848825

9.2 Overall Principles of Construction Traffic and Pedestrian Management

The overall principals of traffic management during construction activities include:

- Minimising the impact on pedestrian and cyclist safety and movements
- Maintaining appropriate emergency vehicle, public transport, school bus, service vehicle access
- Minimising the impact to existing traffic on adjacent roads and intersections
- Minimising the loss of on-street parking
- Maintaining access to / from adjacent properties
- Restricting construction vehicle movements to designated routes to / from the site
- Managing and controlling construction vehicle activity near the site
- Ensuring construction activity is carried out in accordance with Council's approved hours of work.

9.3 Proposed Work Hours

The construction work will vary depending on the phase of construction, type of construction, coordination requirements with other construction and associated activities.

9.3.1 Building Works Associated with Stage 2

For construction works associated with the Development of Stage 2, it is anticipated that standard construction working hours will be applicable for general construction activities:

- Monday to Friday: 7:00AM to 6:00PM.
- Saturday: 8:00AM to 1:00PM.
- Sunday and Public holidays: No planned work.

It may (on occasions) be necessary to undertake night works to minimise disruption to traffic however any works undertaken outside of these times will only occur with prior approval from Council.

9.4 Contractor Parking

Limited on-site parking will be available to construction workers and contractors.

The incumbent contractor will be required to ensure contractors working on the project are aware of the limited availability of on-site parking, and any reliance on on-street parking shall comply with parking restrictions displayed.

The incumbent contractors shall provide details of on-site parking based on construction works staging and availability of suitable areas within the site.

Should parking be not available for specific stages of works, it is the incumbent contractor's responsibility to prepare relevant plan and documentation to ensure contractor parking demand and associated management measures are documented, implemented, continually monitored and managed.

9.5 Worker Induction

All workers and subcontractors engaged on-site would be required to complete a site induction. The induction should include permitted access routes to and from the construction site for all vehicles, as well as standard environmental, work, health and safety (WHS), driver protocols and emergency procedures.

Any workers required to undertake works or traffic control within the public domain would be suitably trained and covered by adequate and appropriate insurances.

9.6 Authorised Traffic Controller

There is likely to be a requirement for authorised traffic controller(s) to be present throughout all of the projects construction stages to manage pedestrians and traffic movements at the Herring Road frontage and access. In addition, once Stage 1 is operational and Stage 2 is undergoing construction, authorised traffic controller(s) are likely to be required internal to the site to manage pedestrians and other vehicles, as necessary. The responsibilities are likely to include:

- Pedestrian and cyclist management, to ensure that adverse conflicts between vehicle movements and pedestrians do not occur.
- Supervision of all vehicle movements across pedestrian footpaths and nearby sensitive interfaces.
- Supervision of all loading and unloading of construction materials during the deliveries in the construction phase of the project.
- Management and supervision of road closures / lane closures for specific activities.
- Monitoring of traffic conditions whilst Traffic Guidance Schemes are implemented to ensure no conflict with existing Traffic Control Devices along the public roadway.

9.7 Pedestrian Management Principles During Construction

The proposed works consists of road works, civil works and intersection works that may result in some footpath closures due to the nature of works required. The pedestrian management is for the external road network prior to the Stage 1 buildings being operational and for both the external road network and internal road network once Stage 1 is operational and Stage 2 is undergoing construction.

The following principles provide guidance to the incumbent contractors to assist with the planning and staging of construction activities to minimise impact to pedestrian movements and shall form part of the detailed CTPMP. Key considerations being:

- Pedestrian access to / from each of the properties occupied along roadways adjacent to the works area shall be maintained at all times.
- Pedestrian pathways adjacent to works area shall be protected by hoarding. If the pedestrian pathway is adjacent to areas where deep excavation works are being undertaken, additional no-go areas shall be allowed for within the works area to improve pedestrian safety.
- Temporary pedestrian pathways may be required as part of the pedestrian diversion strategy. Temporary pedestrian pathways shall be constructed to suitable standards in accordance with Council requirements. Temporary lighting may be required and subject to review by lighting engineer to ensure compliance with relevant Australian Standards.
- Should pedestrian diversion be required, detailed TGS outlining the relevant pedestrian diversion signage, temporary kerb ramps (where required), and whether Authorised Traffic Controllers will be in place to support the temporary diversion shall be prepared and submitted to TfNSW / Council for approvals.
- Traffic controller(s) shall be present at the site accesses to manage pedestrian and vehicular traffic to ensure public safety while construction vehicles enter and exit the site. Pedestrians will not be directed to use the other footpath by use of signage alone. Also, traffic controls would need to be in accordance with AS1742.3 and RMS 'Traffic Control at Worksites' manual at all times.
- Should any unforeseen activities require the temporary closure of any existing pedestrian access, a TGS should be developed and implemented by the contractor to ensure a safe alternative for pedestrians traversing these routes in the vicinity of the site.

9.8 Staging and Duration of Works

Detailed staging and duration of works is not available at the time of preparation of this preliminary CTPMP.

It is recommended that a condition be included in the SSD requiring a Detailed Construction Traffic and Pedestrian Management Plan prior to the commencement of bulk earthworks within the Stage 2 site.

9.9 Construction Vehicle Types and Estimated Traffic Volumes

Construction traffic will generally incorporate:

- Vehicles up to the dimensions of a Truck + Dog Trailers and 19m long Articulated Vehicle for removal of spoil and transportation of material.
- Concrete mixer trucks up to 12m in length.

Any oversize vehicles using local roads to access the site for would require additional Council and/or Transport for NSW approval.

The maximum number of trucks accessing the site is subject to the development of a detailed construction staging plan upon the appointment of the contractor. Notwithstanding this, the number of trips is expected to be well within the acceptable limits, given the upgrades to the surrounding road network as part of the Stage 1 approvals.

9.10 Construction Mitigation Measures

Construction of the above development would generate a moderate increase in traffic on the surrounding road network. This modest increase in traffic is not expected to adversely impact on the operation of the surrounding road network, given the upgrades to be implemented as part of the Stage 1 Approvals. In this regard, the following measures should be undertaken to minimise the impacts of the construction activities of the development:

- A construction fence and suitably classed Hoarding shall be provided along site boundaries / works area boundaries to provide safe pedestrian access. The fencing / hoardings should be maintained for the duration of the construction program associated with the stage of works being undertaken.
- Traffic control would be required to manage and regulate traffic movements into and out of the site during construction, with pedestrian priority provided during peak hour periods and to maintain accessibility to public transport facilities.
- Disruption to road users should be kept to a minimum by scheduling intensive delivery activities outside of road network peak hours.
- Supervised traffic control will be required where two-way flow is restricted over any length of the roadway, depending on the number of truck movements required and would be managed outside of peak hour vehicle and pedestrian activity.

9.11 Site Access and Truck Routes

Consistent with the Preliminary Construction Traffic Management and Pedestrian Management Plan provided as part of the Stage 1 Development (SSDA 8903), it is proposed that construction vehicles would enter and exit the Site via the routes shown in **Figure 21**. A copy of the truck route would be provided to all drivers prior to travel to the site. In accordance with the Vehicle Movement Plan (VMP) to be distributed by the lead contractor during prior to construction, all vehicles (both light and heavy) shall enter and leave the site in a forward direction.

Two options have been given for the construction vehicle access routes to site – one with the ability to turn right into and out of Ivanhoe Place, and the other without.

The routes shown in **Figure 21** are to be utilised by all construction vehicles travelling to and from the site and represents the shortest route between the local and regional road network - hence minimising the impacts of the construction process.

Construction of the Proposal would generate approximately 100 additional movements within the network, spread over a typical 12 hour period (6:00am to 6:00pm). Given that the M2 and Epping Road routes currently carry high volumes of traffic, construction of the development is not anticipated to have a material impact to the existing volumes on the M2 and the local network.

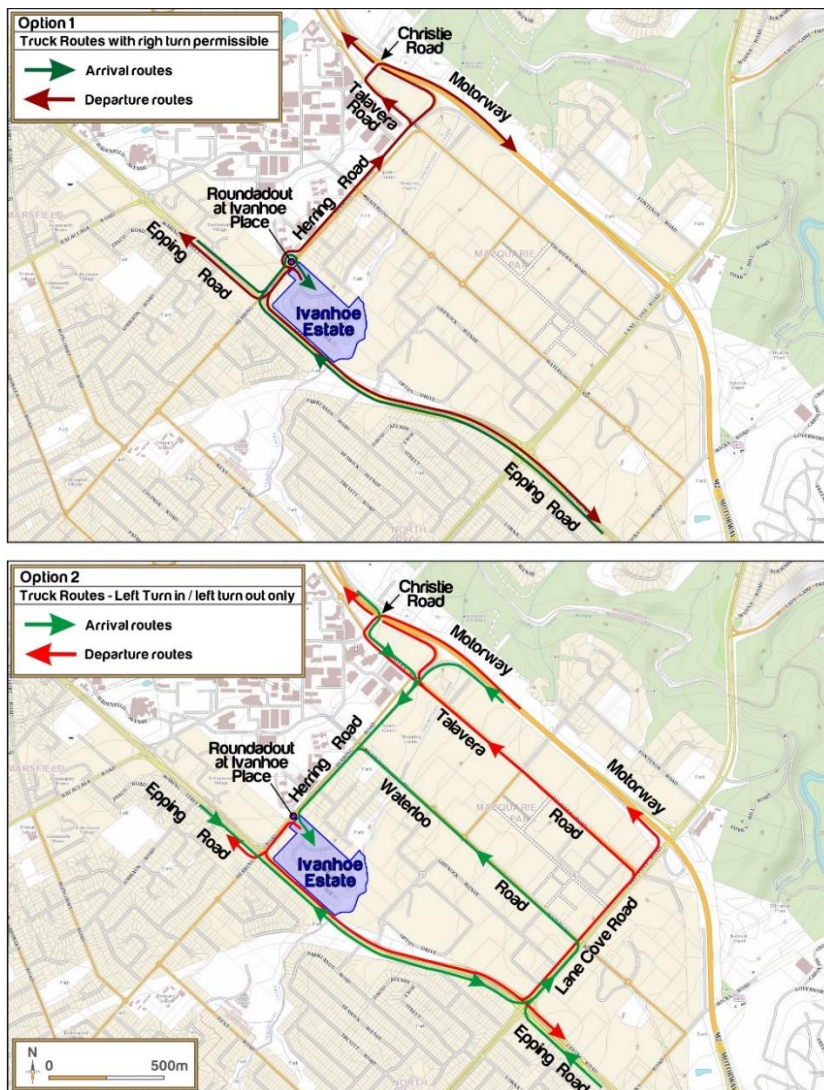


Figure 21: Construction Traffic Routes

10 Conclusions and Recommendations

Ason Group has prepared this Traffic Assessment (TA) report to support a Development Application for the Ivanhoe Estate – Stage 2, a State Significant Development (SSD) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) – the Proposal. It has been prepared for Aspire Consortium on behalf of NSW Land and Housing Corporation.

The key findings of this Traffic Assessment are:

- The DA for Stage 2 of the Ivanhoe Estate Redevelopment is broadly consistent with that envisaged as part of the approved Masterplan for the site, which envisaged the creation of an integrated neighbourhood including social housing mixed with affordable and private housing, as well as seniors housing, a new school, child care centres, community facilities and retail development.
- This Stage 2 DA seeks consent for the second stage of detailed works within the Ivanhoe Estate – in particular the construction of Buildings C2, C3 and C4.
- Building C2 will provide the Village Green and Community Centre. Notable, all car parking for C2 has already been approved within the C1 building as part of the Stage 1 Development.
- Building C3 will provide 162 residential market apartments and a 970 square metres of retail space.
- Building C4 will provide 272 residential market apartments and 216 residential social apartments.
- The parking rates applied to the Proposal are consistent with that of the Approved Masterplan and results in a total of 163 spaces being provided for Building C3 and 396 spaces for Building C4. This is consistent with the maximum parking rates permitted under Council's DCP.
- Building C3 is expected to generated 33 veh/hr in the AM peak hour and 29 veh/hr in the PM peak hour, whilst Building C4 is expected to generate 44 veh/hr in the AM peak hour and 44 veh/hr in the PM peak hour.
- Combining the anticipated traffic to be generated by Stages 1 and 2 results in a total of 188 veh/hr in the AM peak hour and 178 veh/hr in the PM peak hour. Under the Masterplan, the Stage 1 and 2 uses within the Approved Masterplan will generate some 441 veh/hr in the AM peak and 413 veh/hr in the PM peak. Thus, the proposed development falls well within the traffic generation threshold for the Approved Masterplan.
- A preliminary Construction Traffic Management Plan has been provided as that sets out the number of principles that should be adopted by any future detailed CTMP that is developed in coordination with the prospective building contractor.
- The access and basement designs have been deigned in general accordance with the relevant Australian Standards (AS2890 series), subject to the incorporation of the design recommendations within Section 8.2. A standard condition of consent requiring compliance with the AS2890 series would be considered sufficient to ensure that any minor changes to the plans required, if any, could be undertaken as part of detailed Construction Certificate documentation.

In summary, the Proposal is supportable on traffic planning grounds and will not result in any adverse impacts on the surrounding road network or the availability of on-street parking.

Appendix A. Existing SIDRA Analysis

MOVEMENT SUMMARY



Site: 101 [Herring Road/Epping Road_Existing AM_ 2016]



Network: N101 [AM]

Epping Road - Herring Road

Existing

Signals - Fixed Time Isolated Cycle Time = 149 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m		per veh	km/h
South: Herring Road S (250m)													
1	L2	18	0.0	18	0.0	0.662	54.6	LOS D	23.1	165.6	0.94	0.82	32.1
2	T1	544	2.7	544	2.7	0.662	47.2	LOS D	23.1	165.6	0.90	0.77	15.6
3	R2	337	1.6	337	1.6	1.239	301.2	LOS F	57.1	405.3	1.00	1.55	13.5
Approach		899	2.2	899	2.2	1.239	142.5	LOS F	57.1	405.3	0.94	1.06	14.1
East: Epping Road E (1200m)													
4	L2	106	2.0	106	2.0	0.719	59.9	LOS E	19.3	136.8	0.98	0.86	39.4
5	T1	821	1.5	821	1.5	0.719	56.4	LOS D	21.3	151.3	0.98	0.85	43.6
6	R2	611	2.9	611	2.9	1.246	304.6	LOS F	50.6	362.9	1.00	1.46	11.6
Approach		1538	2.1	1538	2.1	1.246	155.2	LOS F	50.6	362.9	0.99	1.09	23.3
North: Herring Road N (200m)													
7	L2	293	4.7	293	4.7	0.179	6.2	LOS A	1.6	11.4	0.13	0.59	61.5
8	T1	186	6.2	186	6.2	0.401	61.8	LOS E	7.8	57.2	0.95	0.76	18.3
9	R2	131	1.6	131	1.6	0.401	67.8	LOS E	6.9	50.6	0.95	0.78	25.9
Approach		609	4.5	609	4.5	0.401	36.4	LOS C	7.8	57.2	0.55	0.68	39.1
West: Epping Road W (600m)													
10	L2	575	1.5	575	1.5	0.318	6.7	LOS A	0.0	0.0	0.00	0.57	58.0
11	T1	1616	1.8	1616	1.8	1.254	300.1	LOS F	92.3	655.8	1.00	1.87	16.2
12	R2	31	0.0	31	0.0	0.123	64.5	LOS E	1.9	13.4	0.89	0.73	27.8
Approach		2221	1.7	2221	1.7	1.254	221.0	LOS F	92.3	655.8	0.74	1.52	17.6
All Vehicles		5267	2.2	5267	2.2	1.254	167.0	LOS F	92.3	655.8	0.82	1.22	19.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.1 %

Number of Iterations: 6 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		Pedestrian	m		per ped
P1	South Full Crossing	53	55.1	LOS E	0.2	0.2	0.86	0.86
P2	East Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	58.6	LOS E	0.2	0.2	0.89	0.89
P4	West Full Crossing	53	52.5	LOS E	0.2	0.2	0.84	0.84
All Pedestrians		211	58.8	LOS E			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Network - RMS Cycle Time\Existing\Existing_Network.sip7

MOVEMENT SUMMARY



Site: 101 [Herring Road/Ivanhoe Place_Existing AM_2016]



Network: N101 [AM]

Herring Road_Ivanhoe Place
Existing
Roundabout

Movement Performance - Vehicles													
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Arrival Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road (180m)													
1	L2	5	0.0	5	0.0	0.602	4.2	LOS A	5.0	35.8	0.17	0.36	29.5
2	T1	1877	2.0	1757	2.0	0.602	3.9	LOS A	5.0	35.8	0.18	0.37	44.0
3	R2	1	0.0	1	0.0	0.602	9.2	LOS A	4.5	32.3	0.18	0.37	51.2
Approach		1883	2.0	1763 ^{N1}	2.0	0.602	3.9	LOS A	5.0	35.8	0.18	0.37	44.0
East: Ivanhoe Place (125m)													
4	L2	35	0.0	35	0.0	0.045	3.4	LOS A	0.2	1.1	0.35	0.48	35.3
5	T1	6	0.0	6	0.0	0.045	3.3	LOS A	0.2	1.1	0.35	0.48	19.9
6	R2	6	0.0	6	0.0	0.045	8.5	LOS A	0.2	1.1	0.35	0.48	35.3
Approach		47	0.0	47	0.0	0.045	4.0	LOS A	0.2	1.1	0.35	0.48	31.7
North: Herring Road (380m)													
7	L2	4	0.0	4	0.0	0.153	4.0	LOS A	0.8	5.6	0.08	0.36	50.9
8	T1	418	4.5	418	4.5	0.153	3.7	LOS A	0.8	5.6	0.08	0.38	51.1
9	R2	24	4.3	24	4.3	0.153	9.0	LOS A	0.7	5.3	0.08	0.40	43.1
Approach		446	4.5	446	4.5	0.153	4.0	LOS A	0.8	5.6	0.08	0.38	50.6
West: Morling College (20m)													
10	L2	1	0.0	1	0.0	0.025	7.2	LOS A	0.2	1.1	0.77	0.71	17.1
11	T1	1	0.0	1	0.0	0.025	7.5	LOS A	0.2	1.1	0.77	0.71	31.3
12	R2	15	0.0	15	0.0	0.025	11.8	LOS A	0.2	1.1	0.77	0.71	17.1
Approach		17	0.0	17	0.0	0.025	11.2	LOS A	0.2	1.1	0.77	0.71	18.3
All Vehicles		2394	2.4	2274 ^{N1}	2.5	0.602	4.0	LOS A	5.0	35.8	0.17	0.37	45.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.1 %

Number of Iterations: 6 (maximum specified: 10)

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Network - RMS Cycle Time\Existing\Existing_Network.sip7

MOVEMENT SUMMARY



Site: 101 [Herring Road/Waterloo Road_Existing AM_2016]



Network: N101 [AM]

Herring Road_ Waterloo Road

Existing

Signals - Fixed Time Isolated Cycle Time = 139 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Arrival Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Prop. Queued Distance m	Effective Stop Rate per veh	Average Speed km/h	
South: Herring Road (380m)													
1	L2	115	1.8	107	1.8	1.983	955.9	LOS F	30.0	213.0	1.00	1.44	2.5
2	T1	739	2.7	692	2.6	0.951	62.1	LOS E	52.2	373.6	0.88	1.01	24.7
3	R2	806	1.4	755	1.4	0.936	66.6	LOS E	22.3	157.8	1.00	1.06	15.9
Approach		1660	2.0	1555 ^{N1}	2.0	1.983	126.1	LOS F	52.2	373.6	0.95	1.06	12.5
East: Waterloo Road (380m)													
4	L2	212	1.5	212	1.5	0.281	21.8	LOS B	6.3	44.7	0.71	0.76	31.3
5	T1	147	1.4	147	1.4	0.530	60.4	LOS E	9.4	66.7	0.98	0.79	25.1
6	R2	138	44.3	138	44.3	0.799	77.4	LOS F	10.0	96.4	1.00	0.91	21.3
Approach		497	13.3	497	13.3	0.799	48.7	LOS D	10.0	96.4	0.87	0.81	25.0
North: Herring Road (320m)													
7	L2	126	39.2	126	39.2	0.730	74.1	LOS F	8.8	82.7	1.00	0.86	12.9
8	T1	224	7.0	224	7.0	0.209	39.3	LOS C	5.7	42.0	0.79	0.64	20.6
9	R2	86	47.6	86	47.6	0.865	87.8	LOS F	6.7	65.6	1.00	0.95	18.4
Approach		437	24.3	437	24.3	0.865	58.9	LOS E	8.8	82.7	0.89	0.77	17.4
West: Waterloo Road (320m)													
10	L2	87	54.2	87	54.2	0.713	68.3	LOS E	11.7	101.4	1.00	0.87	22.5
11	T1	299	1.4	299	1.4	0.777	64.8	LOS E	14.7	104.1	1.00	0.89	14.4
12	R2	69	1.5	69	1.5	0.314	66.8	LOS E	4.4	31.1	0.95	0.76	14.0
Approach		456	11.5	456	11.5	0.777	65.8	LOS E	14.7	104.1	0.99	0.87	16.2
All Vehicles		3049	8.5	2944 ^{N1}	8.8	1.983	93.7	LOS F	52.2	373.6	0.93	0.95	14.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.1 %

Number of Iterations: 6 (maximum specified: 10)

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	46.9	LOS E	0.2	0.2	0.82	0.82
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	24.8	LOS C	0.1	0.1	0.60	0.60
All Pedestrians		211	49.8	LOS E			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Network - RMS Cycle Time\Existing\Existing_Network.sip7

MOVEMENT SUMMARY



Site: 101 [Waterloo Road_Byfield Sreet_Existing AM_2016]



Network: N101 [AM]

Waterloo Road_Byfield Sreet
Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Arrival Flows HV %	Total HV veh/h	Deg. Satn %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Byfield Sreet (350m)												
1	L2	83	1.3	83	1.3	0.078	5.4 LOS A	0.5	3.8	0.70	0.60	41.2
3	R2	69	1.5	69	1.5	0.087	11.5 LOS A	0.5	3.9	0.71	0.73	41.5
Approach		153	1.4	153	1.4	0.087	8.2 LOS A	0.5	3.9	0.71	0.66	41.4
East: Waterloo Road (155m)												
4	L2	542	1.6	542	1.6	0.430	4.9 LOS A	4.2	30.1	0.42	0.48	45.1
5	T1	625	10.9	625	10.9	0.430	4.8 LOS A	4.2	30.1	0.44	0.44	38.5
Approach		1167	6.6	1167	6.6	0.430	4.9 LOS A	4.2	31.0	0.43	0.46	42.9
West: Waterloo Road (380m)												
11	T1	882	7.3	846	7.5	0.341	4.4 LOS A	2.5	18.6	0.23	0.44	51.5
12	R2	126	1.7	121	1.7	0.341	9.1 LOS A	2.4	17.8	0.24	0.49	50.3
Approach		1008	6.6	967 ^{N1}	6.8	0.341	5.0 LOS A	2.5	18.6	0.23	0.45	51.3
All Vehicles		2328	6.2	2287 ^{N1}	6.4	0.430	5.1 LOS A	4.2	31.0	0.37	0.47	47.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.1 %

Number of Iterations: 6 (maximum specified: 10)

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY



Site: 101 [Herring Road/Epping Road_Existing PM_2016]



Network: N101 [PM]

Epping Road - Herring Road

Existing

Signals - Fixed Time Isolated Cycle Time = 149 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Arrival Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road S (250m)													
1	L2	46	0.0	46	0.0	0.896	83.4	LOS F	20.5	146.9	1.00	1.02	24.6
2	T1	402	3.4	402	3.4	0.896	78.7	LOS F	20.5	146.9	1.00	1.02	10.4
3	R2	122	1.7	122	1.7	0.662	73.4	LOS F	8.8	62.4	1.00	0.84	34.5
Approach		571	2.8	571	2.8	0.896	77.9	LOS F	20.5	146.9	1.00	0.98	18.9
East: Epping Road E (1200m)													
4	L2	281	1.5	281	1.5	0.974	96.2	LOS F	56.4	399.9	1.00	1.16	30.9
5	T1	1606	1.6	1606	1.6	0.974	88.3	LOS F	60.4	428.9	1.00	1.16	36.0
6	R2	386	3.3	386	3.3	0.971	111.8	LOS F	18.1	130.3	1.00	1.05	25.2
Approach		2274	1.9	2274	1.9	0.974	93.3	LOS F	60.4	428.9	1.00	1.14	33.6
North: Herring Road N (200m)													
7	L2	274	5.0	274	5.0	0.169	6.2	LOS A	1.6	11.6	0.13	0.59	61.5
8	T1	575	2.6	575	2.6	0.986	104.4	LOS F	39.6	283.0	1.00	1.20	12.4
9	R2	496	1.5	496	1.5	0.986	113.6	LOS F	33.8	241.0	1.00	1.13	18.4
Approach		1344	2.7	1344	2.7	0.986	87.8	LOS F	39.6	283.0	0.82	1.05	21.3
West: Epping Road W (600m)													
10	L2	323	1.6	323	1.6	0.179	6.7	LOS A	0.0	0.0	0.00	0.57	58.1
11	T1	931	1.5	931	1.5	0.477	40.9	LOS C	17.8	126.2	0.84	0.72	48.8
12	R2	85	1.2	85	1.2	0.425	72.7	LOS F	5.9	41.5	0.97	0.78	25.9
Approach		1339	1.5	1339	1.5	0.477	34.7	LOS C	17.8	126.2	0.64	0.69	48.0
All Vehicles		5527	2.1	5527	2.1	0.986	76.2	LOS F	60.4	428.9	0.87	0.99	32.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.4 %

Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	41.4	LOS E	0.2	0.2	0.75	0.75
P2	East Full Crossing	53	64.0	LOS F	0.2	0.2	0.93	0.93
P3	North Full Crossing	53	44.5	LOS E	0.2	0.2	0.77	0.77
P4	West Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	54.7	LOS E			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Network - RMS Cycle Time\Existing\Existing_Network.sip7

MOVEMENT SUMMARY



Site: 101 [Herring Road/Ivanhoe Place_Existing PM_2016]



Network: N101 [PM]

Herring Road_Ivanhoe Place
Existing
Roundabout

Movement Performance - Vehicles													
Mov ID	OD Mov	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m		per veh	km/h
South: Herring Road (180m)													
1	L2	4	0.0	4	0.0	0.564	4.6	LOS A	4.4	31.8	0.25	0.39	27.7
2	T1	1098	2.5	1098	2.5	0.564	4.2	LOS A	4.4	31.8	0.24	0.39	43.1
3	R2	1	0.0	1	0.0	0.564	9.5	LOS A	1.3	9.6	0.20	0.40	50.8
Approach		1103	2.5	1103	2.5	0.564	4.2	LOS A	4.4	31.8	0.24	0.39	43.0
East: Ivanhoe Place (125m)													
4	L2	33	3.2	33	3.2	0.109	7.8	LOS A	0.4	3.0	0.72	0.65	28.1
5	T1	8	0.0	8	0.0	0.109	7.6	LOS A	0.4	3.0	0.72	0.65	17.8
6	R2	8	0.0	8	0.0	0.109	12.8	LOS A	0.4	3.0	0.72	0.65	28.1
Approach		49	2.1	49	2.1	0.109	8.6	LOS A	0.4	3.0	0.72	0.65	25.4
North: Herring Road (380m)													
7	L2	22	4.8	22	4.8	0.721	4.1	LOS A	2.6	18.5	0.09	0.36	50.8
8	T1	1285	2.4	1285	2.4	0.721	3.7	LOS A	4.2	29.9	0.10	0.38	51.0
9	R2	68	1.5	68	1.5	0.721	9.0	LOS A	4.2	29.9	0.10	0.39	43.1
Approach		1376	2.4	1376	2.4	0.721	4.0	LOS A	4.2	29.9	0.10	0.38	50.5
West: Morling College (20m)													
10	L2	6	0.0	6	0.0	0.034	5.4	LOS A	0.2	1.1	0.69	0.66	18.8
11	T1	1	0.0	1	0.0	0.034	5.7	LOS A	0.2	1.1	0.69	0.66	35.1
12	R2	13	0.0	13	0.0	0.034	10.0	LOS A	0.2	1.1	0.69	0.66	18.8
Approach		20	0.0	20	0.0	0.034	8.3	LOS A	0.2	1.1	0.69	0.66	20.0
All Vehicles		2548	2.4	2548	2.4	0.721	4.2	LOS A	4.4	31.8	0.17	0.39	47.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.4 %

Number of Iterations: 10 (maximum specified: 10)

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Network - RMS Cycle Time\Existing\Existing_Network.sip7

MOVEMENT SUMMARY



Site: 101 [Herring Road/Waterloo Road Existing PM_2016]



Network: N101 [PM]

