STANBURY
TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

TRAFFIC & PARKING IMPACT ASSESSMENT

PROPOSED INDUSTRIAL DEVELOPMENT
4 MINNA CLOSE
BELROSE

PREPARED FOR WU PROPERTIES
OUR REF: 22-003-3

MAY 2023

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TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

1.1 Scope of Assessment

Stanbury Traffic Planning has been commissioned by Wu Properties to prepare a Traffic & Parking Impact Assessment accompanying a development application to be lodged with Northern Beaches Council. The proposal involves the construction an industrial development at 4 Minna Close, Belrose (hereafter referred to as the 'subject site').

The development is proposed to comprise a single building providing an approximate warehouse / factory floor area of 1,551.52m^2 in conjunction with a mezzanine level of support office floor space providing a floor area of 175.47m^2.

The development is to be serviced by 26 passenger vehicle parking spaces within one level of basement parking. Vehicular access to the basement parking area is proposed via a combined ingress / egress driveway connecting with Minna Close in the south-western portion of the site.

Two heavy vehicle loading bays are also proposed to be provided at ground floor level capable of accommodating vehicles up to and including 12.5m long Heavy Rigid Vehicles (HRVs). Heavy vehicle entry is to be facilitated by an existing driveway (with proposed minor modifications) providing access to a right of carriageway straddling the eastern boundary of the site and connecting with Minna Close in the south-eastern corner of the site. Heavy vehicle exit is proposed to be provided via a second egress-only driveway connecting with Minna Close in the south-western corner of the site.

The aim of this assessment is to investigate and report upon the potential traffic and parking consequences of the development application and to recommend appropriate ameliorative measures where required. This report provides the following scope of assessment:

- Section 1 provides a summary of the site location, details, existing and surrounding land-uses;

- Section 2 describes the proposed development;

- Section 3 assesses the adequacy of the proposed site access arrangements, parking provision, internal circulation and servicing arrangements with reference to relevant Council, Transport for NSW (TfNSW) and Australian Standard specifications;

- Section 4 assesses the existing traffic, parking and transport conditions surrounding and servicing the subject development site including a description of the surrounding road network, traffic demands, operational performance and available public transport infrastructure; and

- Section 5 estimates the projected traffic generating ability of the proposed development and assesses the ability or otherwise of the surrounding road network to be capable of accommodating the altered demand in a safe and efficient manner.

The report has been prepared pursuant to State Environmental Planning Policy (Transport & Infrastructure) 2021.

1.2 Reference Documents

Reference is made to the following documents throughout this report:

- TfNSW's *Guide to Traffic Generating Developments*;
- Northern Beaches Council's *Warringah Development Control Plan 2011* (WDCP 2011);
- Australian Standard for *Parking Facilities Part 1: Off-Street Car Parking* (AS2890.1:2004);
- Australian Standard for *Parking Facilities Part 2: Off-Street Commercial Vehicle Facilities* (AS2890.1:2018);
- Australian Standard for *Parking Facilities Part 3: Bicycle Parking* (AS2890.3:2015); and
- Australian Standard for *Parking Facilities Part 6: Off-Street Parking for People with Disabilities* (AS2890.6:2022).