Herring Road_Waterloo Road

Existing

Signals - Fixed Time Isolated Cycle Time = 139 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Arrival Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road (380m)													
1	L2	35	3.0	35	3.0	1.368	374.6	LOS F	11.9	85.5	1.00	1.23	5.5
2	T1	665	3.0	665	3.0	1.368	392.5	LOS F	86.4	620.1	1.00	2.32	5.7
3	R2	418	1.5	418	1.5	0.803	73.2	LOS F	14.7	104.4	1.00	0.89	14.8
Approach		1118	2.4	1118	2.4	1.368	272.6	LOS F	86.4	620.1	1.00	1.76	6.8
East: Waterloo Road (380m)													
4	L2	735	1.4	735	1.4	0.776	42.0	LOS C	28.9	204.8	0.84	0.84	21.9
5	T1	96	1.1	96	1.1	0.776	45.9	LOS D	28.9	204.8	0.97	0.88	27.7
6	R2	169	37.3	169	37.3	0.730	69.7	LOS E	11.6	106.7	1.00	0.87	22.8
Approach		1000	7.5	1000	7.5	0.776	47.0	LOS D	28.9	204.8	0.88	0.84	22.8
North: Herring Road (320m)													
7	L2	105	57.0	105	57.0	0.517	65.7	LOS E	6.8	70.4	0.96	0.80	14.2
8	T1	619	3.4	619	3.4	0.730	51.1	LOS D	19.4	140.0	0.96	0.83	17.2
9	R2	105	42.0	105	42.0	0.512	67.0	LOS E	6.8	64.7	0.97	0.80	21.9
Approach		829	15.1	829	15.1	0.730	55.0	LOS D	19.4	140.0	0.96	0.82	17.6
West: Waterloo Road (320m)													
10	L2	128	36.1	128	36.1	0.454	48.2	LOS D	11.6	97.0	0.86	0.78	27.4
11	T1	340	1.5	340	1.5	0.494	44.7	LOS D	14.6	103.5	0.89	0.76	18.8
12	R2	92	1.1	92	1.1	0.319	62.1	LOS E	5.6	39.4	0.93	0.77	14.8
Approach		560	9.4	560	9.4	0.494	48.4	LOS D	14.6	103.5	0.89	0.77	20.4
All Vehicles		3507	8.0	3507	8.0	1.368	121.0	LOS F	86.4	620.1	0.94	1.12	11.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.4 %

Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	51.1	LOS E	0.2	0.2	0.86	0.86
P2	East Full Crossing	53	51.9	LOS E	0.2	0.2	0.87	0.87
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.84	0.84
P4	West Full Crossing	53	48.5	LOS E	0.2	0.2	0.84	0.84
All Pedestrians		211	50.2	LOS E			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Network - RMS Cycle Time\Existing\Existing_Network.sip7

MOVEMENT SUMMARY



Site: 101 [Waterloo Road_Byfield Sreet_Existing PM_2016]



Network: N101 [PM]

Waterloo Road_Byfield Sreet
Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m		per veh	km/h
South: Byfield Sreet (350m)													
1	L2	403	1.6	403	1.6	0.428	7.9	LOS A	3.6	25.7	0.90	0.82	38.5
3	R2	186	1.7	186	1.7	0.276	14.0	LOS A	1.9	13.6	0.84	0.86	39.4
Approach		589	1.6	589	1.6	0.428	9.9	LOS A	3.6	25.7	0.88	0.84	38.9
East: Waterloo Road (155m)													
4	L2	148	1.4	148	1.4	0.348	4.7	LOS A	3.0	22.1	0.38	0.44	45.3
5	T1	788	9.1	788	9.1	0.348	4.5	LOS A	3.0	22.1	0.39	0.43	39.1
Approach		937	7.9	937	7.9	0.348	4.5	LOS A	3.0	22.1	0.39	0.43	41.1
West: Waterloo Road (380m)													
11	T1	1094	6.8	1094	6.8	0.492	5.4	LOS A	4.1	30.5	0.49	0.54	49.9
12	R2	105	2.0	105	2.0	0.492	10.2	LOS A	3.9	28.9	0.50	0.57	49.4
Approach		1199	6.4	1199	6.4	0.492	5.8	LOS A	4.1	30.5	0.49	0.54	49.9
All Vehicles		2725	5.9	2725	5.9	0.492	6.2	LOS A	4.1	30.5	0.54	0.57	45.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 3.4 %

Number of Iterations: 10 (maximum specified: 10)

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Appendix B. Future SIDRA Analysis

MOVEMENT SUMMARY

 Site: 1 [AM_ Epping-Herring_ s0]

 Network: N1 [AM_ Ivanhoe_ s0]

Epping Road x Herring Road

RMS Base 2021

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
South: Herring Road (250m)													
1	L2	15	0.0	15	0.0	0.895	88.1	LOS F	15.8	113.2	1.00	1.05	23.9
2	T1	620	2.5	620	2.5	0.895	79.6	LOS F	15.8	113.2	1.00	1.04	10.4
3	R2	356	1.5	356	1.5	0.727	66.8	LOS E	7.4	52.4	0.95	1.02	11.8
Approach		991	2.1	991	2.1	0.895	75.1	LOS F	15.8	113.2	0.98	1.26	11.1
East: Epping Road (630m)													
4	L2	107	2.0	107	2.0	0.428	33.7	LOS C	10.4	74.0	0.72	0.69	41.3
5	T1	1005	1.6	1005	1.6	0.428	28.4	LOS B	11.0	77.9	0.72	0.65	48.3
6	R2	359	3.8	359	3.8	0.939	99.9	LOS F	9.5	69.0	1.00	1.45	17.6
Approach		1472	2.1	1472	2.1	0.939	46.3	LOS D	11.0	77.9	0.79	0.74	38.1
North: Herring Road (180m)													
7	L2	158	7.3	158	7.3	0.205	28.1	LOS B	3.8	28.6	0.63	0.72	18.2
8	T1	225	5.1	225	5.1	0.393	69.7	LOS E	5.0	36.5	1.00	1.00	16.9
9	R2	151	1.4	151	1.4	0.269	72.3	LOS F	3.2	22.8	1.00	0.78	24.6
Approach		534	4.7	534	4.7	0.393	58.1	LOS E	5.0	36.5	0.89	0.77	20.1
West: Epping Road (600m)													
10	L2	571	1.5	571	1.5	0.475	18.8	LOS B	10.2	72.0	0.53	0.79	44.1
11	T1	2065	1.7	2065	1.7	0.993	94.6	LOS F	44.7	317.5	0.99	1.20	17.7
12	R2	21	0.0	21	0.0	0.286	86.1	LOS F	1.0	6.8	1.00	0.70	23.4
Approach		2657	1.6	2657	1.6	0.993	78.2	LOS F	44.7	317.5	0.89	1.11	20.4
All Vehicles		5653	2.1	5653	2.1	0.993	67.5	LOS E	44.7	317.5	0.88	1.12	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	31.0	LOS D	0.1	0.1	0.65	0.65
P2	East Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	37.8	LOS D	0.2	0.2	0.71	0.71
P4	West Full Crossing	53	66.9	LOS F	0.2	0.2	0.95	0.95
All Pedestrians		211	51.1	LOS E			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 1 [PM_Epping-Herring_s0]

 Network: N1 [PM_Ivanhoe_s0]

Epping Road x Herring Road

RMS Base 2021

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (250m)														
1	L2	21	0.0	21	0.0	0.904	108.6	LOS F	14.9	105.9	1.00	1.09	1.90	20.7
2	T1	549	2.3	549	2.3	0.904	90.3	LOS F	14.9	106.7	1.00	1.06	1.56	9.3
3	R2	156	1.4	156	1.4	0.247	62.9	LOS E	3.0	21.3	0.90	0.76	0.90	12.4
Approach		726	2.0	726	2.0	0.904	84.9	LOS F	14.9	106.7	0.98	1.00	1.43	10.3
East: Epping Road (630m)														
4	L2	302	1.0	302	1.0	0.909	68.9	LOS E	29.3	206.7	1.00	1.05	1.43	28.3
5	T1	1552	1.2	1552	1.2	0.909	62.6	LOS E	29.9	211.5	1.00	1.03	1.21	35.3
6	R2	391	3.0	391	3.0	0.635	68.1	LOS E	8.6	61.5	0.98	0.83	0.98	23.1
Approach		2244	1.5	2244	1.5	0.909	64.4	LOS E	29.9	211.5	1.00	1.00	1.20	32.7
North: Herring Road (180m)														
7	L2	292	4.3	292	4.3	0.258	12.9	LOS A	5.2	37.6	0.51	0.71	0.51	29.1
8	T1	685	1.8	685	1.8	0.897	47.1	LOS D	14.8	104.9	0.98	0.90	1.05	22.1
9	R2	525	1.0	525	1.0	0.719	47.4	LOS D	9.6	68.0	0.87	0.81	0.87	31.2
Approach		1502	2.0	1502	2.0	0.897	40.6	LOS C	14.8	104.9	0.85	0.83	0.88	26.7
West: Epping Road (600m)														
10	L2	301	1.0	301	1.0	0.288	16.1	LOS B	5.3	37.5	0.46	0.71	0.46	46.5
11	T1	1023	1.0	1023	1.0	0.635	50.1	LOS D	13.2	93.4	0.93	0.81	0.93	27.3
12	R2	175	1.2	175	1.2	0.898	91.4	LOS F	8.8	62.1	1.00	0.95	1.34	22.5
Approach		1499	1.1	1499	1.1	0.898	48.1	LOS D	13.2	93.4	0.85	0.80	0.89	28.6
All Vehicles		5972	1.6	5972	1.6	0.909	56.8	LOS E	29.9	211.5	0.92	0.91	1.07	27.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	41.4	LOS E	0.2	0.2	0.75	0.75
P2	East Full Crossing	53	65.0	LOS F	0.2	0.2	0.93	0.93
P3	North Full Crossing	53	50.1	LOS E	0.2	0.2	0.82	0.82
P4	West Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	56.3	LOS E			0.87	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 2 [AM_ Herring-Ivanhoe_ s0]

 Network: N1 [AM_ Ivanhoe_ s0]

Herring Road x Ivanhoe Place

RMS Base 2021

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				
South: Herring Road (180m)														
1	L2	1	0.0	1	0.0	0.016	7.0	LOS A	0.0	0.3	0.05	0.06	0.05	22.0
2	T1	1476	2.2	1476	2.2	0.620	9.8	LOS A	13.6	96.2	0.37	0.34	0.37	46.7
3	R2	1	0.0	1	0.0	0.014	83.1	LOS F	0.0	0.3	1.00	0.59	1.00	7.6
Approach		1478	2.2	1478	2.2	0.620	9.9	LOS A	13.6	96.2	0.37	0.34	0.37	46.6
East: Ivanhoe Main Road (550m)														
4	L2	1	0.0	1	0.0	0.006	35.5	LOS C	0.1	0.4	0.82	0.54	0.82	20.0
5	T1	1	0.0	1	0.0	0.006	34.1	LOS C	0.1	0.4	0.82	0.54	0.82	20.4
6	R2	1	0.0	1	0.0	0.014	77.5	LOS F	0.0	0.3	0.98	0.58	0.98	20.2
Approach		3	0.0	3	0.0	0.014	49.0	LOS D	0.1	0.4	0.88	0.55	0.88	20.2
North: Herring Road (380m)														
7	L2	1	0.0	1	0.0	0.017	18.3	LOS B	0.2	2.8	0.42	0.32	0.42	38.5
8	T1	508	3.7	508	3.7	0.211	14.9	LOS B	5.1	35.8	0.50	0.43	0.50	36.9
9	R2	24	0.0	24	0.0	0.312	85.1	LOS F	1.1	7.8	1.00	0.71	1.00	14.7
Approach		534	3.6	534	3.6	0.312	18.1	LOS B	5.1	35.8	0.52	0.44	0.52	34.1
West: Morling College (70m)														
10	L2	7	0.0	7	0.0	0.021	53.4	LOS D	0.3	2.0	0.81	0.66	0.81	20.0
11	T1	1	0.0	1	0.0	0.021	52.3	LOS D	0.3	2.0	0.81	0.66	0.81	5.3
12	R2	22	0.0	22	0.0	0.285	83.8	LOS F	1.0	7.1	1.00	0.70	1.00	3.7
Approach		31	0.0	31	0.0	0.285	75.4	LOS F	1.0	7.1	0.95	0.69	0.95	7.5
All Vehicles		2045	2.5	2045	2.5	0.620	13.1	LOS A	13.6	96.2	0.42	0.37	0.42	42.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	17.0	LOS B	0.1	0.1	0.48	0.48
P3	North Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	17.4	LOS B	0.1	0.1	0.48	0.48
All Pedestrians		211	43.0	LOS E			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 2 [PM_ Herring-Ivanhoe_ s0]

 Network: N1 [PM_ Ivanhoe_ s0]

Herring Road x Ivanhoe Place

RMS Base 2021

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Herring Road (180m)														
1	L2	1	0.0	1	0.0	0.016	20.8	LOS B	0.3	3.2	0.53	0.40	0.53	16.7
2	T1	1123	1.9	1123	1.9	0.476	20.6	LOS B	16.6	116.8	0.70	0.63	0.70	37.6
3	R2	1	0.0	1	0.0	0.012	82.0	LOS F	0.0	0.3	1.00	0.59	1.00	7.7
Approach		1125	1.9	1125	1.9	0.476	20.7	LOS B	16.6	116.8	0.70	0.63	0.70	37.5
East: Ivanhoe Place (550m)														
4	L2	1	0.0	1	0.0	0.006	28.3	LOS B	0.0	0.3	0.82	0.53	0.82	21.5
5	T1	1	0.0	1	0.0	0.006	26.8	LOS B	0.0	0.3	0.82	0.53	0.82	21.8
6	R2	1	0.0	1	0.0	0.014	77.5	LOS F	0.0	0.3	0.98	0.58	0.98	20.2
Approach		3	0.0	3	0.0	0.014	44.2	LOS D	0.0	0.3	0.87	0.55	0.87	21.0
North: Herring Road (380m)														
7	L2	1	0.0	1	0.0	0.018	18.7	LOS B	0.2	2.8	0.43	0.33	0.43	38.1
8	T1	1493	1.7	1493	1.7	0.663	21.5	LOS B	22.1	155.8	0.72	0.65	0.72	31.5
9	R2	56	1.9	56	1.9	0.625	86.0	LOS F	2.6	18.6	1.00	0.78	1.08	14.6
Approach		1549	1.7	1549	1.7	0.663	23.8	LOS B	22.1	155.8	0.73	0.66	0.73	30.0
West: Morling College (70m)														
10	L2	21	0.0	21	0.0	0.050	51.4	LOS D	0.8	5.3	0.80	0.69	0.80	20.5
11	T1	1	0.0	1	0.0	0.050	50.3	LOS D	0.8	5.3	0.80	0.69	0.80	5.4
12	R2	12	0.0	12	0.0	0.150	82.8	LOS F	0.5	3.7	0.99	0.68	0.99	3.8
Approach		34	0.0	34	0.0	0.150	62.1	LOS E	0.8	5.3	0.87	0.69	0.87	14.0
All Vehicles		2712	1.7	2712	1.7	0.663	23.0	LOS B	22.1	155.8	0.72	0.65	0.72	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	17.4	LOS B	0.1	0.1	0.48	0.48
P3	North Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	17.9	LOS B	0.1	0.1	0.49	0.49
All Pedestrians		211	43.2	LOS E			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 4 [AM_ Epping-Lyonpark_ s0]

Network: N1 [AM_ Ivanhoe_ s0]

Epping Road x Lyonpark Road
RMS Base 2021
Site Category: Left In - Left Out
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: Epping Road (670m)														
5	T1	1554	2.0	1554	2.0	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1554	2.0	1554	2.0	0.205	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.9
North: Lyonpark Road (160m)														
7	L2	103	1.0	103	1.0	0.057	4.4	LOS A	0.0	0.0	0.00	0.47	0.00	47.4
Approach		103	1.0	103	1.0	0.057	4.4	NA	0.0	0.0	0.00	0.47	0.00	47.4
West: Epping Road (630m)														
10	L2	746	1.4	746	1.4	0.412	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.6
11	T1	1845	2.3	1845	2.3	0.325	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		2592	2.0	2592	2.0	0.412	1.9	NA	0.0	0.0	0.00	0.18	0.00	67.7
All Vehicles		4248	2.0	4248	2.0	0.412	1.3	NA	0.0	0.0	0.00	0.12	0.00	67.7

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

MOVEMENT SUMMARY

Site: 4 [PM_ Epping-Lyonpark_ s0]

Network: N1 [PM_ Ivanhoe_ s0]

Epping Road x Lyonpark Road
RMS Base 2021
Site Category: Left In - Left Out
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: Epping Road (670m)														
5	T1	2299	1.4	2299	1.4	0.302	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		2299	1.4	2299	1.4	0.302	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.9
North: Lyonpark Road (160m)														
7	L2	1035	1.0	1035	1.0	0.570	4.4	LOS A	0.0	0.0	0.00	0.47	0.00	47.3
Approach		1035	1.0	1035	1.0	0.570	4.4	NA	0.0	0.0	0.00	0.47	0.00	47.3
West: Epping Road (630m)														
10	L2	122	0.9	122	0.9	0.067	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.7
11	T1	1359	1.7	1359	1.7	0.239	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1481	1.6	1481	1.6	0.239	0.6	NA	0.0	0.0	0.00	0.05	0.00	69.4
All Vehicles		4815	1.4	4815	1.4	0.570	1.1	NA	0.0	0.0	0.00	0.12	0.00	63.4

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

MOVEMENT SUMMARY

Site: 3 [AM_ Lyonpark-Ivanhoe_ s0]

Network: N1 [AM_ Ivanhoe_ s0]

Lyonpark Road x Ivanhoe Main Road
2021 RMS Base
Site Category: Three Leg Priority Controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles															
Mov ID	Turn	Demand		Flows		Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %			v/c	sec		veh	Distance m			km/h
South: Lyonpark Road (160m)															
1	L2	1	0.0	1	0.0	0.261		4.6	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
2	T1	495	1.5	495	1.5	0.261		0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		496	1.5	496	1.5	0.261		0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
North: Lyonpark Road (180m)															
8	T1	286	1.5	286	1.5	0.152		0.0	LOS A	0.0	0.0	0.01	0.00	0.01	49.9
9	R2	1	0.0	1	0.0	0.152		6.9	LOS A	0.0	0.0	0.01	0.00	0.01	49.9
Approach		287	1.5	287	1.5	0.152		0.0	NA	0.0	0.0	0.01	0.00	0.01	49.9
West: Ivanhoe Main Road (550m)															
10	L2	1	0.0	1	0.0	0.002		3.7	LOS A	0.0	0.0	0.36	0.44	0.36	31.5
12	R2	1	0.0	1	0.0	0.002		3.3	LOS A	0.0	0.0	0.36	0.44	0.36	28.5
Approach		2	0.0	2	0.0	0.002		3.5	LOS A	0.0	0.0	0.36	0.44	0.36	30.1
All Vehicles		785	1.5	785	1.5	0.261		0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7

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

MOVEMENT SUMMARY

Site: 3 [PM_ Lyonpark-Ivanhoe_ s0]

Network: N1 [PM_ Ivanhoe_ s0]

Lyonpark Road x Ivanhoe Main Road
2021 RMS Base
Site Category: Three Leg Priority Controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Lyonpark Road (160m)														
1	L2	1	0.0	1	0.0	0.145	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
2	T1	276	1.1	276	1.1	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		277	1.1	277	1.1	0.145	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
North: Lyonpark Road (180m)														
8	T1	555	0.9	555	0.9	0.292	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	1	0.0	1	0.0	0.292	5.9	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		556	0.9	556	0.9	0.292	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Ivanhoe Main Road (550m)														
10	L2	1	0.0	1	0.0	0.002	2.8	LOS A	0.0	0.0	0.27	0.41	0.27	31.7
12	R2	1	0.0	1	0.0	0.002	3.4	LOS A	0.0	0.0	0.27	0.41	0.27	28.6
Approach		2	0.0	2	0.0	0.002	3.1	LOS A	0.0	0.0	0.27	0.41	0.27	30.3
All Vehicles		835	1.0	835	1.0	0.292	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7

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

MOVEMENT SUMMARY

 Site: 6 [AM_Waterloo-Byfield_s0]

 Network: N2 [AM_Waterloo_s0]

Waterloo Road x Byfield Sreet

RMS Base 2021

Site Category: Three Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Byfield Sreet (350m)														
1	L2	107	2.0	107	2.0	0.104	6.3	LOS A	0.7	5.0	0.22	0.57	0.22	40.4
3	R2	23	4.5	23	4.5	0.041	57.8	LOS E	0.4	3.0	0.87	0.68	0.87	19.7
Approach		131	2.4	131	2.4	0.104	15.5	LOS B	0.7	5.0	0.33	0.59	0.33	32.5
East: Waterloo Road (155m)														
4	L2	51	2.1	51	2.1	0.163	26.3	LOS B	2.1	21.7	0.58	0.55	0.58	31.6
5	T1	657	10.4	657	10.4	0.349	23.1	LOS B	8.3	58.5	0.65	0.56	0.65	18.4
Approach		707	9.8	707	9.8	0.349	23.2	LOS B	8.3	58.5	0.64	0.56	0.64	20.0
West: Waterloo Road (390m)														
11	T1	613	10.0	613	10.0	0.191	3.4	LOS A	1.7	12.3	0.19	0.16	0.19	54.8
12	R2	151	1.4	151	1.4	0.352	39.6	LOS C	4.0	28.7	0.68	0.74	0.68	30.5
Approach		763	8.3	763	8.3	0.352	10.5	LOS A	4.0	28.7	0.28	0.27	0.28	45.6
All Vehicles		1601	8.5	1601	8.5	0.352	16.6	LOS B	8.3	58.5	0.45	0.43	0.45	34.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	23.7	LOS C	0.1	0.1	0.58	0.58
P4	West Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		105	43.7	LOS E			0.77	0.77

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\Users\Faria Imam\Downloads\Ivanhoe Estate Sidra Network.sip8

MOVEMENT SUMMARY

 Site: 6 [PM_Waterloo-Byfield_s0]

 Network: N2 [PM_Waterloo_s0]

Waterloo Road x Byfield Sreet

RMS Base 2021

Site Category: Three Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Byfield Sreet (350m)														
1	L2	538	1.6	538	1.6	0.629	14.6	LOS B	11.8	83.6	0.63	0.76	0.63	32.3
3	R2	5	0.0	5	0.0	0.009	56.9	LOS E	0.1	0.6	0.86	0.62	0.86	19.9
Approach		543	1.6	543	1.6	0.629	15.1	LOS B	11.8	83.6	0.64	0.76	0.64	32.0
East: Waterloo Road (155m)														
4	L2	3	0.0	3	0.0	0.109	25.2	LOS B	1.4	17.4	0.55	0.45	0.55	33.5
5	T1	1122	6.8	1122	6.8	0.599	26.1	LOS B	16.7	118.6	0.75	0.67	0.75	17.0
Approach		1125	6.8	1125	6.8	0.599	26.1	LOS B	16.7	118.6	0.75	0.67	0.75	17.0
West: Waterloo Road (390m)														
11	T1	901	8.1	901	8.1	0.286	9.8	LOS A	10.6	75.0	0.59	0.52	0.59	46.6
12	R2	254	1.7	254	1.7	0.613	71.4	LOS F	10.5	74.4	1.00	0.84	1.00	22.6
Approach		1155	6.7	1155	6.7	0.613	23.4	LOS B	10.6	75.0	0.68	0.59	0.68	35.9
All Vehicles		2823	5.7	2823	5.7	0.629	22.9	LOS B	16.7	118.6	0.70	0.65	0.70	29.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	23.1	LOS C	0.1	0.1	0.58	0.58
P4	West Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		105	43.4	LOS E			0.77	0.77

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 8 June 2021 11:04:38 AM

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MOVEMENT SUMMARY

 Site: 5 [AM_Herring-Waterloo_s0]

 Network: N2 [AM_Waterloo_s0]

Herring Road x Waterloo Road

RMS Base 2021

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (380m)														
1	L2	109	1.9	109	1.9	0.156	22.4	LOS B	2.4	18.2	0.59	0.67	0.59	39.3
2	T1	796	2.8	796	2.8	0.732	45.7	LOS D	15.4	109.6	0.94	0.82	0.94	29.5
3	R2	661	1.4	661	1.4	0.590	30.0	LOS C	7.7	54.7	0.90	0.82	0.90	26.8
Approach		1566	2.2	1566	2.2	0.732	37.4	LOS C	15.4	109.6	0.90	0.81	0.90	29.2
East: Waterloo Road (390m)														
4	L2	319	1.7	319	1.7	0.222	8.8	LOS A	2.8	20.0	0.17	0.62	0.17	49.1
5	T1	149	1.4	149	1.4	0.222	18.7	LOS B	2.8	20.0	0.46	0.40	0.46	42.0
6	R2	122	50.9	122	50.9	0.334	71.0	LOS F	2.5	33.1	1.00	0.78	1.00	22.9
Approach		591	11.8	591	11.8	0.334	24.2	LOS B	2.8	33.1	0.41	0.60	0.41	38.7
North: Herring Road (330m)														
7	L2	77	64.4	77	64.4	0.325	37.4	LOS C	2.4	27.0	0.87	0.75	0.87	22.5
8	T1	219	7.2	219	7.2	0.363	56.2	LOS D	3.9	27.7	0.94	0.75	0.94	26.4
9	R2	64	63.9	64	63.9	0.250	57.3	LOS E	2.3	24.7	0.88	0.76	0.88	24.4
Approach		360	29.5	360	29.5	0.363	52.2	LOS D	3.9	27.7	0.91	0.75	0.91	25.4
West: Waterloo Road (320m)														
10	L2	78	60.8	78	60.8	0.161	35.8	LOS C	2.1	22.4	0.69	0.73	0.69	30.9
11	T1	275	1.5	275	1.5	0.457	57.9	LOS E	5.2	37.2	0.96	0.77	0.96	15.9
Approach		353	14.6	353	14.6	0.457	53.0	LOS D	5.2	37.2	0.90	0.76	0.90	19.2
All Vehicles		2869	9.1	2869	9.1	0.732	38.5	LOS C	15.4	109.6	0.80	0.75	0.80	29.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P4	West Full Crossing	53	45.2	LOS E	0.2	0.2	0.81	0.81	
All Pedestrians		211	59.1	LOS E			0.92	0.92	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 5 [PM_Herring-Waterloo_s0]

 Network: N2 [PM_Waterloo_s0]

Herring Road x Waterloo Road

RMS Base 2021

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h	
South: Herring Road (380m)														
1	L2	45	0.0	45	0.0	0.080	24.4	LOS B	1.2	9.4	0.62	0.63	38.6	
2	T1	674	3.0	674	3.0	0.477	34.9	LOS C	10.5	74.5	0.81	0.70	33.5	
3	R2	439	1.4	439	1.4	0.511	33.1	LOS C	5.2	37.0	0.92	0.80	25.3	
Approach		1158	2.3	1158	2.3	0.511	33.8	LOS C	10.5	74.5	0.84	0.74	31.1	
East: Waterloo Road (390m)														
4	L2	937	1.3	937	1.3	0.519	17.0	LOS B	11.2	79.5	0.38	0.68	43.3	
5	T1	174	1.8	174	1.8	0.519	28.8	LOS C	11.2	79.5	0.69	0.72	34.6	
6	R2	178	36.1	178	36.1	0.330	53.4	LOS D	3.8	27.0	0.84	0.76	27.0	
Approach		1288	6.2	1288	6.2	0.519	23.6	LOS B	11.2	79.5	0.49	0.70	39.0	
North: Herring Road (330m)														
7	L2	91	67.4	91	67.4	0.299	30.7	LOS C	2.3	26.4	0.82	0.74	25.4	
8	T1	602	3.5	602	3.5	0.913	74.4	LOS F	14.1	100.0	1.00	1.06	22.4	
9	R2	133	34.1	133	34.1	0.882	86.1	LOS F	6.3	56.7	1.00	0.97	18.9	
Approach		825	15.4	825	15.4	0.913	71.4	LOS F	14.1	100.0	0.98	1.01	21.8	
West: Waterloo Road (320m)														
10	L2	112	42.5	112	42.5	0.284	47.4	LOS D	3.6	34.4	0.82	0.77	26.9	
11	T1	435	1.5	435	1.5	0.722	62.0	LOS E	8.9	62.9	1.00	0.86	15.1	
Approach		546	9.8	546	9.8	0.722	59.0	LOS E	8.9	62.9	0.96	0.84	17.7	
All Vehicles		3818	7.5	3818	7.5	0.913	42.1	LOS C	14.1	100.0	0.77	0.80	28.7	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	61.9	LOS F	0.2	0.2	0.94	0.94	
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P4	West Full Crossing	53	37.5	LOS D	0.2	0.2	0.74	0.74	
All Pedestrians		211	56.7	LOS E			0.90	0.90	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 1 [AM_ Epping-Herring_ s1_no Left-In_opt1]

 Network: N1 [AM_ Ivanhoe_ s1_no Left-In_opt1]

Epping Road x Herring Road

RMS Base 2021 plus Development plus Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (250m)														
1	L2	14	0.0	14	0.0	1.027	109.8	LOS F	17.9	127.6	1.00	1.19	1.64	16.5
2	T1	699	2.6	699	2.6	1.027	116.6	LOS F	24.1	172.2	1.00	1.25	1.63	6.6
3	R2	291	1.4	291	1.4	0.480	61.4	LOS E	5.6	40.0	0.92	0.79	0.92	12.6
Approach		1003	2.2	1003	2.2	1.027	100.5	LOS F	24.1	172.2	0.98	1.12	1.42	7.8
East: Epping Road (630m)														
4	L2	97	2.2	97	2.2	0.430	35.3	LOS C	10.4	74.0	0.73	0.70	0.84	40.5
5	T1	988	1.6	988	1.6	0.430	29.8	LOS C	10.9	77.4	0.74	0.66	0.76	47.6
6	R2	379	3.6	379	3.6	0.993	121.0	LOS F	12.0	86.4	1.00	1.08	1.61	15.2
Approach		1464	2.2	1464	2.2	0.993	53.8	LOS D	12.0	86.4	0.80	0.77	0.99	35.4
North: Herring Road (180m)														
7	L2	69	18.2	69	18.2	0.089	21.2	LOS B	1.1	8.8	0.41	0.64	0.41	22.0
8	T1	288	4.4	288	4.4	0.501	62.0	LOS E	6.4	46.8	0.93	0.75	0.93	18.4
9	R2	196	1.6	196	1.6	0.351	76.6	LOS F	4.4	30.9	1.00	0.79	1.00	23.7
Approach		554	5.1	554	5.1	0.501	62.1	LOS E	6.4	46.8	0.89	0.75	0.89	21.0
West: Epping Road (600m)														
10	L2	580	1.5	580	1.5	0.592	25.4	LOS B	11.6	82.4	0.65	0.88	0.90	39.1
11	T1	2055	1.7	2055	1.7	1.040	126.1	LOS F	50.1	355.8	1.00	1.36	1.57	14.0
12	R2	20	0.0	20	0.0	0.272	86.0	LOS F	0.9	6.4	1.00	0.70	1.00	23.4
Approach		2655	1.7	2655	1.7	1.040	103.8	LOS F	50.1	355.8	0.92	1.25	1.42	16.4
All Vehicles		5676	2.2	5676	2.2	1.040	86.2	LOS F	50.1	355.8	0.90	1.05	1.26	19.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	32.3	LOS D	0.1	0.1	0.66	0.66
P2	East Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	40.0	LOS D	0.2	0.2	0.73	0.73
P4	West Full Crossing	53	65.0	LOS F	0.2	0.2	0.93	0.93
All Pedestrians		211	51.5	LOS E			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

 Site: 1 [PM_ Epping-Herring_ s1_no Left-In_opt1]

 Network: N1 [PM_ Ivanhoe_ s1_no Left-In_opt1]

Epping Road x Herring Road

RMS Base 2021 plus Development plus Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (250m)														
1	L2	21	0.0	21	0.0	0.939	120.8	LOS F	15.4	110.2	1.00	1.16	2.03	19.1
2	T1	573	2.6	573	2.6	0.939	98.2	LOS F	17.9	127.8	1.00	1.12	1.63	8.7
3	R2	188	1.1	188	1.1	0.267	60.6	LOS E	3.6	25.2	0.89	0.77	0.89	12.8
Approach		782	2.2	782	2.2	0.939	89.7	LOS F	17.9	127.8	0.97	1.04	1.46	9.8
East: Epping Road (630m)														
4	L2	280	1.1	280	1.1	0.945	83.4	LOS F	31.8	224.7	1.00	1.11	1.56	25.1
5	T1	1539	1.2	1539	1.2	0.945	76.2	LOS F	32.3	228.1	1.00	1.10	1.32	31.9
6	R2	464	2.5	464	2.5	0.771	71.8	LOS F	11.8	84.7	1.00	0.88	1.09	22.3
Approach		2283	1.4	2283	1.4	0.945	76.2	LOS F	32.3	228.1	1.00	1.06	1.30	29.6
North: Herring Road (180m)														
7	L2	277	4.6	277	4.6	0.240	9.8	LOS A	2.2	16.3	0.23	0.62	0.23	33.3
8	T1	749	1.8	749	1.8	0.949	88.2	LOS F	20.6	146.3	1.00	1.13	1.35	14.2
9	R2	536	1.0	536	1.0	0.709	79.3	LOS F	12.0	84.5	1.00	0.85	1.01	23.2
Approach		1562	2.0	1562	2.0	0.949	71.3	LOS F	20.6	146.3	0.86	0.94	1.03	18.7
West: Epping Road (600m)														
10	L2	323	1.0	323	1.0	0.417	22.2	LOS B	7.2	51.0	0.58	0.77	0.63	41.4
11	T1	1038	1.0	1038	1.0	0.751	57.2	LOS E	14.5	102.1	0.99	0.87	1.01	25.2
12	R2	177	1.2	177	1.2	0.969	109.5	LOS F	9.9	70.0	1.00	1.03	1.54	19.9
Approach		1538	1.0	1538	1.0	0.969	55.9	LOS D	14.5	102.1	0.90	0.87	0.99	26.2
All Vehicles		6165	1.6	6165	1.6	0.969	71.6	LOS F	32.3	228.1	0.94	0.98	1.18	23.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	43.7	LOS E	0.2	0.2	0.77	0.77
P2	East Full Crossing	53	64.0	LOS F	0.2	0.2	0.93	0.93
P3	North Full Crossing	53	55.1	LOS E	0.2	0.2	0.86	0.86
P4	West Full Crossing	53	65.9	LOS F	0.2	0.2	0.94	0.94
All Pedestrians		211	57.2	LOS E			0.87	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

 Site: 2 [AM_ Herring-Ivanhoe_ s1_no Left-In_opt1]

 Network: N1 [AM_ Ivanhoe_ s1_no Left-In_opt1]

Herring Road x Ivanhoe Place

RMS Base 2021 plus Development plus Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (180m)														
1	L2	1	0.0	1	0.0	0.017	7.3	LOS A	0.0	0.3	0.05	0.06	0.05	21.9
2	T1	1315	2.3	1303	2.3	0.677	13.3	LOS A	16.9	119.6	0.45	0.41	0.45	43.4
3	R2	262	1.2	260	1.2	0.327	17.4	LOS B	3.4	24.0	0.32	0.65	0.32	24.6
Approach		1578	2.1	1564 ^{N1}	2.1	0.677	14.0	LOS A	16.9	119.6	0.43	0.45	0.43	41.3
East: Ivanhoe Main Road (110m)														
4	L2	346	1.8	346	1.8	0.301	8.1	LOS A	4.8	34.2	0.45	0.52	0.45	20.0
5	T1	8	0.0	8	0.0	0.301	6.6	LOS A	4.8	34.2	0.45	0.52	0.45	21.5
6	R2	121	0.9	121	0.9	0.645	73.3	LOS F	5.4	37.9	1.00	0.82	1.03	16.4
Approach		476	1.5	476	1.5	0.645	24.6	LOS B	5.4	37.9	0.59	0.59	0.59	17.8
North: Herring Road (380m)														
7	L2	81	1.3	81	1.3	0.342	70.4	LOS E	2.5	17.4	0.96	0.77	0.96	15.1
8	T1	189	7.8	189	7.8	0.319	60.8	LOS E	3.8	28.2	0.93	0.74	0.93	16.8
9	R2	16	0.0	16	0.0	0.204	84.3	LOS F	0.7	5.0	1.00	0.69	1.00	14.8
Approach		286	5.5	286	5.5	0.342	64.8	LOS E	3.8	28.2	0.94	0.74	0.94	16.2
West: Morling College (70m)														
10	L2	6	0.0	6	0.0	0.050	58.3	LOS E	0.6	4.3	0.86	0.68	0.86	19.2
11	T1	11	0.0	11	0.0	0.050	57.3	LOS E	0.6	4.3	0.86	0.68	0.86	5.3
12	R2	13	0.0	13	0.0	0.065	70.3	LOS E	0.5	3.6	0.93	0.68	0.93	4.4
Approach		29	0.0	29	0.0	0.065	63.1	LOS E	0.6	4.3	0.89	0.68	0.89	8.4
All Vehicles		2369	2.4	2356 ^{N1}	2.4	0.677	22.9	LOS B	16.9	119.6	0.53	0.52	0.53	31.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	62.2	LOS F	0.2	0.2	0.91	0.91
P3	North Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	22.1	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		211	55.5	LOS E			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

 Site: 2 [PM_ Herring-Ivanhoe_ s1_no Left-In_opt1]

 Network: N1 [PM_ Ivanhoe_ s1_no Left-In_opt1]

Herring Road x Ivanhoe Place

RMS Base 2021 plus Development plus Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h	
South: Herring Road (180m)														
1	L2	1	0.0	1	0.0	0.017	7.9	LOS A	0.0	0.4	0.07	0.08	0.07	21.6
2	T1	1016	2.1	1015	2.1	0.466	7.0	LOS A	6.7	47.3	0.25	0.23	0.25	49.9
3	R2	179	1.2	179	1.2	0.916	64.7	LOS E	7.1	50.2	0.81	0.88	1.06	9.4
Approach		1196	1.9	1195 ^{N1}	1.9	0.916	15.6	LOS B	7.1	50.2	0.34	0.33	0.38	40.0
East: Ivanhoe Place (110m)														
4	L2	608	1.0	608	1.0	0.885	47.7	LOS D	15.6	110.0	0.90	0.93	1.01	7.6
5	T1	8	0.0	8	0.0	0.885	46.2	LOS D	15.6	110.0	0.90	0.93	1.01	9.9
6	R2	175	1.2	175	1.2	0.885	81.2	LOS F	15.6	110.0	0.99	1.06	1.29	15.3
Approach		792	1.1	792	1.1	0.885	55.0	LOS D	15.6	110.0	0.92	0.96	1.07	10.3
North: Herring Road (380m)														
7	L2	7	0.0	7	0.0	0.037	36.6	LOS C	0.5	5.6	0.66	0.54	0.66	25.0
8	T1	944	2.1	944	2.1	0.922	70.6	LOS F	24.7	174.0	1.00	1.09	1.24	15.1
9	R2	35	0.0	35	0.0	0.448	85.9	LOS F	1.6	11.3	1.00	0.72	1.00	14.6
Approach		986	2.0	986	2.0	0.922	70.9	LOS F	24.7	174.0	0.99	1.07	1.23	15.1
West: Morling College (70m)														
10	L2	21	0.0	21	0.0	0.056	53.1	LOS D	0.8	5.6	0.82	0.69	0.82	20.1
11	T1	2	0.0	2	0.0	0.056	52.1	LOS D	0.8	5.6	0.82	0.69	0.82	5.3
12	R2	8	0.0	8	0.0	0.133	82.7	LOS F	0.4	2.7	0.99	0.67	0.99	3.8
Approach		32	0.0	32	0.0	0.133	61.0	LOS E	0.8	5.6	0.86	0.69	0.86	14.7
All Vehicles		3005	1.7	3004 ^{N1}	1.7	0.922	44.6	LOS D	24.7	174.0	0.71	0.74	0.84	20.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	65.9	LOS F	0.2	0.2	0.94	0.94
P2	East Full Crossing	53	36.4	LOS D	0.2	0.2	0.70	0.70
P3	North Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	21.5	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		211	48.1	LOS E			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3 [AM_ Lyonpark-Ivanhoe_ s1_no Left-In_opt1]

Network: N1 [AM_ Ivanhoe_ s1_no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: Three Leg Priority Controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
South: Lyonpark Road (160m)													
1	L2	17	0.0	16	0.0	0.234	4.6	LOS A	0.0	0.0	0.00	0.00	49.3
2	T1	443	1.4	429	1.4	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	49.6
Approach		460	1.4	445 ^{N1}	1.4	0.234	0.2	NA	0.0	0.0	0.00	0.00	49.6
North: Lyonpark Road (180m)													
8	T1	257	1.6	257	1.6	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R2	433	1.5	433	1.5	0.380	7.3	LOS A	0.9	6.6	0.58	0.79	32.6
Approach		689	1.5	689	1.5	0.380	4.6	NA	0.9	6.6	0.36	0.50	37.5
West: Ivanhoe Main Road (290m)													
10	L2	193	1.6	191	1.6	0.716	7.7	LOS A	2.4	16.9	0.74	1.31	28.8
12	R2	389	1.6	387	1.6	0.716	11.6	LOS A	2.4	16.9	0.74	1.31	23.3
Approach		582	1.6	578 ^{N1}	1.6	0.716	10.3	LOS A	2.4	16.9	0.74	1.31	25.5
All Vehicles		1732	1.5	1713 ^{N1}	1.5	0.716	5.4	NA	2.4	16.9	0.40	0.65	33.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3 [PM_ Lyonpark-Ivanhoe_ s1_no Left-In_opt1]

Network: N1 [PM_ Ivanhoe_ s1_no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road

RMS Base 2021 plus Development plus Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Three Leg Priority Controlled

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
South: Lyonpark Road (160m)													
1	L2	122	0.9	122	0.9	0.147	4.6	LOS A	0.0	0.0	0.00	0.24	43.0
2	T1	153	0.7	153	0.7	0.147	0.0	LOS A	0.0	0.0	0.00	0.24	46.3
Approach		275	0.8	275	0.8	0.147	2.0	NA	0.0	0.0	0.00	0.24	45.3
North: Lyonpark Road (180m)													
8	T1	604	1.0	604	1.0	0.320	0.0	LOS A	0.0	0.0	0.00	0.00	49.9
9	R2	793	1.1	793	1.1	0.572	7.2	LOS A	2.4	17.0	0.56	0.74	32.7
Approach		1397	1.1	1397	1.1	0.572	4.1	NA	2.4	17.0	0.32	0.42	38.5
West: Ivanhoe Main Road (290m)													
10	L2	40	0.0	40	0.0	0.372	3.8	LOS A	0.6	4.2	0.58	0.77	28.5
12	R2	137	0.8	137	0.8	0.372	13.0	LOS A	0.6	4.2	0.58	0.77	23.0
Approach		177	0.6	177	0.6	0.372	11.0	LOS A	0.6	4.2	0.58	0.77	24.5
All Vehicles		1848	1.0	1848	1.0	0.572	4.5	NA	2.4	17.0	0.30	0.43	36.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3a [AM_ Ivanhoe Main x Road 02_ s1_ no Left-In_opt1]

Network: N1 [AM_ Ivanhoe_s1_no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Road 02														
1	L2	67	0.0	67	0.0	0.331	4.2	LOS A	0.6	4.0	0.58	0.78	0.70	19.9
3	R2	157	0.0	157	0.0	0.331	7.9	LOS A	0.6	4.0	0.58	0.78	0.70	19.9
Approach		224	0.0	224	0.0	0.331	6.8	LOS A	0.6	4.0	0.58	0.78	0.70	19.9
East: Ivanhoe Main St														
4	L2	98	0.0	98	0.0	0.263	2.0	LOS A	0.0	0.0	0.00	0.06	0.00	31.3
5	T1	408	0.8	408	0.8	0.263	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	29.2
Approach		506	0.6	506	0.6	0.263	0.4	NA	0.0	0.0	0.00	0.06	0.00	29.8
West: Ivanhoe Main St														
11	T1	312	0.7	310	0.7	0.200	0.5	LOS A	0.2	1.2	0.15	0.06	0.15	28.0
12	R2	42	0.0	42	0.0	0.200	4.8	LOS A	0.2	1.2	0.15	0.06	0.15	29.6
Approach		354	0.6	352 ^{N1}	0.6	0.200	1.0	NA	0.2	1.2	0.15	0.06	0.15	28.3
All Vehicles		1084	0.5	1082 ^{N1}	0.5	0.331	1.9	NA	0.6	4.0	0.17	0.21	0.19	27.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3a [PM_ Ivanhoe Main x Road 02_ s1_ no Left-In_ opt1]

Network: N1 [PM_ Ivanhoe_ s1_ no Left-In_ opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Road 02														
1	L2	47	0.0	47	0.0	0.307	6.5	LOS A	0.3	2.3	0.67	0.85	0.79	18.3
3	R2	66	0.0	66	0.0	0.307	10.1	LOS A	0.3	2.3	0.67	0.85	0.79	18.3
Approach		114	0.0	114	0.0	0.307	8.6	LOS A	0.3	2.3	0.67	0.85	0.79	18.3
East: Ivanhoe Main St														
4	L2	136	0.0	136	0.0	0.442	2.0	LOS A	6.2	43.4	0.00	0.05	0.00	31.4
5	T1	717	0.4	717	0.4	0.442	0.0	LOS A	6.2	43.4	0.00	0.05	0.00	29.3
Approach		853	0.4	853	0.4	0.442	0.3	NA	6.2	43.4	0.00	0.05	0.00	29.8
West: Ivanhoe Main St														
11	T1	131	0.8	130	0.8	0.159	3.5	LOS A	0.3	2.1	0.54	0.22	0.54	22.5
12	R2	58	0.0	58	0.0	0.159	7.8	LOS A	0.3	2.1	0.54	0.22	0.54	25.9
Approach		188	0.6	188	0.6	0.159	4.8	NA	0.3	2.1	0.54	0.22	0.54	23.9
All Vehicles		1155	0.4	1154 ^{N1}	0.4	0.442	1.9	NA	6.2	43.4	0.15	0.16	0.17	27.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3b [AM_ Ivanhoe Main x Road 03_ s1_ no Left-In_ opt1]

Network: N1 [AM_ Ivanhoe_ s1_ no Left-In_ opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Road 03														
1	L2	67	0.0	67	0.0	0.354	4.0	LOS A	0.6	4.3	0.58	0.79	0.73	19.3
3	R2	157	0.0	157	0.0	0.354	8.9	LOS A	0.6	4.3	0.58	0.79	0.73	19.3
Approach		224	0.0	224	0.0	0.354	7.5	LOS A	0.6	4.3	0.58	0.79	0.73	19.3
East: Ivanhoe Main St														
4	L2	98	0.0	98	0.0	0.228	2.0	LOS A	0.0	0.0	0.00	0.07	0.00	30.7
5	T1	341	0.9	341	0.9	0.228	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	29.6
Approach		439	0.7	438 ^{N1}	0.7	0.228	0.5	NA	0.0	0.0	0.00	0.07	0.00	29.9
West: Ivanhoe Main St														
11	T1	426	0.5	424	0.5	0.255	0.3	LOS A	0.2	1.3	0.13	0.04	0.13	28.6
12	R2	42	0.0	42	0.0	0.255	4.5	LOS A	0.2	1.3	0.13	0.04	0.13	29.9
Approach		468	0.4	466 ^{N1}	0.4	0.255	0.7	NA	0.2	1.3	0.13	0.04	0.13	28.8
All Vehicles		1132	0.5	1129 ^{N1}	0.5	0.354	1.9	NA	0.6	4.3	0.17	0.20	0.20	27.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3b [PM_ Ivanhoe Main x Road 03_ s1_ no Left-In_opt1]

Network: N1 [PM_ Ivanhoe_ s1_ no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows	Arrival Flows	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed			
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec	Vehicles veh	Distance m					
South: Road 03														
1	L2	47	0.0	47	0.0	0.272	7.3	LOS A	0.4	2.6	0.75	0.89	0.86	17.1
3	R2	66	0.0	66	0.0	0.272	12.3	LOS A	0.4	2.6	0.75	0.89	0.86	17.1
Approach		114	0.0	114	0.0	0.272	10.3	LOS A	0.4	2.6	0.75	0.89	0.86	17.1
East: Ivanhoe Main St														
4	L2	136	0.0	136	0.0	0.487	2.0	LOS A	0.0	0.0	0.00	0.05	0.00	30.7
5	T1	805	0.4	805	0.4	0.487	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	29.7
Approach		941	0.3	941	0.3	0.487	0.3	NA	0.0	0.0	0.00	0.05	0.00	29.9
West: Ivanhoe Main St														
11	T1	139	0.8	139	0.8	0.181	4.5	LOS A	0.4	3.0	0.59	0.22	0.59	21.3
12	R2	58	0.0	58	0.0	0.181	9.2	LOS A	0.4	3.0	0.59	0.22	0.59	25.0
Approach		197	0.5	197	0.5	0.181	5.9	NA	0.4	3.0	0.59	0.22	0.59	22.7
All Vehicles		1252	0.3	1252	0.3	0.487	2.1	NA	0.4	3.0	0.16	0.15	0.17	28.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 4 [AM_Epping-Lyonpark_s1_no Left-In_opt1]

Network: N1 [AM_Ivanhoe_s1_no Left-In_opt1]

Epping Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: Left In - Left Out
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
East: Epping Road (670m)													
5	T1	1549	2.0	1549	2.0	0.204	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		1549	2.0	1549	2.0	0.204	0.0	NA	0.0	0.0	0.00	0.00	69.9
North: Lyonpark Road (160m)													
7	L2	397	1.3	397	1.3	0.219	4.4	LOS A	0.0	0.0	0.00	0.47	47.4
Approach		397	1.3	397	1.3	0.219	4.4	NA	0.0	0.0	0.00	0.47	47.4
West: Epping Road (630m)													
10	L2	636	1.5	615	1.5	0.340	6.4	LOS A	0.0	0.0	0.00	0.61	58.7
11	T1	1711	2.5	1656	2.5	0.292	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		2346	2.2	2271 ^{N1}	2.2	0.340	1.8	NA	0.0	0.0	0.00	0.16	67.9
All Vehicles		4293	2.1	4217 ^{N1}	2.1	0.340	1.4	NA	0.0	0.0	0.00	0.13	65.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 4 [PM_Epping-Lyonpark_s1_no Left-In_opt1]

Network: N1 [PM_Ivanhoe_s1_no Left-In_opt1]

Epping Road x Lyonpark Road
 RMS Base 2021 plus Development plus Upgrades
 No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
 Site Category: Left In - Left Out
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
East: Epping Road (670m)													
5	T1	2303	1.5	2303	1.5	0.303	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		2303	1.5	2303	1.5	0.303	0.0	NA	0.0	0.0	0.00	0.00	69.9
North: Lyonpark Road (160m)													
7	L2	1204	1.0	1204	1.0	0.663	4.4	LOS A	0.0	0.0	0.00	0.47	47.3
Approach		1204	1.0	1204	1.0	0.663	4.4	NA	0.0	0.0	0.00	0.47	47.3
West: Epping Road (630m)													
10	L2	129	0.8	129	0.8	0.071	6.4	LOS A	0.0	0.0	0.00	0.61	58.7
11	T1	1333	1.7	1333	1.7	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		1462	1.6	1462	1.6	0.234	0.6	NA	0.0	0.0	0.00	0.05	69.3
All Vehicles		4969	1.4	4969	1.4	0.663	1.3	NA	0.0	0.0	0.00	0.13	62.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

 Site: 6 [AM_Waterloo-Byfield_s1]

 Network: N2 [AM_Waterloo_s1]

Waterloo Road x Byfield Sreet

RMS Base 2021 plus Development plus Upgrades

Site Category: Three Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Byfield Sreet (350m)														
1	L2	82	1.3	82	1.3	0.070	5.6	LOS A	0.4	2.7	0.17	0.55	0.17	41.4
3	R2	36	2.9	36	2.9	0.062	58.1	LOS E	0.6	4.5	0.88	0.69	0.88	19.6
Approach		118	1.8	118	1.8	0.070	21.5	LOS B	0.6	4.5	0.39	0.59	0.39	29.2
East: Waterloo Road (155m)														
4	L2	58	1.8	58	1.8	0.197	32.0	LOS C	2.4	23.8	0.66	0.61	0.66	28.7
5	T1	457	14.3	457	14.3	0.257	27.6	LOS B	5.5	39.1	0.69	0.58	0.69	16.1
Approach		515	12.9	515	12.9	0.257	27.9	LOS B	5.5	39.1	0.68	0.59	0.68	18.4
West: Waterloo Road (390m)														
11	T1	562	10.7	562	10.7	0.173	3.7	LOS A	1.7	11.8	0.20	0.17	0.20	54.4
12	R2	141	1.5	141	1.5	0.258	35.1	LOS C	3.5	24.5	0.63	0.72	0.63	32.2
Approach		703	8.8	703	8.8	0.258	10.0	LOS A	3.5	24.5	0.29	0.28	0.29	46.1
All Vehicles		1336	9.8	1336	9.8	0.258	18.0	LOS B	5.5	39.1	0.45	0.43	0.45	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	29.2	LOS C	0.1	0.1	0.65	0.65
P4	West Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		105	46.5	LOS E			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 21 August 2018 10:23:41 AM

Project: C:\Users\Faria Imam\Downloads\Ivanhoe Estate Sidra Network.sip8

MOVEMENT SUMMARY

 Site: 6 [PM_Waterloo-Byfield_s1]

 Network: N2 [PM_Waterloo_s1]

Waterloo Road x Byfield Sreet

RMS Base 2021 plus Development plus Upgrades

Site Category: Three Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Byfield Sreet (350m)														
1	L2	120	0.9	120	0.9	0.119	8.2	LOS A	1.1	8.0	0.29	0.59	0.29	38.2
3	R2	16	0.0	16	0.0	0.027	57.4	LOS E	0.3	1.9	0.87	0.66	0.87	19.8
Approach		136	0.8	136	0.8	0.119	13.9	LOS A	1.1	8.0	0.36	0.60	0.36	33.4
East: Waterloo Road (155m)														
4	L2	25	0.0	25	0.0	0.162	32.8	LOS C	2.0	22.5	0.66	0.57	0.66	28.8
5	T1	841	8.3	841	8.3	0.548	32.6	LOS C	13.4	94.9	0.79	0.69	0.79	14.4
Approach		866	8.0	866	8.0	0.548	32.6	LOS C	13.4	94.9	0.79	0.69	0.79	15.0
West: Waterloo Road (390m)														
11	T1	809	8.3	809	8.3	0.254	3.9	LOS A	3.0	21.2	0.22	0.19	0.22	53.9
12	R2	319	1.0	319	1.0	0.553	34.0	LOS C	8.6	60.9	0.70	0.77	0.70	32.6
Approach		1128	6.3	1128	6.3	0.553	12.4	LOS A	8.6	60.9	0.35	0.35	0.35	43.9
All Vehicles		2131	6.6	2131	6.6	0.553	20.7	LOS B	13.4	94.9	0.53	0.51	0.53	32.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	30.5	LOS D	0.1	0.1	0.66	0.66
P4	West Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		105	47.1	LOS E			0.81	0.81

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 21 August 2018 10:24:01 AM

Project: C:\Users\Faria Imam\Downloads\Ivanhoe Estate Sidra Network.sip8

MOVEMENT SUMMARY

 Site: 5 [AM_Herring-Waterloo_s1]

 Network: N2 [AM_Waterloo_s1]

Herring Road x Waterloo Road

RMS Base 2021 plus Development plus Upgrades

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (380m)														
1	L2	94	1.1	94	1.1	0.158	27.4	LOS B	2.4	18.0	0.66	0.69	0.66	36.6
2	T1	841	2.6	841	2.6	0.904	67.3	LOS E	20.6	145.7	1.00	1.05	1.23	23.8
3	R2	587	1.6	587	1.6	0.525	29.5	LOS C	6.6	47.1	0.88	0.81	0.88	27.1
Approach		1522	2.1	1522	2.1	0.904	50.2	LOS D	20.6	145.7	0.93	0.93	1.06	25.2
East: Waterloo Road (390m)														
4	L2	88	1.2	88	1.2	0.063	7.0	LOS A	0.3	1.8	0.08	0.59	0.08	50.6
5	T1	146	1.4	146	1.4	0.206	18.8	LOS B	2.6	18.2	0.45	0.37	0.45	42.1
6	R2	106	57.4	106	57.4	0.334	70.9	LOS F	2.5	33.1	1.00	0.77	1.00	23.0
Approach		341	18.8	341	18.8	0.334	32.0	LOS C	2.6	33.1	0.53	0.56	0.53	34.8
North: Herring Road (330m)														
7	L2	72	69.1	72	69.1	0.316	40.4	LOS C	2.4	27.8	0.87	0.75	0.87	21.4
8	T1	199	7.9	199	7.9	0.328	55.9	LOS D	3.5	24.9	0.93	0.74	0.93	26.5
9	R2	71	58.2	71	58.2	0.220	51.6	LOS D	2.4	24.7	0.84	0.76	0.84	25.9
Approach		341	31.2	341	31.2	0.328	51.6	LOS D	3.5	27.8	0.90	0.74	0.90	25.6
West: Waterloo Road (320m)														
10	L2	80	59.2	80	59.2	0.148	31.7	LOS C	2.0	21.1	0.64	0.72	0.64	32.7
11	T1	268	1.6	268	1.6	0.446	57.8	LOS E	5.1	36.3	0.95	0.77	0.95	15.9
Approach		348	14.8	348	14.8	0.446	51.8	LOS D	5.1	36.3	0.88	0.76	0.88	19.6
All Vehicles		2553	10.0	2553	10.0	0.904	48.2	LOS D	20.6	145.7	0.86	0.83	0.94	25.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	50.2	LOS E	0.2	0.2	0.85	0.85
All Pedestrians		211	60.4	LOS F			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 5 [PM_Herring-Waterloo_s1]

 Network: N2 [PM_Waterloo_s1]

Herring Road x Waterloo Road

RMS Base 2021 plus Development plus Upgrades

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h	
South: Herring Road (380m)														
1	L2	89	0.0	89	0.0	0.120	20.9	LOS B	1.9	14.6	0.55	0.65	0.55	40.3
2	T1	761	2.4	761	2.4	0.539	35.1	LOS C	12.4	87.6	0.82	0.72	0.82	33.4
3	R2	401	1.0	401	1.0	0.465	32.5	LOS C	4.6	32.7	0.90	0.80	0.90	25.6
Approach		1252	1.8	1252	1.8	0.539	33.2	LOS C	12.4	87.6	0.83	0.74	0.83	31.9
East: Waterloo Road (390m)														
4	L2	343	0.9	343	0.9	0.228	9.5	LOS A	2.2	15.2	0.16	0.58	0.16	48.9
5	T1	131	0.8	131	0.8	0.228	12.2	LOS A	2.2	15.2	0.32	0.37	0.32	45.9
6	R2	140	45.9	140	45.9	0.301	62.3	LOS E	3.1	22.3	0.93	0.77	0.93	24.8
Approach		614	11.1	614	11.1	0.301	22.1	LOS B	3.1	27.8	0.37	0.58	0.37	39.8
North: Herring Road (330m)														
7	L2	74	82.9	74	82.9	0.268	30.7	LOS C	1.9	23.5	0.81	0.73	0.81	26.2
8	T1	631	3.3	631	3.3	0.925	76.6	LOS F	15.0	106.2	1.00	1.08	1.34	22.0
9	R2	134	33.9	134	33.9	0.887	86.8	LOS F	6.4	57.4	1.00	0.98	1.39	18.8
Approach		838	15.2	838	15.2	0.925	74.1	LOS F	15.0	106.2	0.98	1.03	1.30	21.5
West: Waterloo Road (320m)														
10	L2	114	41.7	114	41.7	0.288	47.5	LOS D	3.7	35.0	0.82	0.77	0.82	26.9
11	T1	439	1.4	439	1.4	0.729	62.3	LOS E	9.0	63.7	1.00	0.87	1.05	15.1
Approach		553	9.7	553	9.7	0.729	59.2	LOS E	9.0	63.7	0.96	0.85	1.01	17.6
All Vehicles		3256	8.3	3256	8.3	0.925	46.1	LOS D	15.0	106.2	0.80	0.80	0.89	27.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Prop. Queued	Effective Stop Rate		
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	60.9	LOS F	0.2	0.2	0.94	0.94	
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P4	West Full Crossing	53	36.8	LOS D	0.2	0.2	0.73	0.73	
All Pedestrians		211	56.3	LOS E			0.90	0.90	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 1 [AM_ Epping-Herring_ s2_no Left-In_opt1]

 Network: N1 [AM_ Ivanhoe_ s2_no Left-In_opt1]

Epping Road x Herring Road

2031 Background plus Development Traffic, with Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (250m)														
1	L2	15	0.0	15	0.0	1.025	110.6	LOS F	17.4	124.4	1.00	1.19	1.65	16.3
2	T1	739	2.4	739	2.4	1.025	116.6	LOS F	28.0	200.0	1.00	1.27	1.62	6.6
3	R2	308	1.4	308	1.4	0.885	86.6	LOS F	7.5	53.2	1.00	0.97	1.35	9.5
Approach		1062	2.1	1062	2.1	1.025	107.8	LOS F	28.0	200.0	1.00	1.18	1.54	7.4
East: Epping Road (630m)														
4	L2	107	2.0	107	2.0	0.449	36.7	LOS C	11.3	80.0	0.71	0.71	1.00	39.9
5	T1	1097	1.5	1097	1.5	0.449	28.6	LOS C	11.8	83.5	0.72	0.66	0.80	48.3
6	R2	418	3.5	418	3.5	1.033	143.0	LOS F	16.2	116.8	1.00	1.14	1.74	13.2
Approach		1622	2.1	1622	2.1	1.033	58.6	LOS E	16.2	116.8	0.79	0.78	1.05	33.8
North: Herring Road (180m)														
7	L2	88	15.5	88	15.5	0.117	28.6	LOS C	2.3	18.1	0.63	0.69	0.63	18.0
8	T1	355	3.9	355	3.9	0.504	58.4	LOS E	7.9	56.9	0.91	0.75	0.91	19.2
9	R2	239	1.8	239	1.8	0.896	92.8	LOS F	5.8	41.4	1.00	0.90	1.24	20.9
Approach		682	4.6	682	4.6	0.896	66.6	LOS E	7.9	56.9	0.91	0.80	0.99	20.0
West: Epping Road (600m)														
10	L2	602	1.4	602	1.4	0.866	48.2	LOS D	22.9	162.3	0.93	1.03	1.36	28.0
11	T1	2137	1.7	2137	1.7	1.041	126.1	LOS F	53.2	377.7	1.00	1.36	1.57	14.0
12	R2	21	0.0	21	0.0	0.214	82.6	LOS F	0.9	6.6	0.99	0.71	0.99	24.0
Approach		2760	1.6	2760	1.6	1.041	108.8	LOS F	53.2	377.7	0.98	1.28	1.52	15.8
All Vehicles		6126	2.2	6126	2.2	1.041	90.6	LOS F	53.2	377.7	0.93	1.08	1.34	18.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	29.7	LOS C	0.1	0.1	0.63	0.63
P2	East Full Crossing	53	66.9	LOS F	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	37.8	LOS D	0.2	0.2	0.71	0.71
P4	West Full Crossing	53	59.5	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		211	48.5	LOS E			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Monday, 6 January 2020 4:13:42 PM

Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

 Site: 1 [PM_ Epping-Herring_ s2_no Left-In_opt1]

 Network: N1 [PM_ Ivanhoe_ s2_no Left-In_opt1]

Epping Road x Herring Road

2031 Background plus Development Traffic, with Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (250m)														
1	L2	24	0.0	24	0.0	0.942	120.7	LOS F	19.2	136.4	1.00	1.17	2.02	19.2
2	T1	638	2.1	638	2.1	0.942	99.2	LOS F	19.2	136.4	1.00	1.14	1.65	8.6
3	R2	212	1.0	212	1.0	0.887	92.7	LOS F	5.3	37.3	1.00	0.96	1.40	9.0
Approach		874	1.8	874	1.8	0.942	98.2	LOS F	19.2	136.4	1.00	1.10	1.60	9.1
East: Epping Road (630m)														
4	L2	277	1.1	277	1.1	0.945	85.9	LOS F	32.1	226.6	1.00	1.13	1.68	24.7
5	T1	1523	1.1	1523	1.1	0.945	77.0	LOS F	32.1	226.6	1.00	1.11	1.35	31.8
6	R2	460	2.7	460	2.7	0.913	91.6	LOS F	12.9	92.8	1.00	0.98	1.34	18.8
Approach		2260	1.4	2260	1.4	0.945	81.1	LOS F	32.1	226.6	1.00	1.08	1.39	28.5
North: Herring Road (180m)														
7	L2	299	4.2	299	4.2	0.271	9.4	LOS A	2.1	15.5	0.18	0.61	0.18	33.9
8	T1	807	1.7	807	1.7	0.647	56.0	LOS D	17.7	125.7	0.94	0.82	0.94	19.7
9	R2	576	1.1	576	1.1	0.885	88.5	LOS F	13.7	97.0	1.00	0.91	1.13	21.6
Approach		1682	1.9	1682	1.9	0.885	58.8	LOS E	17.7	125.7	0.82	0.81	0.87	21.3
West: Epping Road (600m)														
10	L2	351	0.9	351	0.9	0.392	21.8	LOS B	7.4	52.2	0.56	0.78	0.64	41.7
11	T1	1137	1.0	1137	1.0	0.689	50.4	LOS D	14.9	105.3	0.95	0.83	0.95	27.2
12	R2	194	1.1	194	1.1	0.936	98.3	LOS F	10.2	72.4	1.00	0.99	1.43	21.4
Approach		1681	1.0	1681	1.0	0.936	50.0	LOS D	14.9	105.3	0.87	0.83	0.94	28.0
All Vehicles		6497	1.5	6497	1.5	0.945	69.6	LOS E	32.1	226.6	0.92	0.95	1.17	24.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	44.5	LOS E	0.2	0.2	0.77	0.77
P2	East Full Crossing	53	48.4	LOS E	0.2	0.2	0.81	0.81
P3	North Full Crossing	53	49.2	LOS E	0.2	0.2	0.81	0.81
P4	West Full Crossing	53	64.0	LOS F	0.2	0.2	0.93	0.93
All Pedestrians		211	51.5	LOS E			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Monday, 6 January 2020 4:14:05 PM

Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

 Site: 2 [AM_ Herring-Ivanhoe_ s2_no Left-In_opt1]

 Network: N1 [AM_ Ivanhoe_ s2_no Left-In_opt1]

Herring Road x Ivanhoe Place

2031 Background plus Development Traffic, with Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (180m)														
1	L2	1	0.0	1	0.0	0.017	9.6	LOS A	0.1	0.7	0.11	0.11	0.11	20.8
2	T1	1459	2.3	1450	2.3	0.682	13.6	LOS A	20.7	146.7	0.40	0.37	0.40	43.1
3	R2	283	1.1	282	1.1	0.372	18.7	LOS B	4.0	28.5	0.35	0.66	0.35	23.6
Approach		1743	2.1	1733 ^{N1}	2.1	0.682	14.4	LOS A	20.7	146.7	0.39	0.42	0.39	40.9
East: Ivanhoe Main Road (110m)														
4	L2	417	1.5	417	1.5	0.349	7.4	LOS A	5.6	40.0	0.44	0.52	0.44	20.6
5	T1	8	0.0	8	0.0	0.349	5.9	LOS A	5.6	40.0	0.44	0.52	0.44	21.9
6	R2	128	0.8	128	0.8	0.684	74.1	LOS F	5.8	40.6	1.00	0.84	1.06	16.2
Approach		554	1.3	554	1.3	0.684	22.8	LOS B	5.8	40.6	0.57	0.59	0.58	18.0
North: Herring Road (380m)														
7	L2	103	1.0	103	1.0	0.375	67.9	LOS E	2.5	17.4	0.95	0.78	0.95	15.5
8	T1	244	6.5	244	6.5	0.372	58.6	LOS E	5.0	36.7	0.93	0.74	0.93	17.3
9	R2	16	0.0	16	0.0	0.204	84.3	LOS F	0.7	5.0	1.00	0.69	1.00	14.8
Approach		363	4.6	363	4.6	0.375	62.4	LOS E	5.0	36.7	0.94	0.75	0.94	16.6
West: Morling College (70m)														
10	L2	6	0.0	6	0.0	0.050	58.3	LOS E	0.6	4.3	0.86	0.68	0.86	19.2
11	T1	11	0.0	11	0.0	0.050	57.3	LOS E	0.6	4.3	0.86	0.68	0.86	5.3
12	R2	13	0.0	13	0.0	0.065	70.3	LOS E	0.5	3.6	0.93	0.68	0.93	4.4
Approach		29	0.0	29	0.0	0.065	63.1	LOS E	0.6	4.3	0.89	0.68	0.89	8.4
All Vehicles		2689	2.3	2679 ^{N1}	2.3	0.684	23.2	LOS B	20.7	146.7	0.51	0.50	0.51	30.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	59.5	LOS E	0.2	0.2	0.89	0.89
P3	North Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	22.1	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		211	54.8	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

 Site: 2 [PM_ Herring-Ivanhoe_ s2_no Left-In_opt1]

 Network: N1 [PM_ Ivanhoe_ s2_no Left-In_opt1]

Herring Road x Ivanhoe Place

2031 Background plus Development Traffic, with Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 149 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				
South: Herring Road (180m)														
1	L2	1	0.0	1	0.0	0.018	7.9	LOS A	0.0	0.4	0.06	0.07	0.06	21.6
2	T1	1351	1.8	1351	1.8	0.756	10.8	LOS A	18.0	127.4	0.44	0.40	0.44	45.7
3	R2	208	1.0	208	1.0	0.961	71.9	LOS F	8.6	60.8	0.75	0.91	1.10	8.6
Approach		1560	1.7	1560	1.7	0.961	19.0	LOS B	18.0	127.4	0.48	0.47	0.53	37.4
East: Ivanhoe Place (110m)														
4	L2	653	1.0	653	1.0	0.641	19.1	LOS B	15.6	110.0	0.72	0.77	0.79	13.7
5	T1	8	0.0	8	0.0	0.641	17.7	LOS B	15.6	110.0	0.72	0.77	0.79	16.2
6	R2	221	1.0	221	1.0	0.930	90.6	LOS F	11.6	81.6	1.00	1.15	1.39	14.2
Approach		882	1.0	882	1.0	0.930	37.0	LOS C	15.6	110.0	0.79	0.86	0.94	14.0
North: Herring Road (380m)														
7	L2	7	0.0	7	0.0	0.047	44.7	LOS D	0.6	6.3	0.74	0.58	0.74	21.9
8	T1	1020	2.2	1020	2.2	0.968	89.0	LOS F	30.8	217.5	1.00	1.16	1.35	12.7
9	R2	35	0.0	35	0.0	0.448	85.9	LOS F	1.6	11.3	1.00	0.72	1.00	14.6
Approach		1062	2.1	1062	2.1	0.968	88.6	LOS F	30.8	217.5	1.00	1.15	1.34	12.7
West: Morling College (70m)														
10	L2	21	0.0	21	0.0	0.056	53.1	LOS D	0.8	5.6	0.82	0.69	0.82	20.1
11	T1	2	0.0	2	0.0	0.056	52.1	LOS D	0.8	5.6	0.82	0.69	0.82	5.3
12	R2	8	0.0	8	0.0	0.040	66.0	LOS E	0.3	2.3	0.90	0.67	0.90	4.6
Approach		32	0.0	32	0.0	0.056	56.5	LOS E	0.8	5.6	0.84	0.69	0.84	15.5
All Vehicles		3536	1.6	3536	1.6	0.968	44.7	LOS D	30.8	217.5	0.72	0.77	0.88	20.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	44.5	LOS E	0.2	0.2	0.77	0.77
P3	North Full Crossing	53	68.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	24.3	LOS C	0.1	0.1	0.57	0.57
All Pedestrians		211	51.6	LOS E			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3 [AM_ Lyonpark-Ivanhoe _ s2_no Left-In_opt1]

Network: N1 [AM_ Ivanhoe_ s2_no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road

2031 Background plus Development Traffic, with Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Three Leg Priority Controlled

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
South: Lyonpark Road (160m)													
1	L2	19	0.0	19	0.0	0.265	4.6	LOS A	0.0	0.0	0.00	0.00	49.3
2	T1	494	1.3	484	1.3	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	49.6
Approach		513	1.2	503 ^{N1}	1.2	0.265	0.2	NA	0.0	0.0	0.00	0.00	49.6
North: Lyonpark Road (180m)													
8	T1	286	1.5	286	1.5	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
9	R2	463	1.4	463	1.4	0.436	8.2	LOS A	1.2	8.4	0.63	0.88	31.3
Approach		749	1.4	749	1.4	0.436	5.1	NA	1.2	8.4	0.39	0.51	36.5
West: Ivanhoe Main Road (290m)													
10	L2	213	1.5	212	1.5	0.839	12.2	LOS A	3.7	26.0	0.84	1.82	26.6
12	R2	403	1.3	402	1.3	0.839	16.9	LOS B	3.7	26.0	0.84	1.82	21.1
Approach		616	1.4	614 ^{N1}	1.4	0.839	15.3	LOS B	3.7	26.0	0.84	1.82	23.3
All Vehicles		1878	1.3	1867 ^{N1}	1.4	0.839	7.1	NA	3.7	26.0	0.43	0.82	31.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3 [PM_ Lyonpark-Ivanhoe _ s2_no Left-In_opt1]

Network: N1 [PM_ Ivanhoe_ s2_no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road

2031 Background plus Development Traffic, with Upgrades

No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)

Site Category: Three Leg Priority Controlled

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
South: Lyonpark Road (160m)													
1	L2	139	0.8	139	0.8	0.168	4.6	LOS A	0.0	0.0	0.00	0.24	43.0
2	T1	174	1.2	174	1.2	0.168	0.0	LOS A	0.0	0.0	0.00	0.24	46.3
Approach		313	1.0	313	1.0	0.168	2.0	NA	0.0	0.0	0.00	0.24	45.3
North: Lyonpark Road (180m)													
8	T1	685	1.1	685	1.1	0.361	0.0	LOS A	0.0	0.0	0.00	0.00	49.9
9	R2	865	1.0	865	1.0	0.650	8.4	LOS A	3.3	23.4	0.64	0.85	31.0
Approach		1551	1.0	1551	1.0	0.650	4.7	NA	3.3	23.4	0.36	0.47	37.3
West: Ivanhoe Main Road (290m)													
10	L2	44	0.0	44	0.0	0.477	5.6	LOS A	0.8	5.6	0.65	0.87	26.8
12	R2	139	0.8	139	0.8	0.477	17.8	LOS B	0.8	5.6	0.65	0.87	21.3
Approach		183	0.6	183	0.6	0.477	14.8	LOS B	0.8	5.6	0.65	0.87	22.9
All Vehicles		2046	1.0	2046	1.0	0.650	5.2	NA	3.3	23.4	0.33	0.47	35.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3a [AM_ Ivanhoe Main x Road 02_ s2_ no Left-In_opt1]

Network: N1 [AM_ Ivanhoe_s2_ no Left-In_opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Road 02														
1	L2	67	0.0	67	0.0	0.370	4.9	LOS A	0.7	4.6	0.63	0.86	0.82	18.8
3	R2	157	0.0	157	0.0	0.370	9.4	LOS A	0.7	4.6	0.63	0.86	0.82	18.8
Approach		224	0.0	224	0.0	0.370	8.0	LOS A	0.7	4.6	0.63	0.86	0.82	18.8
East: Ivanhoe Main St														
4	L2	98	0.0	98	0.0	0.288	2.0	LOS A	0.0	0.0	0.00	0.06	0.00	31.4
5	T1	457	0.7	457	0.7	0.288	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	29.3
Approach		555	0.6	555	0.6	0.288	0.4	NA	0.0	0.0	0.00	0.06	0.00	29.8
West: Ivanhoe Main St														
11	T1	365	0.6	365	0.6	0.230	0.6	LOS A	0.2	1.3	0.15	0.05	0.15	28.0
12	R2	42	0.0	42	0.0	0.230	5.2	LOS A	0.2	1.3	0.15	0.05	0.15	29.5
Approach		407	0.5	407	0.5	0.230	1.0	NA	0.2	1.3	0.15	0.05	0.15	28.2
All Vehicles		1186	0.4	1185 ^{N1}	0.4	0.370	2.0	NA	0.7	4.6	0.17	0.21	0.21	26.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 3a [PM_ Ivanhoe Main x Road 02_ s2_ no Left-In_ opt1]

Network: N1 [PM_ Ivanhoe_ s2_ no Left-In_ opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Road 02														
1	L2	47	0.0	47	0.0	0.398	9.1	LOS A	0.4	3.0	0.77	0.96	0.99	15.8
3	R2	66	0.0	66	0.0	0.398	14.3	LOS A	0.4	3.0	0.77	0.96	0.99	15.8
Approach		114	0.0	114	0.0	0.398	12.1	LOS A	0.4	3.0	0.77	0.96	0.99	15.8
East: Ivanhoe Main St														
4	L2	136	0.0	136	0.0	0.510	2.0	LOS A	0.4	2.6	0.00	0.04	0.00	31.4
5	T1	851	0.4	851	0.4	0.510	0.0	LOS A	0.4	2.6	0.00	0.04	0.00	29.4
Approach		986	0.3	986	0.3	0.510	0.3	NA	0.4	2.6	0.00	0.04	0.00	29.8
West: Ivanhoe Main St														
11	T1	145	0.7	145	0.7	0.194	5.2	LOS A	0.4	2.9	0.62	0.22	0.63	20.5
12	R2	58	0.0	58	0.0	0.194	10.2	LOS A	0.4	2.9	0.62	0.22	0.63	24.4
Approach		203	0.5	203	0.5	0.194	6.6	NA	0.4	2.9	0.62	0.22	0.63	22.0
All Vehicles		1303	0.3	1303	0.3	0.510	2.3	NA	0.4	3.0	0.16	0.15	0.18	26.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 3b [AM_ Ivanhoe Main x Road 03_ s2_ no Left-In_ opt1]

Network: N1 [AM_ Ivanhoe_ s2_ no Left-In_ opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Road 02														
1	L2	67	0.0	67	0.0	0.403	4.8	LOS A	0.7	5.0	0.65	0.87	0.88	18.0
3	R2	157	0.0	157	0.0	0.403	10.8	LOS A	0.7	5.0	0.65	0.87	0.88	18.0
Approach		224	0.0	224	0.0	0.403	9.0	LOS A	0.7	5.0	0.65	0.87	0.88	18.0
East: Ivanhoe Main St														
4	L2	98	0.0	98	0.0	0.253	2.0	LOS A	0.0	0.0	0.00	0.07	0.00	30.7
5	T1	389	0.8	389	0.8	0.253	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	29.7
Approach		487	0.6	487	0.6	0.253	0.4	NA	0.0	0.0	0.00	0.07	0.00	29.9
West: Ivanhoe Main St														
11	T1	480	0.4	480	0.4	0.286	0.4	LOS A	0.2	1.5	0.13	0.04	0.13	28.5
12	R2	42	0.0	42	0.0	0.286	4.9	LOS A	0.2	1.5	0.13	0.04	0.13	29.9
Approach		522	0.4	522	0.4	0.286	0.7	NA	0.2	1.5	0.13	0.04	0.13	28.7
All Vehicles		1234	0.4	1233 ^{N1}	0.4	0.403	2.1	NA	0.7	5.0	0.17	0.20	0.22	27.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Site: 3b [PM_ Ivanhoe Main x Road 03_ s2_ no Left-In_ opt1]

Network: N1 [PM_ Ivanhoe_ s2_ no Left-In_ opt1]

Ivanhoe Main Road x Lyonpark Road
RMS Base 2021 plus Development plus Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: 3 leg Priority controlled
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand	Flows	Arrival	Flows	Deg. Satn	Average Delay	Level of Service	Aver. Queue	Back of Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	m				km/h
South: Road 02														
1	L2	47	0.0	47	0.0	0.353	10.3	LOS A	0.5	3.5	0.83	0.98	1.03	14.5
3	R2	66	0.0	66	0.0	0.353	17.4	LOS B	0.5	3.5	0.83	0.98	1.03	14.5
Approach		114	0.0	114	0.0	0.353	14.4	LOS A	0.5	3.5	0.83	0.98	1.03	14.5
East: Ivanhoe Main St														
4	L2	136	0.0	136	0.0	0.556	2.0	LOS A	0.0	0.0	0.00	0.04	0.00	30.8
5	T1	939	0.3	939	0.3	0.556	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	29.7
Approach		1075	0.3	1075	0.3	0.556	0.3	NA	0.0	0.0	0.00	0.04	0.00	29.9
West: Ivanhoe Main St														
11	T1	154	0.7	154	0.7	0.225	7.1	LOS A	0.6	4.5	0.67	0.23	0.75	18.8
12	R2	58	0.0	58	0.0	0.225	12.6	LOS A	0.6	4.5	0.67	0.23	0.75	23.0
Approach		212	0.5	212	0.5	0.225	8.6	NA	0.6	4.5	0.67	0.23	0.75	20.3
All Vehicles		1400	0.3	1400	0.3	0.556	2.7	NA	0.6	4.5	0.17	0.15	0.20	27.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: ASON GROUP PTY LTD | Processed: Monday, 6 January 2020 4:14:05 PM

Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_ no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 4 [AM_Epping-Lyonpark_s2_no Left-In_opt1]

Network: N1 [AM_Ivanhoe_s2_no Left-In_opt1]

Epping Road x Lyonpark Road
2031 Background plus Development Traffic, with Upgrades
No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
Site Category: Left In - Left Out
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
East: Epping Road (670m)													
5	T1	1717	2.0	1717	2.0	0.227	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		1717	2.0	1717	2.0	0.227	0.0	NA	0.0	0.0	0.00	0.00	69.9
North: Lyonpark Road (160m)													
7	L2	412	1.0	410	1.0	0.226	4.4	LOS A	0.0	0.0	0.00	0.47	47.4
Approach		412	1.0	410 ^{N1}	1.0	0.226	4.4	NA	0.0	0.0	0.00	0.47	47.4
West: Epping Road (630m)													
10	L2	661	1.4	648	1.4	0.358	6.4	LOS A	0.0	0.0	0.00	0.61	58.7
11	T1	1779	2.4	1745	2.4	0.308	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		2440	2.2	2393 ^{N1}	2.2	0.358	1.8	NA	0.0	0.0	0.00	0.16	67.9
All Vehicles		4568	2.0	4520 ^{N1}	2.0	0.358	1.4	NA	0.0	0.0	0.00	0.13	66.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^{N1} Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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Organisation: ASON GROUP PTY LTD | Processed: Monday, 6 January 2020 4:13:42 PM

Project: D:\Ason\01 Desktop 2019 08 23\0421\Revised RTS\Internal intersections\Model\Ivanhoe Estate Sidra Network_no Left-In (100% Herring).sip8

MOVEMENT SUMMARY

Site: 4 [PM_Epping-Lyonpark_s2_no Left-In_opt1]

Network: N1 [PM_Ivanhoe_s2_no Left-In_opt1]

Epping Road x Lyonpark Road
 2031 Background plus Development Traffic, with Upgrades
 No Left-In from Epping (this traffic redistributed as 100% Right-In from Herring)
 Site Category: Left In - Left Out
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles													
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h
East: Epping Road (670m)													
5	T1	2281	1.4	2281	1.4	0.300	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		2281	1.4	2281	1.4	0.300	0.0	NA	0.0	0.0	0.00	0.00	69.9
North: Lyonpark Road (160m)													
7	L2	1351	0.9	1351	0.9	0.744	4.4	LOS A	0.0	0.0	0.00	0.46	47.2
Approach		1351	0.9	1351	0.9	0.744	4.4	NA	0.0	0.0	0.00	0.46	47.2
West: Epping Road (630m)													
10	L2	137	0.8	137	0.8	0.075	6.4	LOS A	0.0	0.0	0.00	0.61	58.7
11	T1	1406	1.6	1406	1.6	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	69.9
Approach		1543	1.6	1543	1.6	0.247	0.6	NA	0.0	0.0	0.00	0.05	69.3
All Vehicles		5175	1.3	5175	1.3	0.744	1.4	NA	0.0	0.0	0.00	0.14	62.2

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

MOVEMENT SUMMARY

 Site: 6 [AM_Waterloo-Byfield_s2]

 Network: N2 [AM_Waterloo_s2]

Waterloo Road x Byfield Sreet

2031 Background plus Development Traffic, with Upgrades

Site Category: Three Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Byfield Sreet (350m)														
1	L2	82	1.3	82	1.3	0.074	6.0	LOS A	0.5	3.3	0.19	0.56	0.19	40.8
3	R2	36	2.9	36	2.9	0.062	58.1	LOS E	0.6	4.5	0.88	0.69	0.88	19.6
Approach		118	1.8	118	1.8	0.074	21.8	LOS B	0.6	4.5	0.40	0.60	0.40	29.0
East: Waterloo Road (155m)														
4	L2	71	1.5	71	1.5	0.207	30.9	LOS C	2.4	24.0	0.64	0.61	0.64	29.1
5	T1	557	12.3	557	12.3	0.326	27.1	LOS B	7.3	52.1	0.69	0.60	0.69	16.4
Approach		627	11.1	627	11.1	0.326	27.3	LOS B	7.3	52.1	0.69	0.60	0.69	18.7
West: Waterloo Road (390m)														
11	T1	663	9.2	663	9.2	0.208	3.5	LOS A	2.2	15.9	0.20	0.17	0.20	54.5
12	R2	166	1.3	166	1.3	0.319	37.5	LOS C	4.4	30.9	0.67	0.74	0.67	31.3
Approach		829	7.6	829	7.6	0.319	10.3	LOS A	4.4	30.9	0.29	0.28	0.29	45.8
All Vehicles		1575	8.6	1575	8.6	0.326	18.0	LOS B	7.3	52.1	0.46	0.43	0.46	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	27.9	LOS C	0.1	0.1	0.63	0.63
P4	West Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		105	45.8	LOS E			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 21 August 2018 10:24:23 AM

Project: C:\Users\Faria Imam\Downloads\Ivanhoe Estate Sidra Network.sip8

MOVEMENT SUMMARY

 Site: 6 [PM_Waterloo-Byfield_s2]

 Network: N2 [PM_Waterloo_s2]

Waterloo Road x Byfield Sreet

2031 Background plus Development Traffic, with Upgrades

Site Category: Three Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Byfield Sreet (350m)														
1	L2	120	0.9	120	0.9	0.115	11.6	LOS A	1.6	11.1	0.39	0.62	0.39	34.9
3	R2	16	0.0	16	0.0	0.027	57.4	LOS E	0.3	1.9	0.87	0.66	0.87	19.8
Approach		136	0.8	136	0.8	0.115	16.9	LOS B	1.6	11.1	0.44	0.63	0.44	31.2
East: Waterloo Road (155m)														
4	L2	29	0.0	29	0.0	0.235	44.9	LOS D	2.4	26.3	0.79	0.66	0.79	24.3
5	T1	980	7.2	980	7.2	0.909	64.3	LOS E	23.7	167.1	0.97	1.02	1.19	8.3
Approach		1009	7.0	1009	7.0	0.909	63.7	LOS E	23.7	167.1	0.97	1.01	1.18	8.8
West: Waterloo Road (390m)														
11	T1	1235	5.8	1235	5.8	0.398	6.4	LOS A	8.3	58.7	0.39	0.35	0.39	50.5
12	R2	486	1.1	486	1.1	0.910	60.4	LOS E	19.3	136.4	0.79	0.92	1.03	24.8
Approach		1721	4.5	1721	4.5	0.910	21.6	LOS B	19.3	136.4	0.50	0.51	0.57	37.1
All Vehicles		2866	5.2	2866	5.2	0.910	36.2	LOS C	23.7	167.1	0.66	0.69	0.78	25.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	Distance m		
P1	South Full Crossing	53	42.0	LOS E	0.2	0.2	0.78	0.78
P4	West Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		105	52.9	LOS E			0.87	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 21 August 2018 10:22:46 AM

Project: C:\Users\Faria Imam\Downloads\Ivanhoe Estate Sidra Network.sip8

MOVEMENT SUMMARY

 Site: 5 [AM_Herring-Waterloo_s2]

 Network: N2 [AM_Waterloo_s2]

Herring Road x Waterloo Road

2031 Background plus Development Traffic, with Upgrades

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Herring Road (380m)														
1	L2	103	2.0	103	2.0	0.156	23.1	LOS B	2.3	17.5	0.61	0.68	0.61	39.0
2	T1	921	2.5	921	2.5	0.896	63.1	LOS E	22.2	157.3	0.99	1.03	1.19	24.7
3	R2	646	1.5	646	1.5	0.577	29.9	LOS C	7.5	53.0	0.89	0.82	0.89	26.8
Approach		1671	2.1	1671	2.1	0.896	47.8	LOS D	22.2	157.3	0.93	0.93	1.04	25.9
East: Waterloo Road (390m)														
4	L2	117	1.8	117	1.8	0.084	7.1	LOS A	0.4	2.7	0.08	0.60	0.08	50.5
5	T1	193	1.6	193	1.6	0.272	18.2	LOS B	3.4	23.9	0.45	0.38	0.45	42.5
6	R2	140	44.4	140	44.4	0.334	71.3	LOS F	3.3	23.6	1.00	0.78	1.00	22.9
Approach		449	15.0	449	15.0	0.334	31.9	LOS C	3.4	33.1	0.53	0.56	0.53	34.8
North: Herring Road (330m)														
7	L2	93	53.4	93	53.4	0.354	37.8	LOS C	2.9	30.6	0.88	0.76	0.88	22.0
8	T1	257	6.1	257	6.1	0.429	57.2	LOS E	4.7	33.1	0.95	0.76	0.95	26.2
9	R2	92	44.8	92	44.8	0.301	55.8	LOS D	3.2	31.3	0.88	0.77	0.88	24.7
Approach		441	24.1	441	24.1	0.429	52.7	LOS D	4.7	33.1	0.92	0.77	0.92	25.3
West: Waterloo Road (320m)														
10	L2	92	51.7	92	51.7	0.175	34.5	LOS C	2.4	24.5	0.68	0.74	0.68	31.5
11	T1	307	1.4	307	1.4	0.510	58.5	LOS E	5.9	42.0	0.97	0.78	0.97	15.8
Approach		399	12.9	399	12.9	0.510	53.0	LOS D	5.9	42.0	0.90	0.77	0.90	19.3
All Vehicles		2960	8.8	2960	8.8	0.896	46.8	LOS D	22.2	157.3	0.86	0.83	0.92	26.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P4	West Full Crossing	53	46.9	LOS E	0.2	0.2	0.82	0.82	
All Pedestrians		211	59.5	LOS E			0.92	0.92	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 5 [PM_Herring-Waterloo_s2]

 Network: N2 [PM_Waterloo_s2]

Herring Road x Waterloo Road

2031 Background plus Development Traffic, with Upgrades

Site Category: Four Leg Signalised

Signals - Fixed Time Coordinated Cycle Time = 139 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h	
South: Herring Road (380m)														
1	L2	119	0.9	119	0.9	0.141	18.3	LOS B	2.3	17.1	0.50	0.65	0.50	41.9
2	T1	998	2.0	998	2.0	0.702	36.4	LOS C	18.1	127.5	0.88	0.78	0.88	32.9
3	R2	532	1.0	532	1.0	0.617	33.0	LOS C	6.1	43.1	0.95	0.82	0.95	25.4
Approach		1648	1.6	1648	1.6	0.702	34.0	LOS C	18.1	127.5	0.87	0.78	0.87	31.5
East: Waterloo Road (390m)														
4	L2	379	1.1	379	1.1	0.263	7.1	LOS A	1.0	7.1	0.06	0.55	0.06	50.9
5	T1	144	1.5	144	1.5	0.263	5.0	LOS A	1.0	7.1	0.14	0.24	0.14	52.5
6	R2	155	40.8	155	40.8	0.340	37.4	LOS C	2.5	18.1	0.59	0.69	0.59	32.4
Approach		678	10.2	678	10.2	0.340	13.6	LOS A	2.5	18.1	0.20	0.52	0.20	45.4
North: Herring Road (330m)														
7	L2	79	77.3	79	77.3	0.262	29.7	LOS C	2.0	23.9	0.80	0.73	0.80	26.4
8	T1	678	2.8	678	2.8	0.915	72.4	LOS F	15.7	111.2	1.00	1.06	1.30	22.8
9	R2	144	31.4	144	31.4	0.881	85.2	LOS F	6.8	60.4	1.00	0.97	1.36	19.0
Approach		901	13.9	901	13.9	0.915	70.7	LOS F	15.7	111.2	0.98	1.02	1.26	22.2
West: Waterloo Road (320m)														
10	L2	131	35.5	131	35.5	0.312	46.9	LOS D	4.2	38.5	0.82	0.78	0.82	27.1
11	T1	505	1.0	505	1.0	0.837	68.1	LOS E	11.1	78.2	1.00	0.95	1.18	14.1
Approach		636	8.1	636	8.1	0.837	63.8	LOS E	11.1	78.2	0.96	0.92	1.10	16.7
All Vehicles		3863	7.1	3863	7.1	0.915	43.9	LOS D	18.1	127.5	0.79	0.81	0.88	27.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

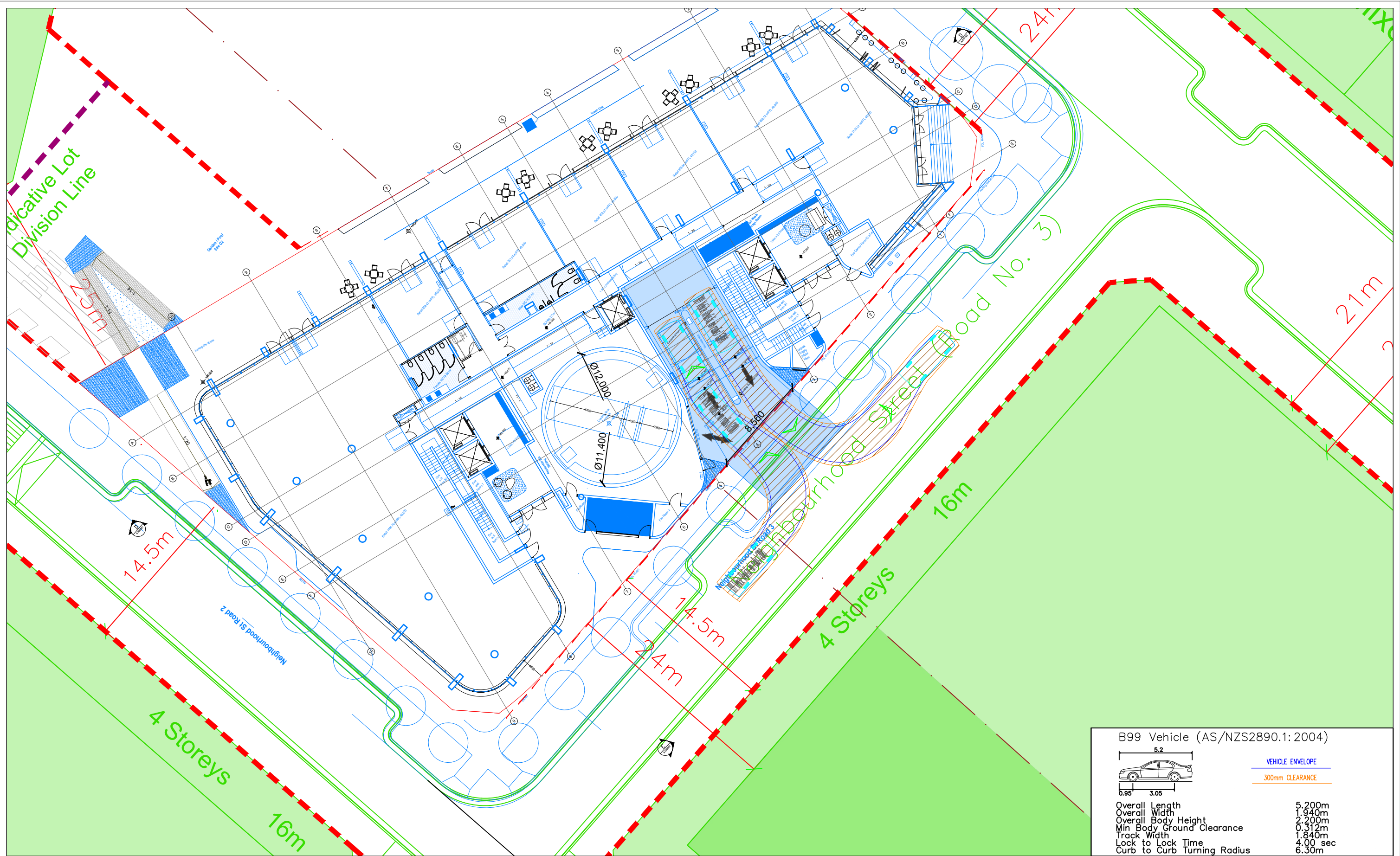
Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate		
		ped/h	sec		Pedestrian ped	Distance m			
P1	South Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	58.1	LOS E	0.2	0.2	0.92	0.92	
P3	North Full Crossing	53	63.8	LOS F	0.2	0.2	0.96	0.96	
P4	West Full Crossing	53	35.3	LOS D	0.1	0.1	0.71	0.71	
All Pedestrians		211	55.3	LOS E			0.89	0.89	

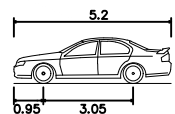
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

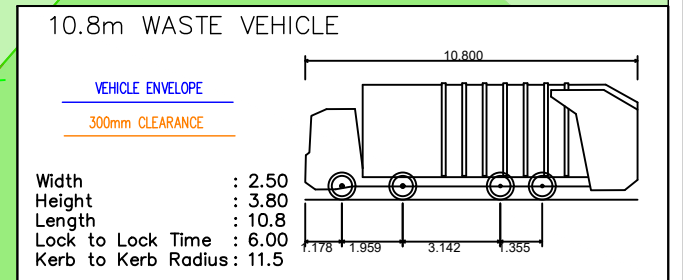
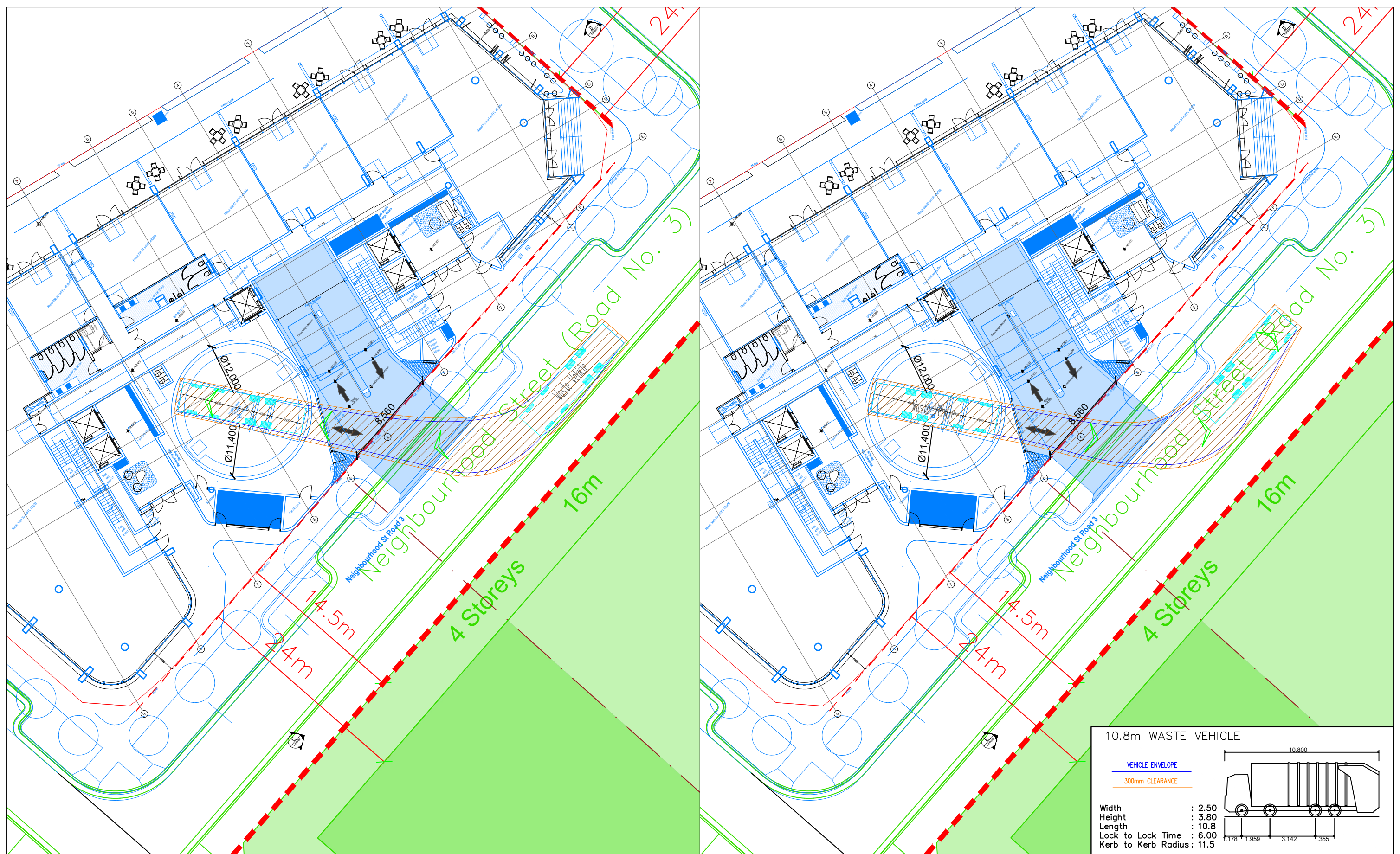
Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix C. Building C3 Swept Path Assessment



Notes: This drawing is provided for information purposes only and should not be used for construction. Plan assessed (blue) was provided by Fox Johnston on 21/07/2021 Swept path assessment completed at 10km/hr and 300mm clearances 10.8m City of Ryde Waste Vehicle adopted for the loading swept paths B99 standard vehicle adopted for access and circulation B85 standard vehicle adopted for standard car parking spaces	Document Info: Drawn by: Tanya Chen File name: AG1633-01-v8.dwg Client: FRASERS	Project: 1633 IVANHOE STAGE 02 Drawing Title: C3 GROUND FLOOR SWEPT PATH ASSESSMENT	Date: 23-Jul-21 Scale @ A3: 1:300 Drawing Number: AG01	B99 Vehicle (AS/NZS2890.1: 2004)  VEHICLE ENVELOPE 300mm CLEARANCE asongroup Suite 17.02, Level 17, 1 Castlereagh St Sydney NSW 2000 info@asongroup.com.au
--	--	---	---	---



Notes:
This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:
Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:
FRASERS

Project:
1633
IVANHOE STAGE 02

Drawing Title:
C3 GROUND FLOOR
SWEPT PATH ASSESSMENT

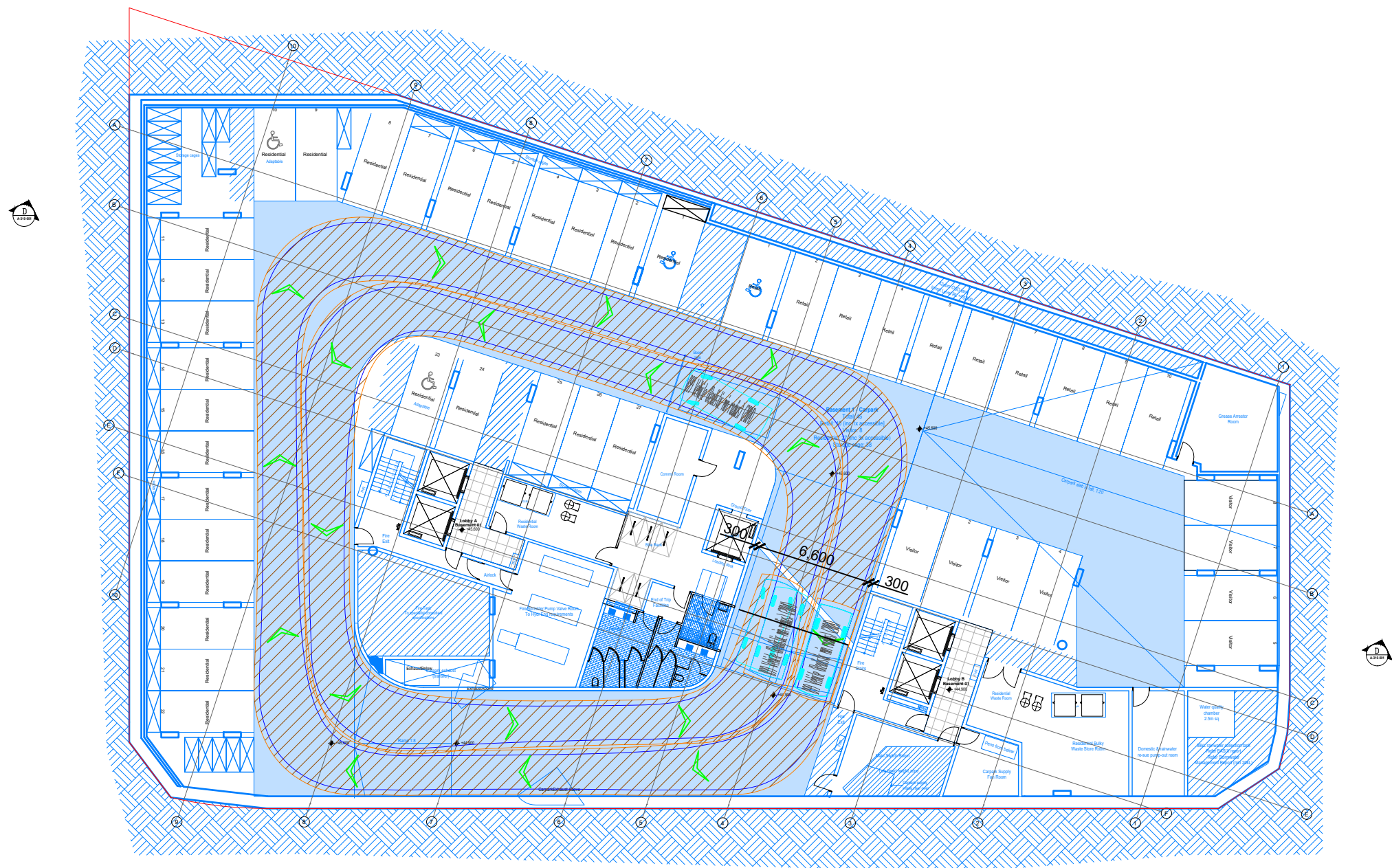
Date:
23-Jul-21

Scale @ A3:
1:300

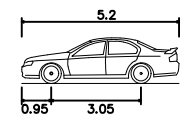
Drawing Number:
AG02

asongroup

Suite 17.02, Level 17, 1 Castlereagh St
Sydney NSW 2000
info@asongroup.com.au



B99 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 5.200m
Overall Width 1.940m
Overall Body Height 2.200m
Min Body Ground Clearance 0.312m
Track Width 1.840m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 6.30m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 1
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

1:300

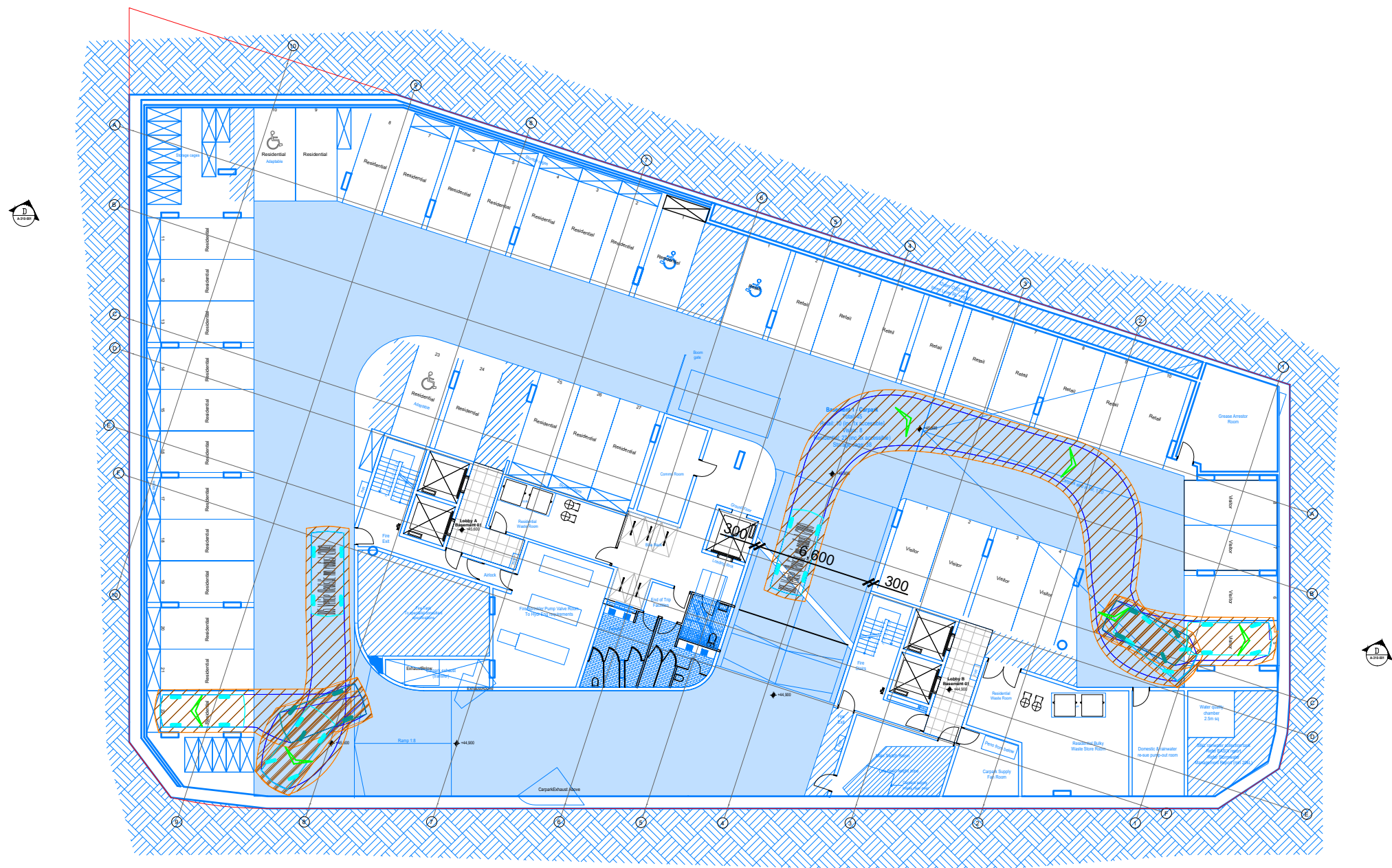
Drawing Number:

AG03

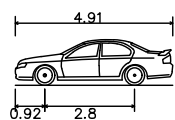
asongroup

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Sydney NSW 2000

info@asongroup.com.au



B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 4.910m
Overall Width 1.870m
Overall Body Height 1.421m
Min Body Ground Clearance 0.159m
Track Width 1.770m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 1
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

1:300

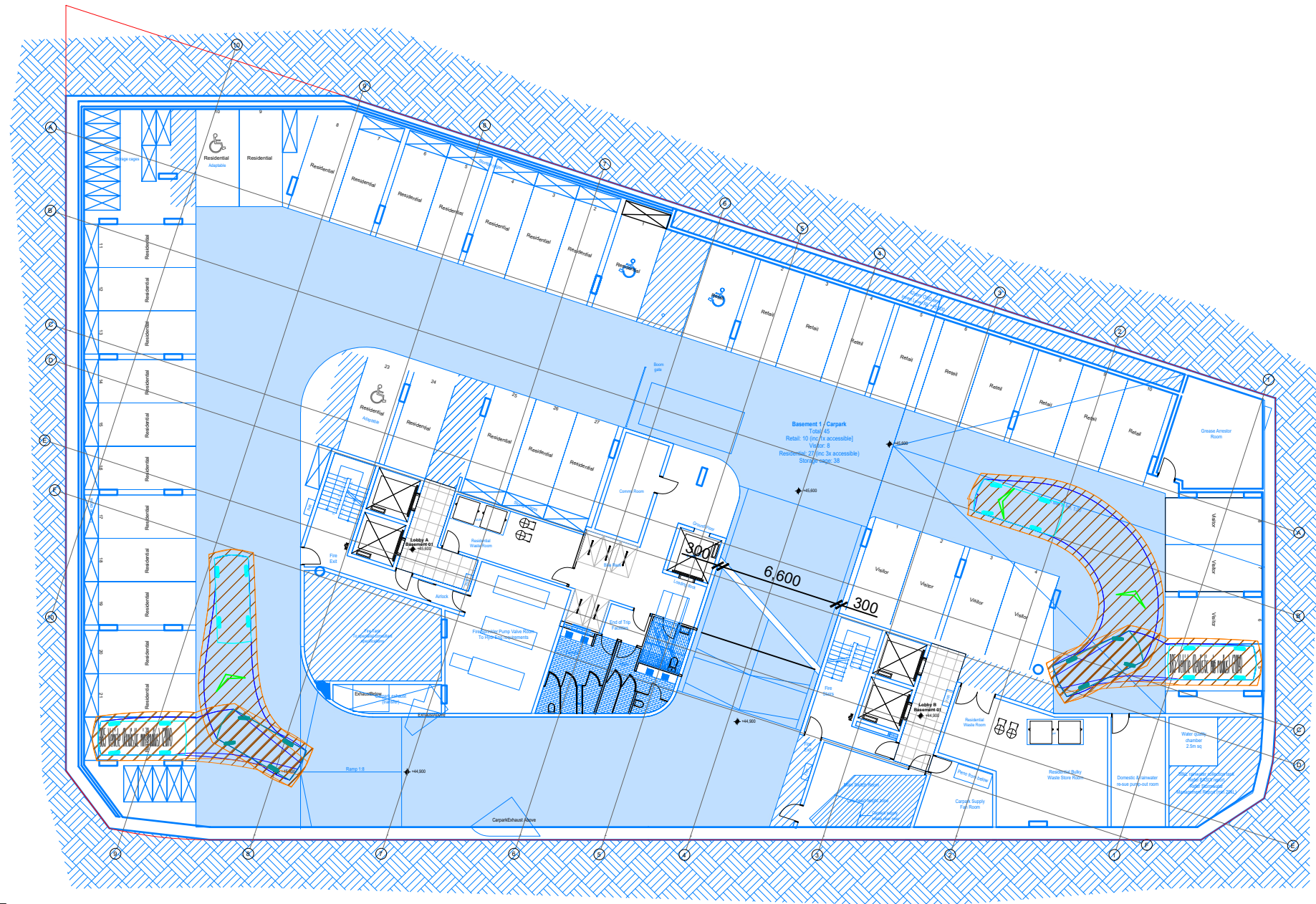
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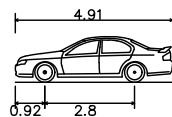
asongroup

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Sydney NSW 2000

info@asongroup.com.au



B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 4.910m
Overall Width 1.870m
Overall Body Height 1.421m
Min Body Ground Clearance 0.159m
Track Width 1.770m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 1
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

1:300

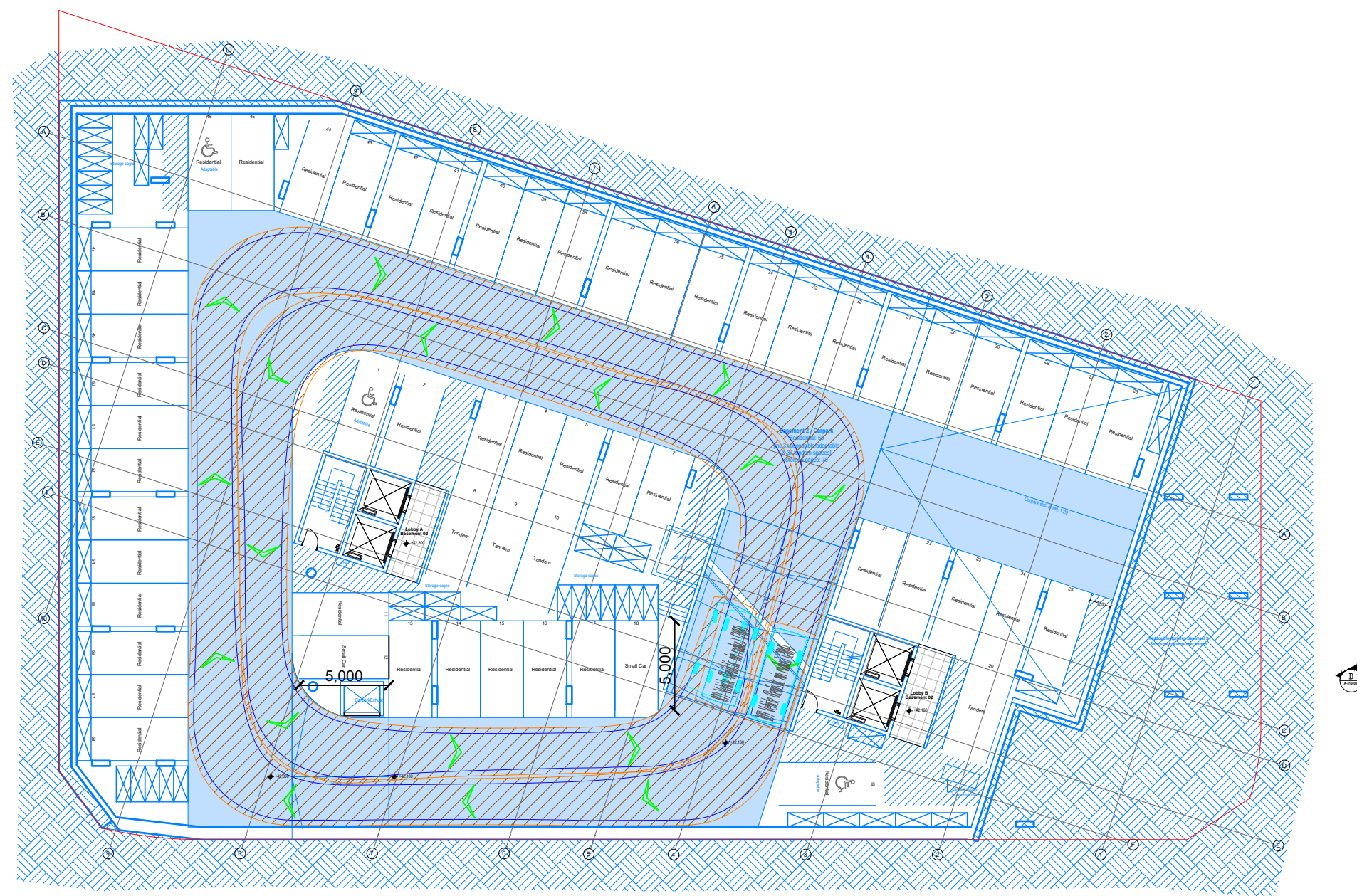
Drawing Number:

AG05

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Sydney NSW 2000

info@asongroup.com.au



B99 Vehicle (AS/NZS2890.1: 2004)

VEHICLE ENVELOPE	
300mm CLEARANCE	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.30m

Notes:
This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:
Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:
FRASERS

Project:
1633
IVANHOE STAGE 02

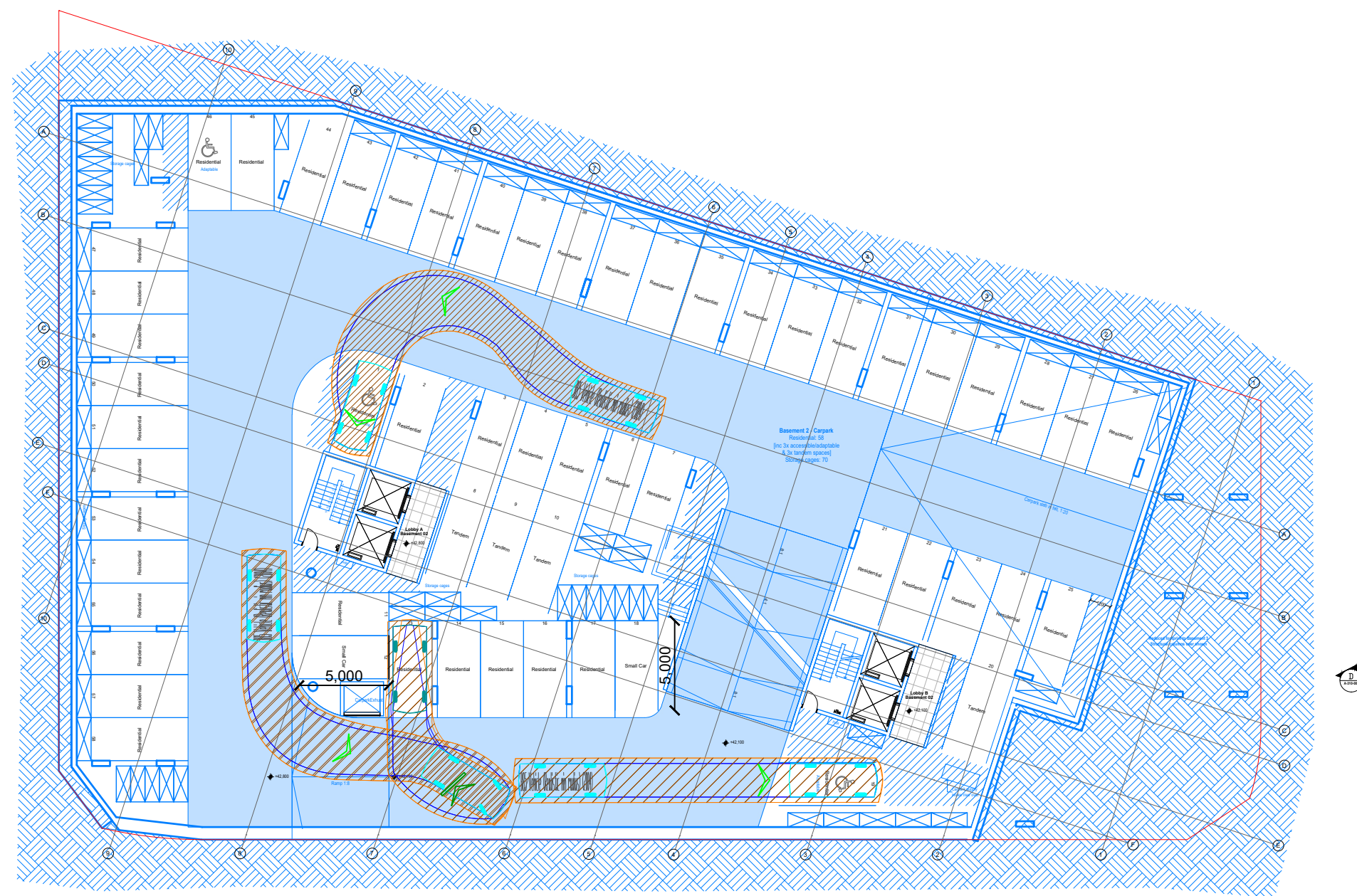
Drawing Title:
C3 BASEMENT LEVEL 2
SWEPT PATH ASSESSMENT

Date:
23-Jul-21

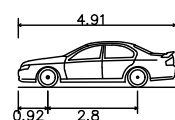
Scale @ A3:
1:300

Drawing Number:
AG06

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Sydney NSW 2000
info@asongroup.com.au



B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 4.910m
Overall Width 1.870m
Overall Body Height 1.421m
Min Body Ground Clearance 0.159m
Track Width 1.770m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 2
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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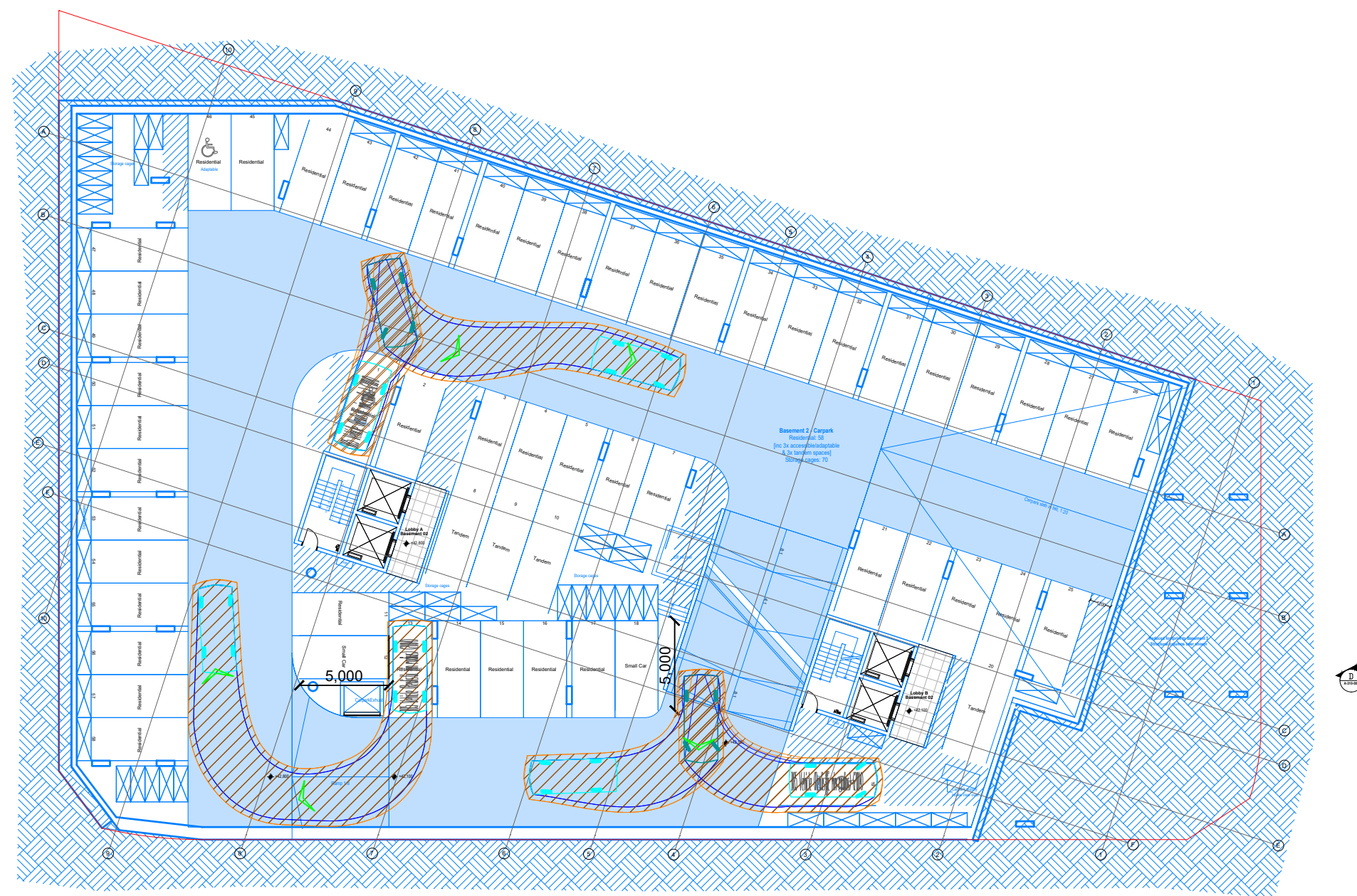
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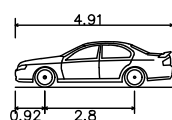
asongroup

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Sydney NSW 2000

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B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 4.910m
Overall Width 1.870m
Overall Body Height 1.421m
Min Body Ground Clearance 0.159m
Track Width 1.770m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 2
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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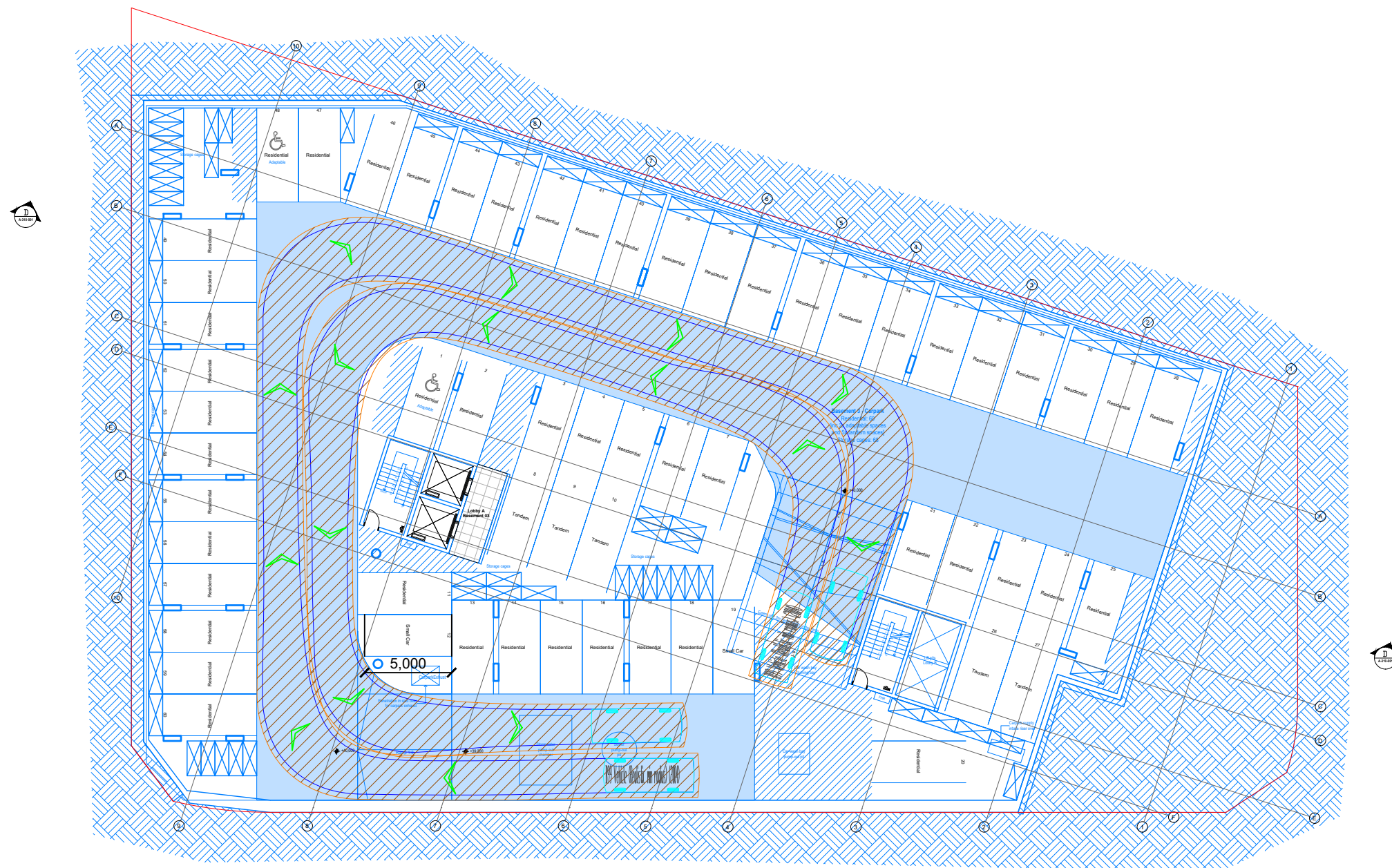
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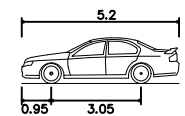
asongroup

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Sydney NSW 2000

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B99 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 5.200m
Overall Width 1.940m
Overall Body Height 2.200m
Min Body Ground Clearance 0.312m
Track Width 1.840m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 6.30m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 3
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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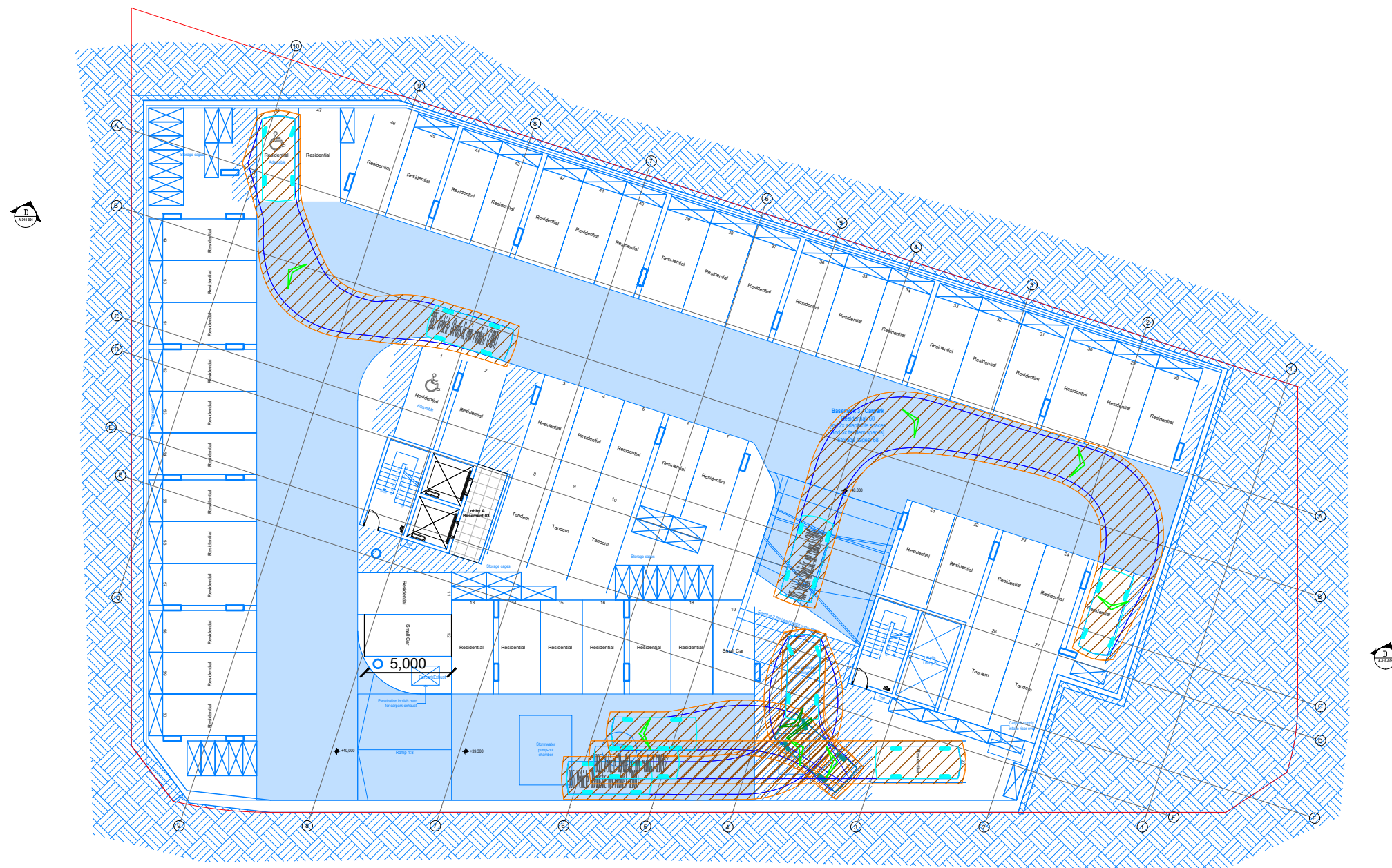
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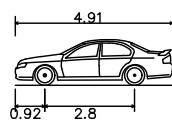
asongroup

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Sydney NSW 2000

info@asongroup.com.au



B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 4.91m
Overall Width 1.87m
Overall Body Height 1.42m
Min Body Ground Clearance 0.159m
Track Width 1.77m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 3
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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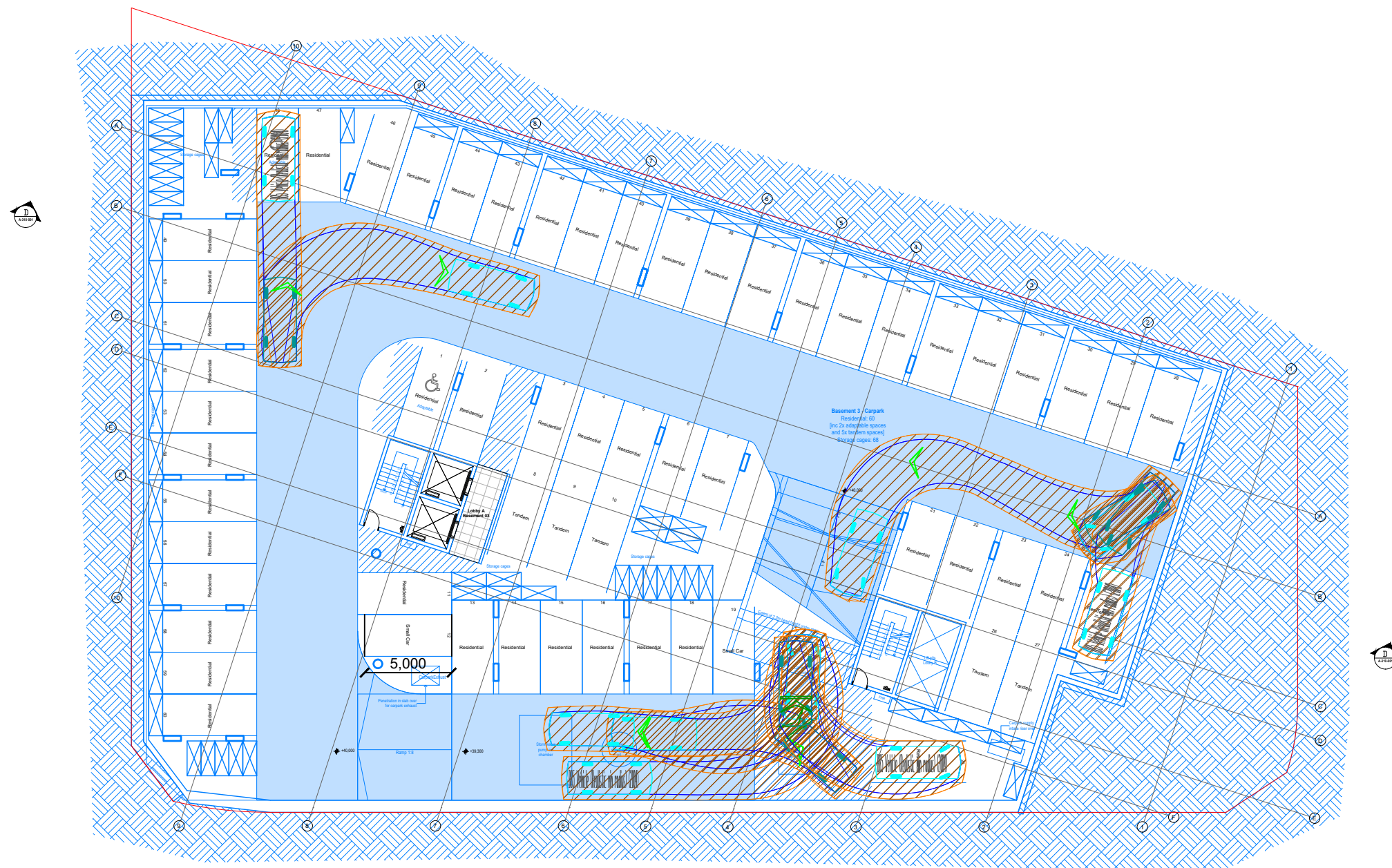
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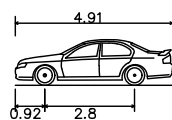
asongroup

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Sydney NSW 2000

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B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

Overall Length 4.91m
Overall Width 1.87m
Overall Body Height 1.42m
Min Body Ground Clearance 0.159m
Track Width 1.77m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

Notes:

This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Fox Johnston on 21/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation
B85 standard vehicle adopted for standard car parking spaces

Document Info:

Drawn by: Tanya Chen
File name: AG1633-01-v8.dwg

Client:

FRASERS

Project:

1633
IVANHOE STAGE 02

Drawing Title:

C3 BASEMENT LEVEL 3
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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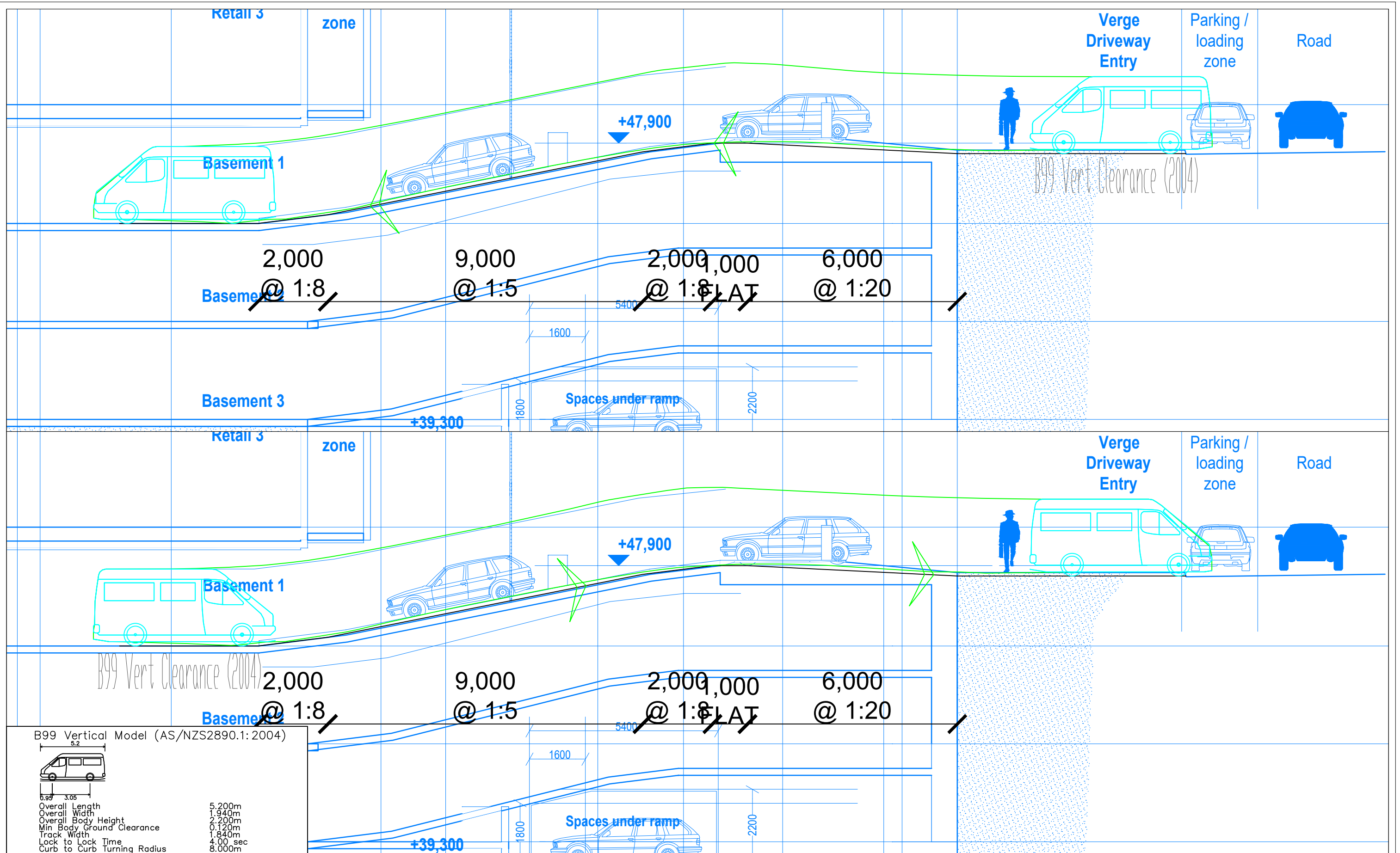
Drawing Number:

AG11

asongroup

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Sydney NSW 2000

info@asongroup.com.au



Notes:
This drawing is provided for information purposes only and should not be used for construction.
Plan assessed (blue) was provided by Frasers on 05/07/2021
Swept path assessment completed at 10km/hr and 300mm clearances
10.8m City of Ryde Waste Vehicle adopted for the loading swept paths
B99 standard vehicle adopted for access and circulation

Document Info:
Drawn by: Tanya Chen
File name: AG1633-01-v7.dwg

Client:
FRASERS

Project:
1633
IVANHOE STAGE 02

Drawing Title:
C3 BASEMENT LEVEL 3
SWEPT PATH ASSESSMENT

Date:
7-Jul-21

Scale @ A3:
1:300

Drawing Number:
AG12

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Sydney NSW 2000
info@asongroup.com.au

Appendix D. C4 Design Recommendations

Kerbs will be indicated on the DA set

PLEASE PROVIDE 300mm KERBS ON THE INSIDE CURVE OF THE RAMP TO COMPLY WITH 2890.1:2004

IS THIS COLUMN ON THE RAMP? PLEASE REMOVE.

Will be removed

LAYBACK TO BE DESIGNED PER RYDE COUNCIL ENGINEERING STANDARD CIV.3.3

Noted

SOCIAL RAMP ACCESS HAS A NUMBER OF CONFLICT POINTS ALONG THE LENGTH WITH NO SIMULTANEOUS ACCESS - TRAFFIC MANAGEMENT SYSTEM IS RECOMMENDED FOR THE RAMP AND THREE ROLLER DOORS IN SOCIAL PARKING TO REDUCE RISK OF COLLISION. DUE TO THE ROLLER DOORS ACCESS CONTROL IS RECOMMENDED TO BE LICENCE PLATE RECOGNITION WITH SUPPLEMENTARY INTERCOMS ON EACH DOOR.

Noted. no further action from Cox at this stage

PLEASE PROVIDE 500mm KERBS ON THE OUTSIDE CURVE OF THE RAMP TO COMPLY WITH 2890.1:2004

IN ORDER TO ACCOMMODATE HRV ACCESS; ACCESS CONTROL IS RECOMMENDED TO BE LICENCE PLATE RECOGNITION WITH SUPPLEMENTARY INTERCOMS ON THE DOOR.

Noted

PLEASE PROVIDE 300mm KERBS ON THE INSIDE CURVE OF THE RAMP TO COMPLY WITH 2890.1:2004

Kerbs will be indicated on the DA set

TRAFFIC MANAGEMENT IS RECOMMENDED TO HOLD CARS DURING HRV ACCESS

Noted

Notes:

This drawing is provided for information purposes only and should not be used for construction.

Swept path assessment undertaken at 10km/hr with 300mm clearances

Plan assessed were issued by Cox on 10.06.2021 (Ground only, pink) and 17.06.2021 (Basements 1-3, blue)

Document Info:

Drawn by: Wendy Zheng

File name: AG1663-02-v3.dwg

Client:

FRASERS

Project:

1663

IVANHOE - C4

Drawing Title:

GROUND FLOOR ACCESS RAMPS
DESIGN REVIEW

Date:

24-Jun-21

Scale @ A3:

1:400

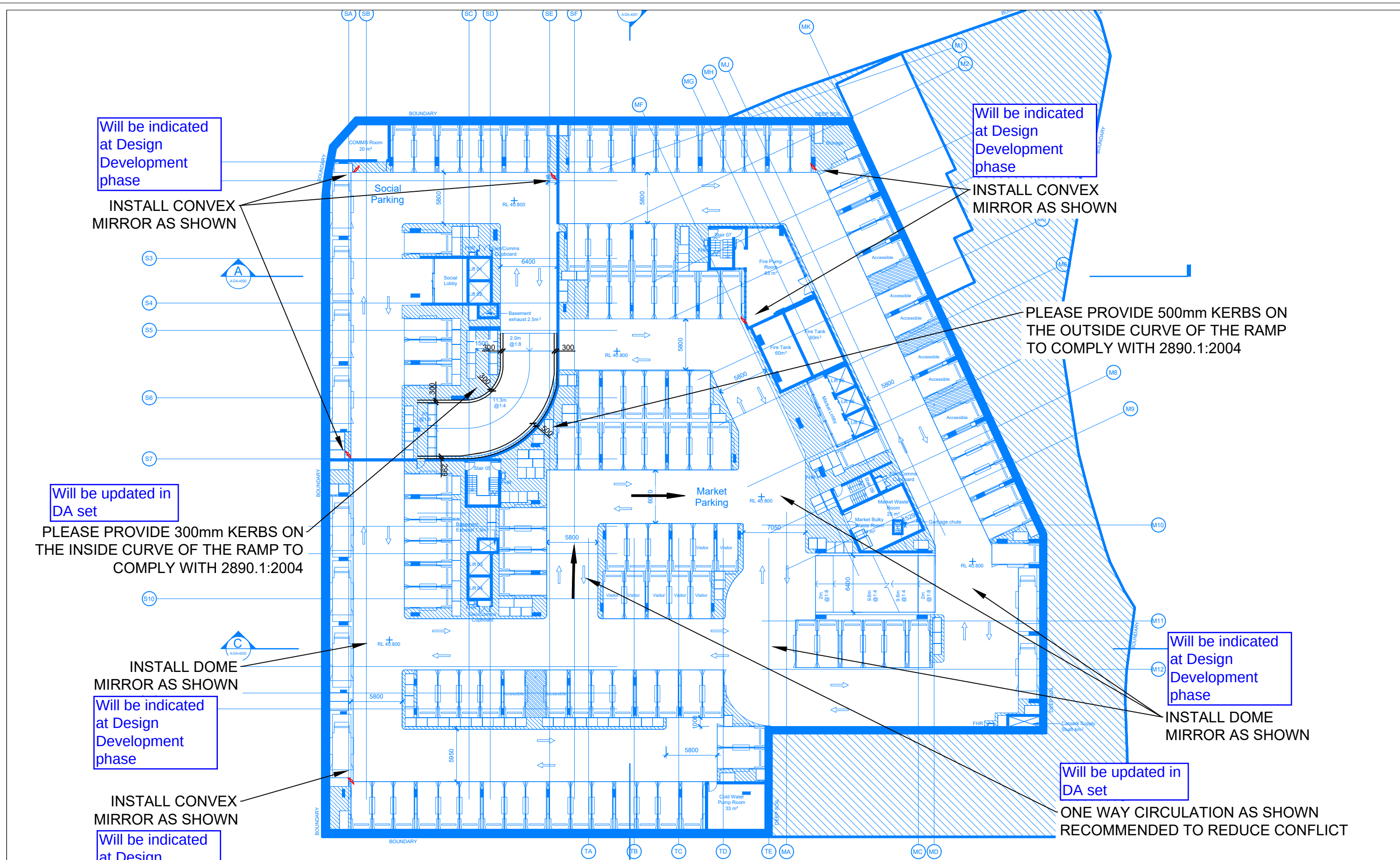
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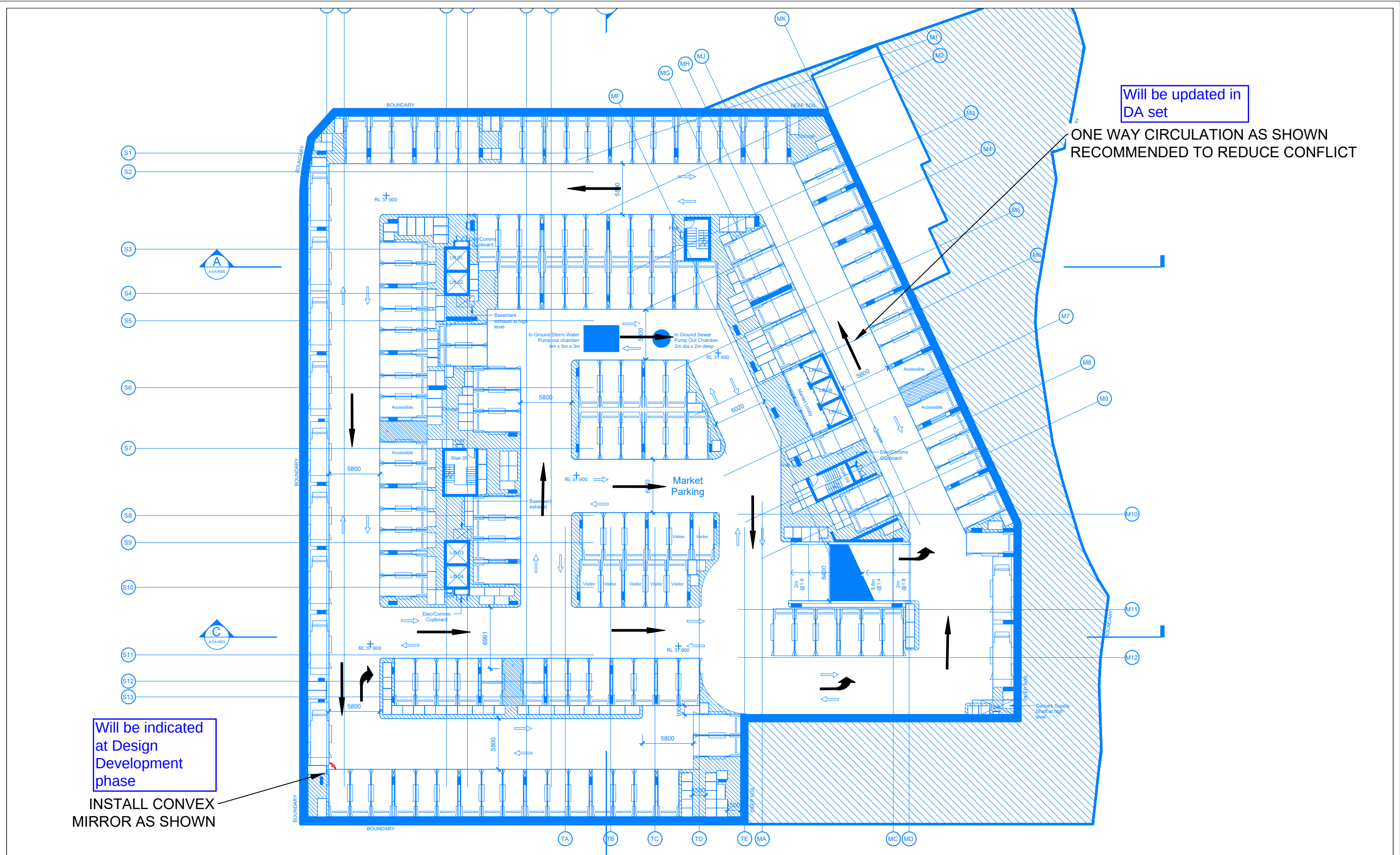
asongroup

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Sydney NSW 2000

info@asongroup.com.au



Notes: This drawing is for information purposes only and should not be used for construction. Swept path assessment undertaken at 10km/hr with 300mm clearances Plan assessed were issued by Cox on 10.06.2021 (Ground only, pink) and 17.06.2021 (Basements 1-3, blue)	Document Info: Drawn by: Wendy Zheng File name: AG1663-02-v3.dwg Client: FRASERS	Project: 1663 IVANHOE - C4 Drawing Title: BASEMENT 02 DESIGN REVIEW	Date: 24-Jun-21 Scale @ A3: 1:400 Drawing Number: AG06	asongroup Suite 17.02, Level 17, 1 Castlereagh St Sydney NSW 2000 info@asongroup.com.au
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Notes: This drawing is provided for information purposes only and should not be used for construction. Swept path assessment undertaken at 10km/hr with 300mm clearances Plan assessed were issued by Cox on 10.06.2021 (Ground only, pink) and 17.06.2021 (Basements 1-3, blue)	Document Info: Drawn by: Wendy Zheng File name: AG1663-02-v3.dwg Client: FRASERS	Project: 1663 IVANHOE - C4 Drawing Title: BASEMENT 03 SWEPT PATH ASSESSMENT	Date: 24-Jun-21 Scale @ A3: 1:400 Drawing Number: AG08	asongroup Suite 17.02, Level 17, 1 Castlereagh St Sydney NSW 2000 info@asongroup.com.au
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Appendix E. Building C4 Swept Path Assessment

PLEASE PROVIDE 300mm KERBS ON THE INSIDE CURVE OF THE RAMP TO COMPLY WITH 2890.1:2004

LAYBACK TO BE DESIGNED PER RYDE COUNCIL ENGINEERING STANDARD CIV.3.3

SOCIAL RAMP ACCESS HAS A NUMBER OF CONFLICT POINTS ALONG THE LENGTH WITH NO SIMULTANEOUS ACCESS - TRAFFIC MANAGEMENT SYSTEM IS RECOMMENDED FOR THE RAMP AND THREE ROLLER DOORS IN SOCIAL PARKING TO REDUCE RISK OF COLLISION. DUE TO THE ROLLER DOORS ACCESS CONTROL IS RECOMMENDED TO BE LICENCE PLATE RECOGNITION WITH SUPPLEMENTARY INTERCOMS ON EACH DOOR.

IN ORDER TO ACCOMMODATE HRV ACCESS; ACCESS CONTROL IS RECOMMENDED TO BE LICENCE PLATE RECOGNITION WITH SUPPLEMENTARY INTERCOMS ON THE DOOR.

TRAFFIC MANAGEMENT IS RECOMMENDED TO HOLD CARS DURING HRV ACCESS

Notes:

This drawing is provided for information purposes only and should not be used for construction.

Swept path assessment undertaken at 10km/hr with 300mm clearances

Plan assessed were issued by Cox on 17.07.2021, ground floor in pink, basements in blue

Document Info:

Drawn by: Wendy Zheng

File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663

IVANHOE - C4

Drawing Title:

GROUND FLOOR ACCESS RAMPS
DESIGN REVIEW

Date:

23-Jul-21

Scale @ A3:

1:400

Drawing Number:

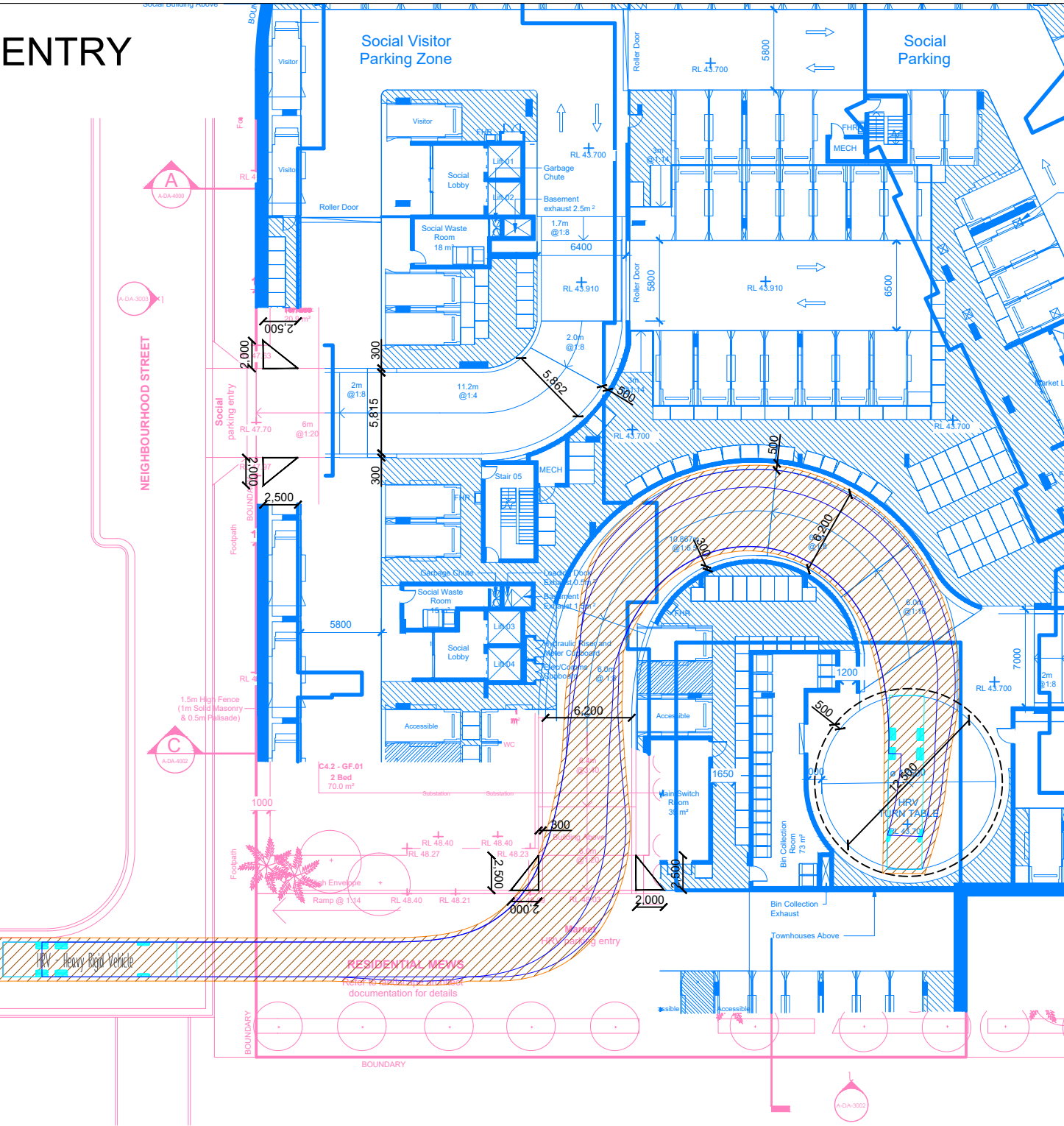
AG01

asongroup

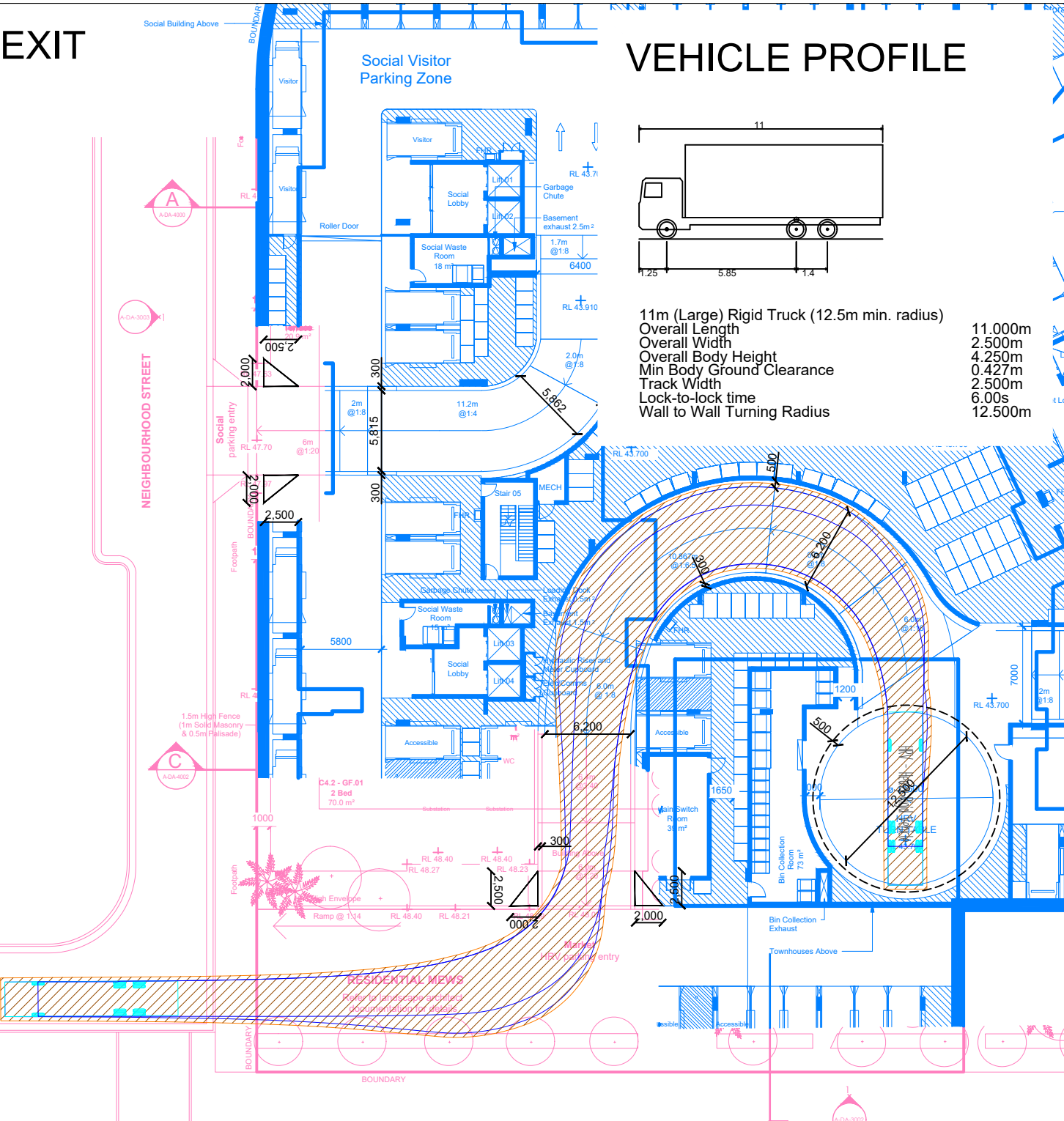
Suite 17.02, Level 17, 1 Castlereagh St
Sydney NSW 2000

info@asongroup.com.au

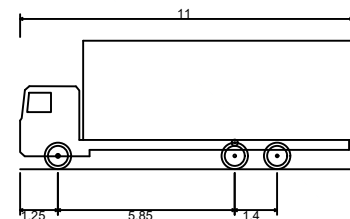
ENTRY



EXIT



VEHICLE PROFILE



11m (Large) Rigid Truck (12.5m min. radius)
Overall Length 11.000m
Overall Width 2.500m
Overall Body Height 4.250m
Min Body Ground Clearance 0.427m
Track Width 2.500m
Lock-to-lock time 6.00s
Wall to Wall Turning Radius 12.500m

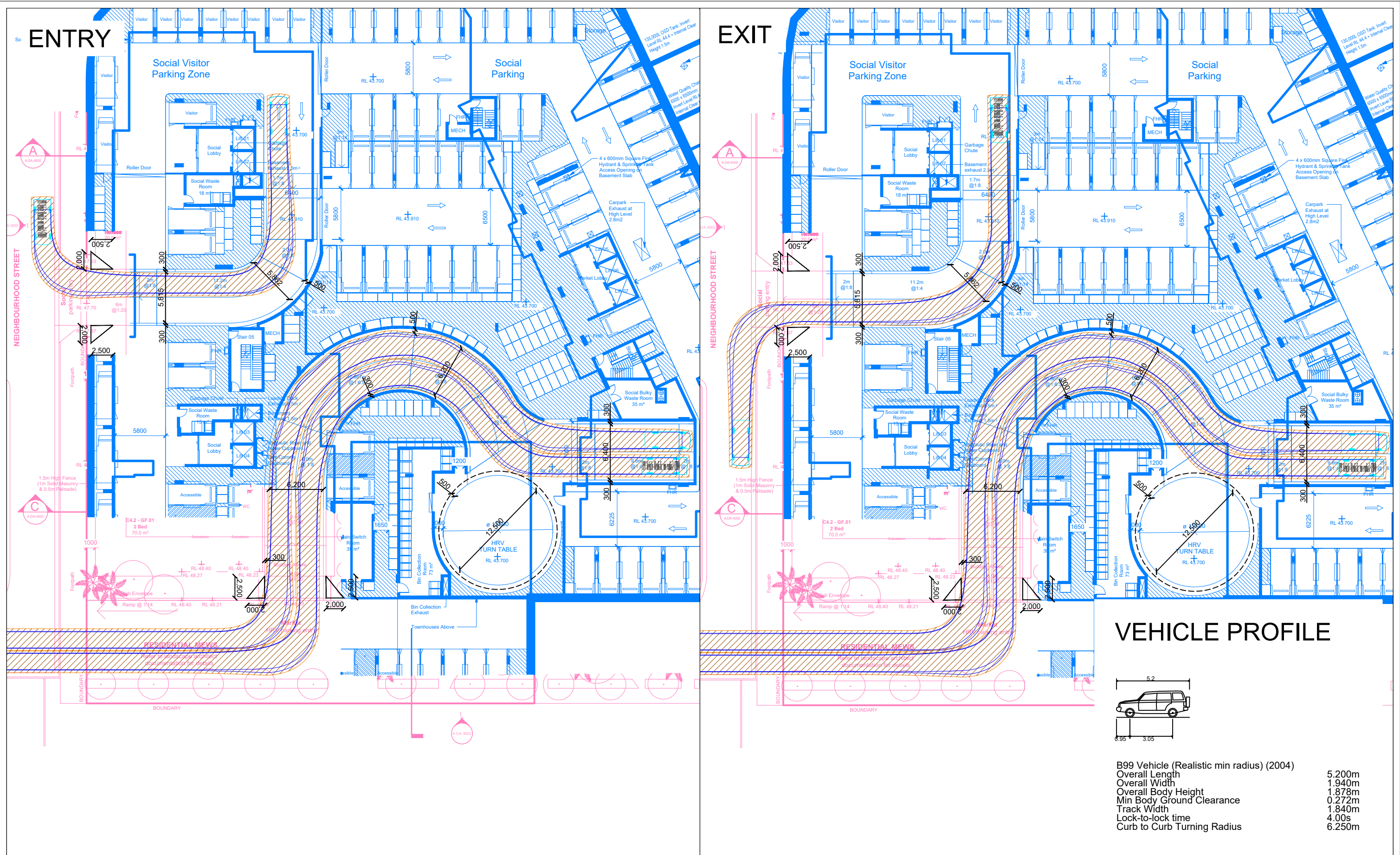
Notes:
This drawing is provided for information purposes only and should not be used for construction.
Swept path assessment undertaken at 10km/hr with 300mm clearances
Plan assessed were issued by Cox on 17.07.2021, ground floor in pink, basements in blue

Document Info:
Drawn by: Wendy Zheng
File name: AG1663-02-v5.dwg
Client:
FRASERS

Project:
1663
IVANHOE - C4
Drawing Title:
GROUND FLOOR ACCESS RAMPS
SWEPT PATH ASSESSMENT

Date:
23-Jul-21
Scale @ A3:
1:400
Drawing Number:
AG02

asongroup
Suite 17.02, Level 17, 1 Castlereagh St
Sydney NSW 2000
info@asongroup.com.au



Notes:

This drawing is provided for information purposes only and should not be used for construction.

Swept path assessment undertaken at 10km/hr with 300mm clearances

Plan assessed were issued by Cox on 17.07.2021, ground floor in pink, basements in blue

Document Info:

Drawn by: Wendy Zheng

File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663

IVANHOE - C4

Drawing Title:

GROUND FLOOR ACCESS RAMPS
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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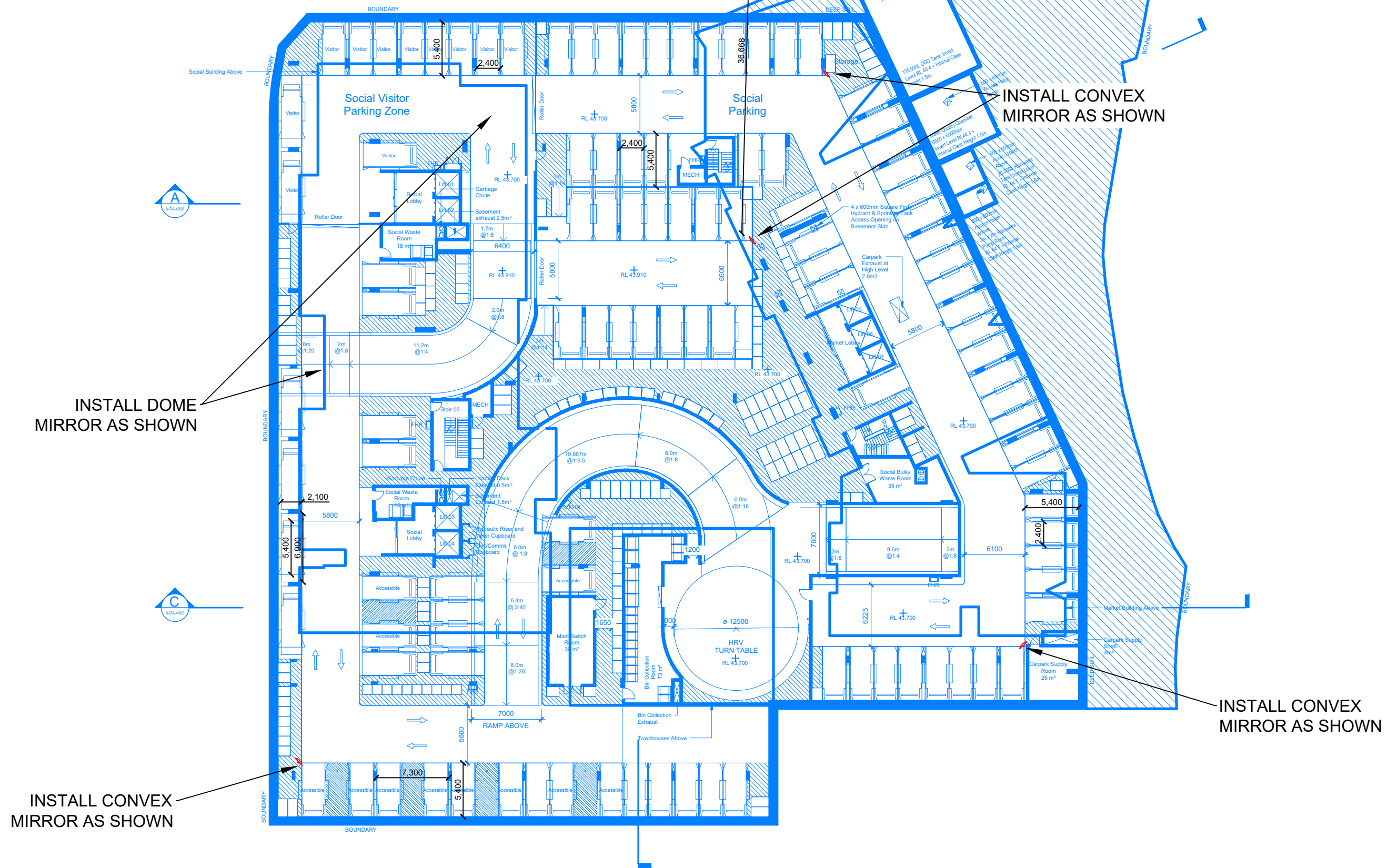
Drawing Number:

AG03

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Notes:

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Document Info:

Drawn by: Wendy Zheng

File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663

IVANHOE - C4

Drawing Title:

BASEMENT 01
DESIGN REVIEW

Date:

23-Jul-21

Scale @ A3:

1:400

Drawing Number:

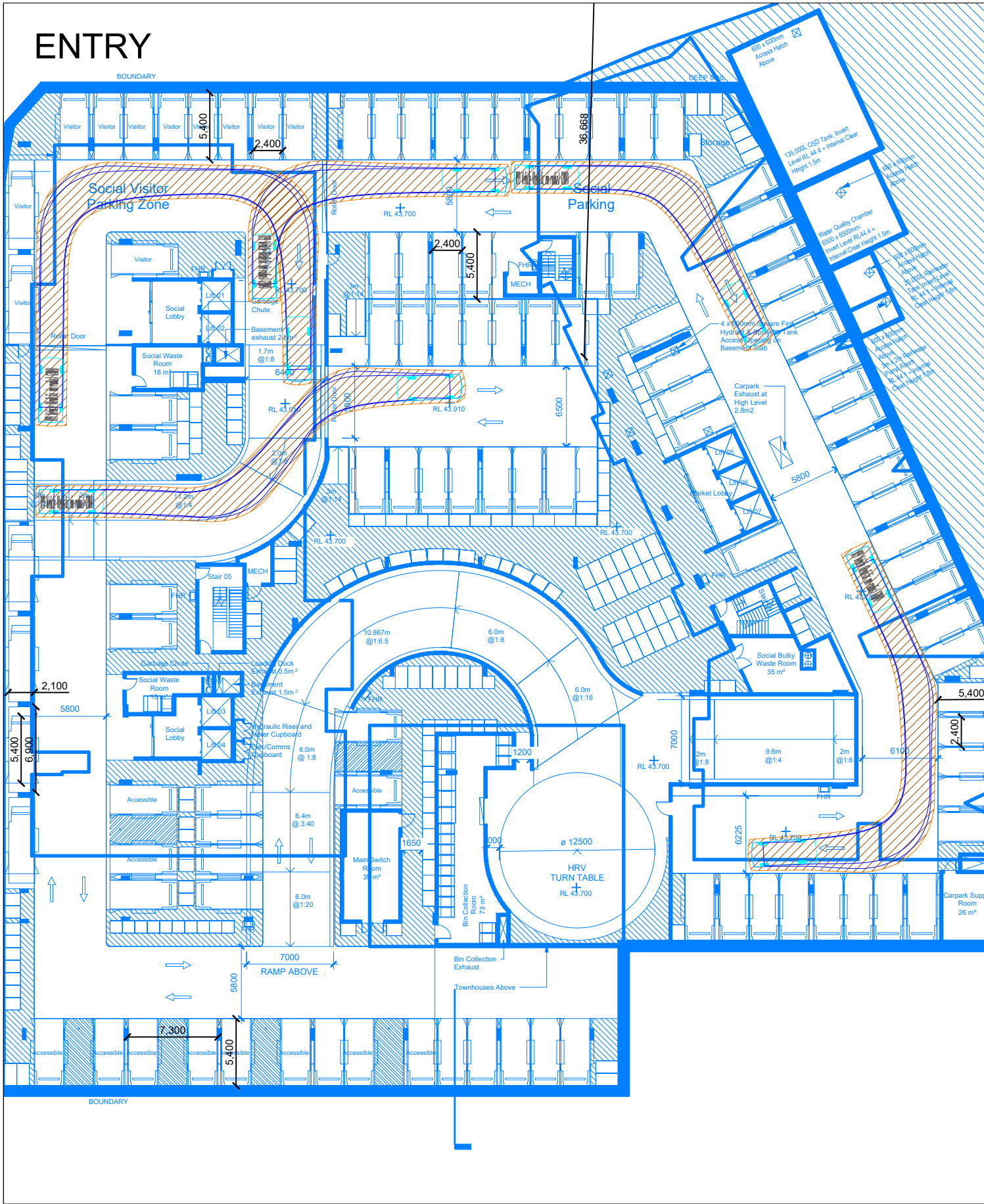
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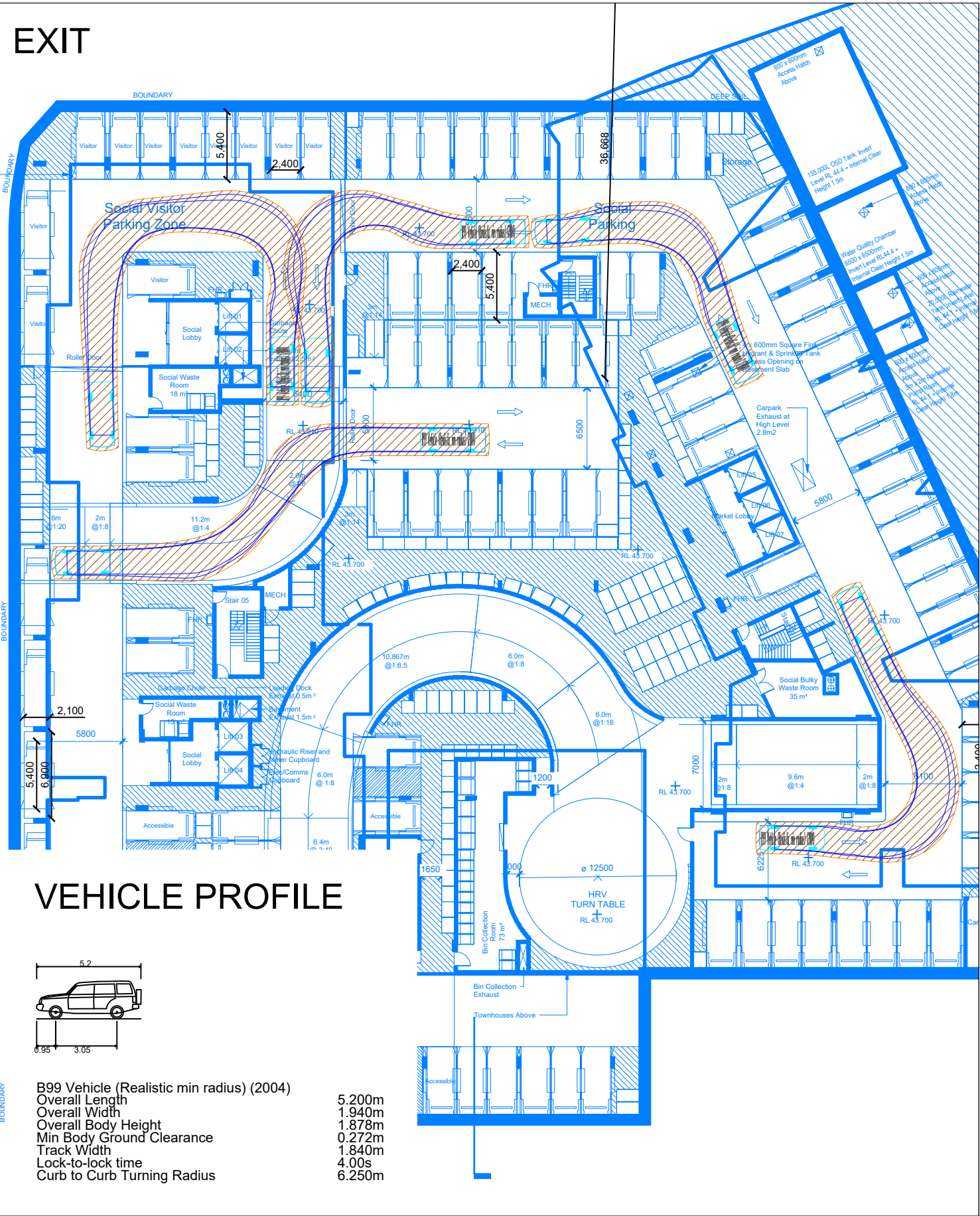
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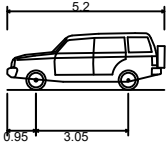
ENTRY



EXIT



VEHICLE PROFILE



B99 Vehicle (Realistic min radius) (2004)	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.878m
Min Body Ground Clearance	0.272m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.250m

Notes:
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Swept path assessment undertaken at 10km/hr with 300mm clearances
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Document Info:
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File name: AG1663-02-v5.dwg

Client:
FRASERS

Project:
1663
IVANHOE - C4

Drawing Title:
BASEMENT 01
SWEPT PATH ASSESSMENT

Date:
23-Jul-21

Scale @ A3:
1:400

Drawing Number:
AG05



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INSTALL CONVEX
MIRROR AS SHOWN

INSTALL CONVEX
MIRROR AS SHOWN

INSTALL DOME
MIRROR AS SHOWN

INSTALL CONVEX
MIRROR AS SHOWN

INSTALL DOME
MIRROR AS SHOWN



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Document Info:

Drawn by: Wendy Zheng

File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663

IVANHOE - C4

Drawing Title:

BASEMENT 02
DESIGN REVIEW

Date:

23-Jul-21

Scale @ A3:

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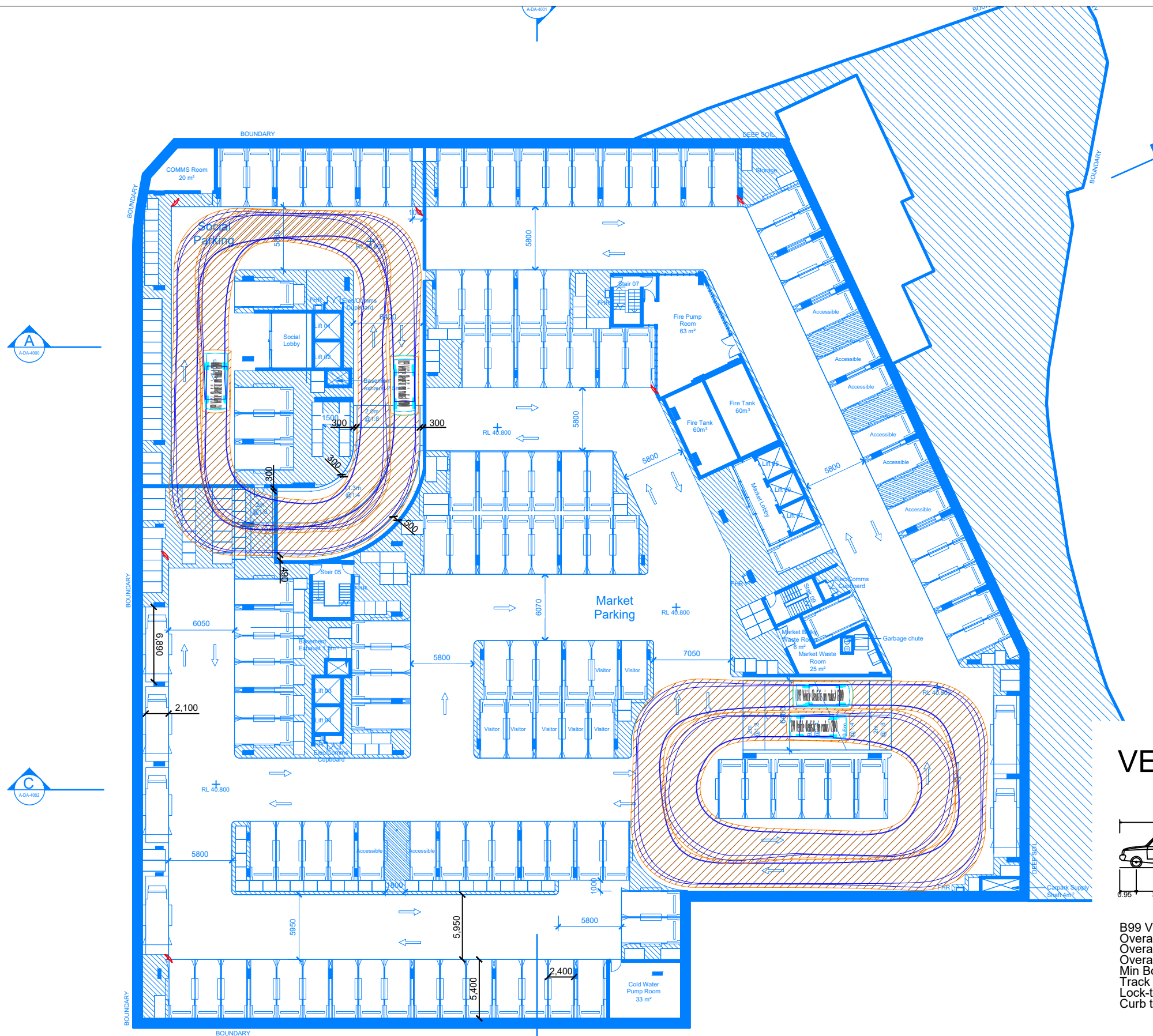
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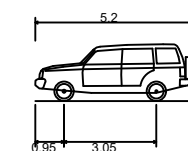
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VEHICLE PROFILE



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Document Info:

Drawn by: Wendy Zheng
File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663
IVANHOE - C4

Drawing Title:

BASEMENT 02
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

1:400

Drawing Number:

AG07

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INSTALL CONVEX
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Document Info:

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File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663

IVANHOE - C4

Drawing Title:

BASEMENT 03

SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

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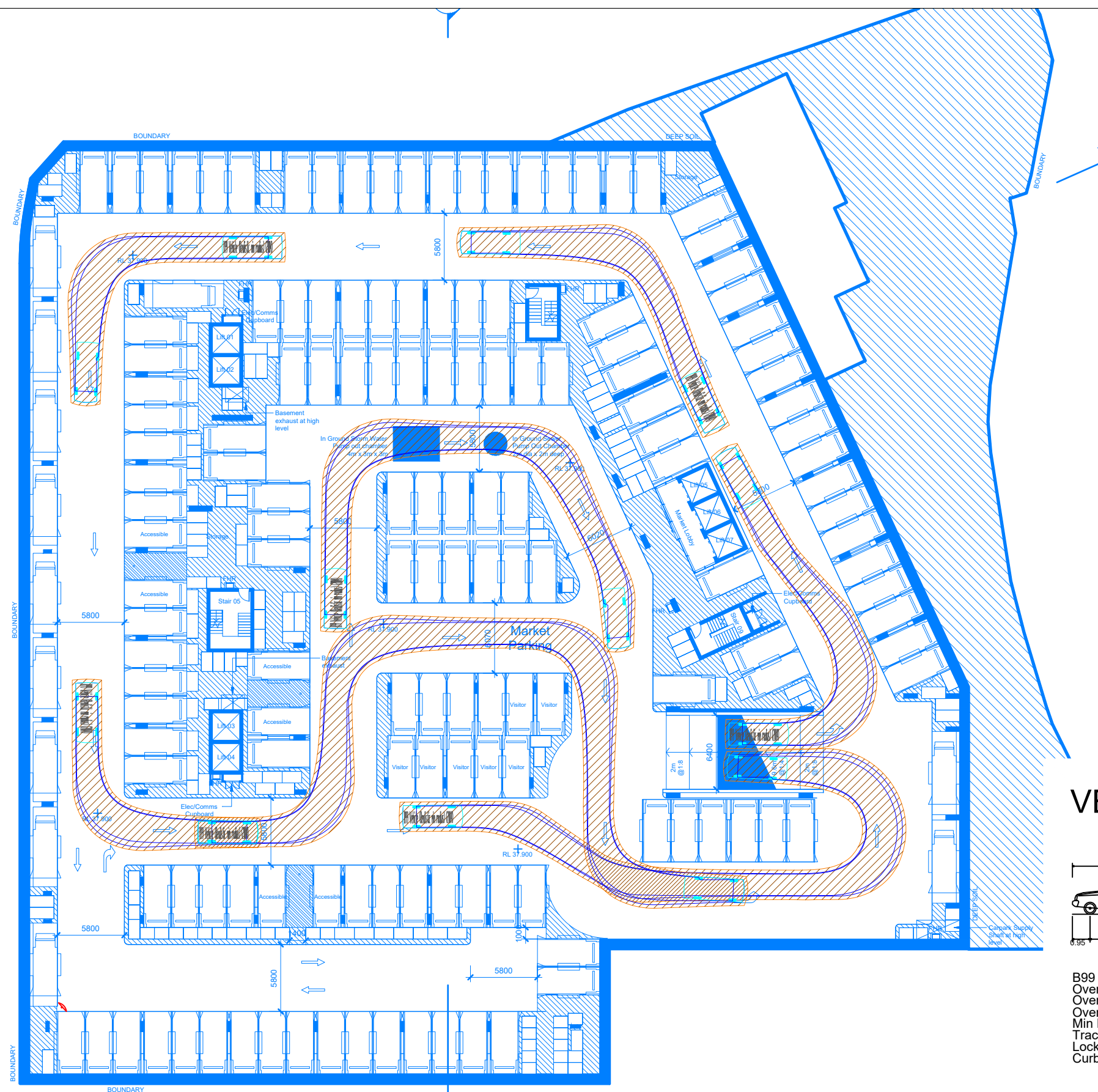
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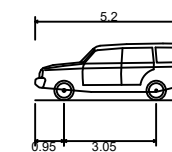
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VEHICLE PROFILE



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Curb to Curb Turning Radius	6.250m

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Drawn by: Wendy Zheng
File name: AG1663-02-v5.dwg

Client:

FRASERS

Project:

1663
IVANHOE - C4

Drawing Title:

BASEMENT 03
SWEPT PATH ASSESSMENT

Date:

23-Jul-21

Scale @ A3:

1:400

Drawing Number:

AG09

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Attn: Liz Yao, Assistant Development Manager

RE: SSD-15822622 – Ivanhoe Estate Redevelopment – Stage 2 – Traffic Engineering Response to RFI City of Ryde Submission to Department of Planning, Industry and Environment (12 November 2021)

Dear Liz,

Reference is made to the City of Ryde's submission to the Department of Planning, Industry and Environment letter dated 12 November 2021 (Council Reference ENV/21/64), and the letter from the Department of Planning, Industry and Environment (DPIE) dated 16 December 2021.

Please find below table a summary of transport engineering matters raised, and the Project Team's response.

TABLE 1 RFI RESPONSE TO CITY OF RYDE'S SUBMISSION

	Council Comments	Project Team Response
2 (a)	a. Section 7.2 of Ason Group's Transport Assessment report (Reference: P1633r01, 5 August 2021) adopted the following weekday trip generation rates for the residential and retail components of the proposed development: Residential AM Peak = 0.14 trips per dwelling PM Peak = 0.12 trips per dwelling Retail AM/PM Peak = 1 trip per 100m² With regards to the above, there are concerns that the peak hour traffic potentially generated by the proposed development has been underestimated in the transport study. An updated traffic modelling assessment is therefore required, which is to be based on the trip generation rates established within the abovementioned TfNSW's technical documents (i.e. Guide to Traffic Generating Developments Updated Traffic Surveys (TDT 2013/04a) and Trip Generation Surveys for Small	The trip generation rates adopted are consistent with those approved as part of the Concept Plan Assessment (SSD8707). These rates were assessed by the Department of Planning, TfNSW, Ryde Council and peer reviewed by Arup as part of the assessment process. Infrastructure upgrades commenced and completed as part of the relevant Conditions of Consent are also predicated on these rates. Notwithstanding, we note that the retail floor area proposed are intended to support the day-to-day needs of future residents of the Ivanhoe Estate, and nearby residents, where walking and cycling to the development can be reasonably relied upon. The retail floor area proposed is 997 square metres in Gross Floor Area. A review of the TfNSW's Guide to Traffic Generating Development Updated Traffic Surveys (TDT 2013/04a), in particular, Appendix F1 found that the trip rates outlined for Sydney Metropolitan Areas for Shopping Centres comprise of 7 Shopping Centres in total. The shopping centres ranges from a Gross Leasable Floor area of 22,143 square metres for Warriewood to 100,134 square metres for Penrith, and majority of the shopping centres surveyed

	Suburban Shopping Centres (7 November 2018)) to ensure a more accurate analysis of the traffic impacts of the proposed development.	being over 50,000 square metres in Gross Leasable Floor Area. Shopping Centres that are typically over 15,000 square metres in Gross Leasable Floor Areas are sub-regional shopping centres that has trading areas significantly beyond the local suburb. Given the proposed retail floor area is below 1,000 square metres, the adoption of trip rates for a sub-regional / regional shopping centre where full range of retail and services is typically provided is considered to be unreasonable. Review of the <i>Trip Generation Surveys for Small Suburban Shopping Centres (7 November 2018)</i> found that for each of the 7 shopping centres surveyed, 5 of the shopping centres were Aldi supermarkets, one was a Coles Supermarket, and one being an IGA Supermarket. Given the retail floor area concerned has no known tenant and the exact nature of the future use is unclear, the use of trip rates that are largely driven by a supermarket is also considered to be unreasonable.
2 (b)	Stage 2 of TfNSW's Macquarie Park Bus Priority and Capacity Improvement Project (MPBPCI) outlined in Section 4.2.2 of Ason Group's Transport Assessment report (Reference: P1633r01, 5 August 2021) is currently on hold. In this regard, the traffic modelling assessment in the transport study needs to be amended to only include works that form Stage 1A and 1B of the MPBPCI project (e.g. the junction of Waterloo Road and Byfield Street needs to be modelled under its current roundabout configuration rather than under traffic signal control).	At the time of the Concept Plan approval, the modelling scope outlined by TfNSW was met, and included the specific provision of the BPCIP works and signalisation of Waterloo Road with Byfield Street. The current proposal is consistent with the Concept Masterplan assumptions, and any changes to sequencing of upgrades made by TfNSW / Council is beyond the scope of this assessment.
2 (c)	Ason Group's Transport Assessment report (Reference: P1633r01, 5 August 2021) indicates that the future T-junction of Lyonpark Road and Ivanhoe Place is expected to operate with a good level of service (LoS) 'B' for both the weekday AM and PM peaks for the year 2031 (inclusive of development traffic). Considering the significant right turning traffic volumes to and from Lyonpark Road via Ivanhoe Place and the through southbound traffic volumes along Lyonpark Road, vehicles exiting Ivanhoe Place onto Lyonpark Road are expected to experience much greater	The operation of Lyon Park Road with Ivanhoe Place was specifically addressed in the Response to Submissions to SSD 8707 in Ason Groups Technical Note dated 22 August 2019. This included the acceptability of changes to the critical gap acceptance parameters adopted by Sidra. In this instance, the parameters were amended to reflect the recommended parameters under Austroads which better reflect more congested urban environments, and behaviour observed within Macquarie Park. This variation was endorsed by TfNSW and Arup. The modelling submitted as part of this assessment is consistent with the previously agreed position.

	delays than what is reflected in the SIDRA output on pages 114 and 115 of the transport study. This is substantiated by the SIDRA modelling undertaken by Council staff, which have incorporated the traffic volumes adopted in the Ason Group's transport report. Figure 1 overpage provides a comparison of the SIDRA outputs. It is evident from Figure 1 that based on the modelling undertaken by Council staff, the future T-junction of Lyonpark Road and Ivanhoe Place is projected to operate with a poor LoS 'F' under the proposed priority controlled intersection treatment. As such, an alternative intersection treatment/improvements is required to ameliorate the traffic impacts generated by the proposed development.	
2 (e)	Table 6 of Ason Group's Transport Assessment report (Reference: P1633r01, 5 August 2021) indicates no difference in the level of service (i.e. average vehicle delay) for the intersections of Herring Road/Ivanhoe Place and Waterloo Road/Herring Road between the year 2021 (middle column of Table 6) and the year 2031 (right column of Table 6) scenarios. This is not considered to be realistic, as more traffic is expected to be concentrated on these intersections in 2031 than 2021. Further, other traffic studies undertaken at these intersections for the year 2031 have shown these intersections to be operating much worse than what is reflected in Table 6 of the report. The discrepancy in the modelling outcomes needs to be justified by the applicant.	Ason Group is not able to comment on variances in modelling results completed by others without reviewing the models and relevant input assumptions. Notwithstanding, we note that the 2021 and 2031 SIDRA modelling results referenced here are extracted from 0421r04v02 TMAP Addendum –Ivanhoe Estate, Macquarie Park, Issue II, dated 13/09/2018. The Aimsun and SIDRA modelling undertaken as part of the TMAP is based on information provided by TfNSW including relevant growth rates. The modelling outputs were submitted to TfNSW for review and subsequently endorsed.
3.	Inadequate waste storage area in the basement and lack of satisfactory access for collection truck	Access to / from the loading facility of each of C3 and C4 have been assessed against AS2890.2:2018. As outlined in Section 8.4 of Ason Group's Transport Assessment (P1663r01, Issue I), the design vehicle adopted for waste collection is a 10.8m long City of Ryde Waste Vehicle for C3, and a 12,5m HRV for C4. Truck turntable are proposed for each of C3 and C4, with clearances proposed in excess of that required by AS2890.2:2018. As outlined in Section 8.3 of Ason Group's Transport Assessment, a detailed operational traffic management plan is recommended to investigate suitable traffic

		management arrangements to support the intended access arrangements.
3 (a)	Building C3 comprising 168 residential dwellings and seven (7) retail tenancies require several design changes with respect to waste storage and truck access for waste collection. The following specific issues are raised: i) Building C3 comprises 168 residential dwellings and seven (7) retail tenancies over 17 storeys. Access is proposed via Neighbourhood St Road 3 to a ground floor loading dock. The waste truck will utilise a turntable which accommodates a 12.5m HRV. The same driveway is used for residential vehicular access. There are concerns surrounding the visibility of cars coming up the ramp exiting the driveway while the waste truck departs from the loading dock area. This needs to be reviewed from a safety and WHS perspective.	As outlined in Section 8.4 of Ason Group's Transport Assessment (P1663r01, Issue I), the design vehicle adopted for waste collection is a 10.8m long City of Ryde Waste Vehicle. The turntable proposed provide a 600mm clearance, in excess of the minimum 300mm clearance required by AS2890.2:2018. The report also outlined a recommendation in Section 8.3, recommending a detailed operational traffic management plan, whereby traffic management devices such as signage in combination of warning probes activated by the loading area can be provided to mitigate safety issues raised.
3 (b)	Building C4 comprises 268 residential apartments in a 24-storey residential building (Market) and 216 residential apartments in a 17-storey residential building (Social) plus four townhouses (Building C4), a total of 488 dwellings. The following issues are raised which require revised basement design to address Council's concerns: i) Access for the Waste Truck is proposed via a new combined ingress/egress driveway (Residential Mews) off Neighbourhood Street. The heavy vehicle driveway provides connectivity to an internal loading dock/turntable, which is intended to accommodate service vehicles up to the size of a 12.5m long Heavy Rigid Vehicle (HRV). Parking for residential units in Market will also access this driveway. Swept paths show that the residential vehicles may impede access for the waste truck. Traffic management signals will be required to be utilised while the	As outlined in Section 8.4 of Ason Group's Transport Assessment (P1663r01, Issue I), the design vehicle adopted for C4 is the 12.5m Heavy Ridid Vehicle. The turntable proposed provide a 1 metre clearance, in excess of the minimum 300mm clearance required by AS2890.2:2018. The report also outlined a recommendation in Section 8.3, recommending a detailed operational traffic management plan, whereby traffic management devices such as signage in combination of warning probes activated by the loading area can be provided to mitigate safety issues raised. The swept path assessments and associated design comments provided in Appendix E clearly indicates that there will be a need for a detailed operational traffic management plan, which will need to take into consideration the access control arrangement of residential private vehicles, signal arrangement and any other traffic management items required to support the safe movement and operation of the loading bay.

	truck is in the loading dock turntable.	
	ii) The access driveway is very tight in the horseshoe and should be revised to ensure that the waste truck can manoeuvre without issues.	

TABLE 2 RFI RESPONSE TO DPIE'S LETTER 16 DECEMBER 2021

	DPIE Comments	Project Team Response
8	Car Parking Confirm the breakdown of the number of car parking spaces proposed within State 2 as the Transport Assessment (TA), EIS and architectural plans provide varying figures.	It is acknowledged that the number of car parking spaces proposed and documented in the TA, EIS and Architectural Plans were not completely consistent. Further co-ordination with the project team, please find a revised TA with revised architectural plans attached that confirm that the numbers now correlate.
8	Car Parking Justify the provision of visitor car parking for social housing dwellings in C4 given Condition A18(k) of the Concept Approval specifies a parking rate of 0.5 spaces per social housing dwelling with no provision for visitor parking (and as per the Building C1 approval).	It is acknowledged that Condition A18(k) of SSD 8707 specified the provision of 0.5 car parking spaces per social housing dwelling intended for residents, with no specific rate nominated for visitors for social housing dwelling. Modification to SSD 8903 included the provision of 4 visitor spaces to 259 social housing. This equates to a rate of 1 visitor space per 65 dwellings. The proposed C4 social housing proposes a provision of 1 visitor space per 20 dwellings, consistent with the visitor parking provision rate with dwellings. The provision of additional visitor parking is considered to be appropriate on the basis that it provide additional capacity for visitors to residents of the social housing component of the development, and the spaces concerned do not increase trip generation during the AM and PM peak hours.
8	Car Parking Confirm the number of car share parking spaces proposed within Stage 2 and how this relates to the minimum of 50 car share spaces required under Condition A18(j).	Within SSD 8903, there were 30 car share spaces approved to be installed within the basement of the C1 Building. The residual 20 car share spaces will be provided along the road network within the Ivanhoe Estate. The residual 20 car share spaces formed part of the Stage 2 Signage and Line Marking Works for the precinct, and were Certified by a PCA around mid 2021. Refer to the attached Construction Certification for Details.

8	Car Parking Confirm public access arrangements for any proposed car share spaces.	Public pedestrian access will be provided via the public lift within C2 which connects to the B3 basement of the C1 Building. Vehicular access to carshare will be via the access ramp to the C1 building under the C1.4 tower. This ramp leads directly to the publicly accessible B3 level. Balance of the car share spaces are provided on-street and publicly accessible.
8	Car Parking Clarify why the EIS states 19 car parking spaces are allocated to Building C2 within the Building C1 basement car park when the consent for Building C1 (as modified) allocates 20 spaces for community facilities located within Building C2.	At the time of submission of the MOD for Stage 1, the community center was still under development and the floor area of the Stage 2 facilities was unknown. As per the submitted scheme, where proposed areas of the community center (700m2) and the pool and gym (1,210m2) totalling 1,910m2. The parking rate of 1 space per 100m2 is nominated in condition A18 of the Concept Plan SSD 8707. This would therefore only allow 19 spaces to be required for the community center parking. A modification to Stage 1 SSDA 8903 will be issued in due course to match the 19 parking spaces within the proposed Stage 2 DA.
8.	Car Parking Review the basement layout, access design and provision of electric vehicle charging stations in response to Council's comments.	There is no statutory requirement for the provision of EV charging. However, Frasers have designed the building to be 'EV Ready' by allowing sufficient provisions in place, and providing the option for EV Charging to customers purchasing apartments.
9	Bicycle Parking Confirm the location of the proposed 25 visitor bicycle parking spaces within the public domain. In addition, provide further information regarding the intended location of the remaining minimum 75 visitor bicycle spaces required within the public domain across the overall site.	25 visitor spaces are to be provided as per the revised plan for Village Green. The remaining 75 visitor bicycle parking spaces are to be located as follows: - Forest Playground – 15 spaces - Green Link (Between the School Site & B3) – 5 spaces - Mews Streets – 30 spaces (based on 6 spaces per Mew) - Shrimpton's Creek – 25 spaces
9	Bicycle Parking Confirm the number of bicycle spaces for Building C3 noting the EIS states 168 residential	A total of 176 bicycle parking spaces are proposed for Building C3, comprising: - 162 bicycle parking spaces for residents (within storage cages) - 4 retail staff bicycle parking spaces located on Basement Level 1 - 10 residential visitor bicycle parking spaces - Bicycle end of trip facilities (2 x showers, 2 x WC, 1 x Accessible WC, 5 x lockers and prep benches) There are 10 retail visitor bicycle parking spaces provided within the public realm.

9	Bicycle Parking Confirm the location of visitor bicycle parking spaces within Buildings C3 and C4, including details of public access, and the location of bicycle spaces for retail workers within Building C3.	Bicycle parking for C3 are predominantly provided within residential storage cages. In addition, there are three bicycle racks located on B1, providing a total of 14 spaces (7 spaces, 5 spaces and 2 spaces). Bicycle parking for C4 are provided within residential storage cages.
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Should you require any additional information or clarification, please do not hesitate to contact the undersigned.

Yours sincerely,



Dora Choi

Principal Lead – Traffic Management & Operations

E dora.choi@asongroup.com.au

M +61 450 923 889