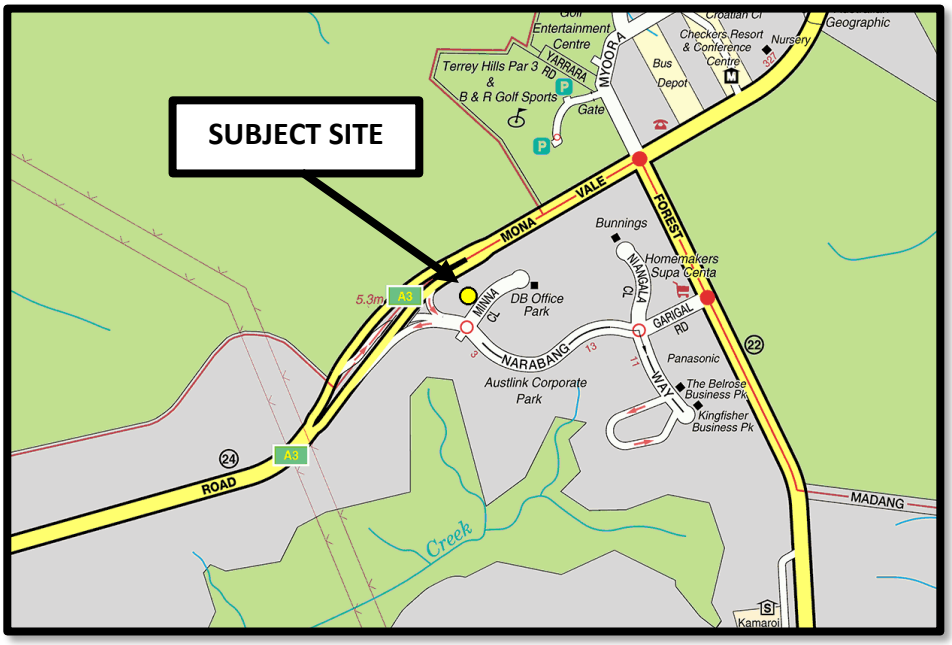
Architectural plans have been prepared by Bureau SRH Architecture and should be read in conjunction with this report, reduced copies of a selection of which are included as **Appendix 1** for reference.

1.3 Site Details

1.3.1 Site Location

The subject site is situated on the northern side of Minna Close being bounded by Narabang Way and Mona Vale Road, Belrose, in the north. The site location is illustrated below within a local context by **Figure 1** and overleaf within an aerial context by **Figure 2**.

FIGURE 1: SITE LOCATION WITHIN A LOCAL CONTEXT



Source: UBD's Australian City Streets – Version 8

FIGURE 2: SITE LOCATION WITHIN AN AERIAL CONTEXT

Source: NearMap (Image Date: 01/05/2023)

1.3.2 Site Description

The subject site provides a real property description of Lot 502 within DP 875858 and a street address of 4 Minna Close, Belrose.

The site forms a primarily rectangular shaped parcel of land, providing approximate frontages of 52m to Minna Close and 60m to Mona Vale Road. The site provides a total area in the order of 4,655m^2.

1.3.3 Existing Site Use

The subject site is currently vacant and undeveloped.

1.3.4 Surrounding Uses

The subject site is surrounded by the following land-uses:

- Industrial development is situated to the west, south and east of the site;
- A Bunnings Warehouse is situated further to the east of the site being serviced by Niangala Close; and
- Mona Vale Road carriageways are situated to the north of the site.

2. PROPOSED DEVELOPMENT

2.1 Built Form

The proposal involves the construction of an industrial development within the southern portion of the subject site. The building is proposed to be provided over two floors. The ground floor of the development is proposed to provide a reception / lobby area, a staff room, a warehouse storage area, a food packaging / bottling area and ancillary amenities. The second floor of the development is proposed to provide an office space.

Table 1 below provides a summary of the proposed building uses and gross floor areas.

TABLE 1: SUMMARY OF PROPOSED BUILDING LAND-USE FLOOR AREAS

	Industry (m^2)	Internal Loading Areas (m^2)	Offices (m^2)	Total (Excludes Internal Loading Area) (m^2)
Gross Floor Area Yield	1,551.52	87.5	175.47	1,727

The development is to be serviced by a basement parking area providing a total of 26 car parking spaces, including two disabled parking spaces. Vehicular access to the basement parking area is proposed via a combined ingress / egress driveway, connecting with Minna Close in the south-western portion of the site.

The development is also proposed to be serviced by two internal loading bays situated at ground floor level and accessed by roller doors situated on the northern wall of the warehouse building, capable of accommodating vehicles up to and including 12.5m long HRVs. Heavy vehicle entry is to be facilitated by an existing driveway (with proposed minor modifications) providing access to a right of carriageway straddling the eastern boundary of the site and connecting with Minna Close in the south-eastern corner of the site. Heavy vehicle exit is proposed to be provided via a second egress-only driveway connecting with Minna Close in the south-western corner of the site.

2.2 Proposed Operation

The development is proposed to accommodate a brewery use, whereby beer is produced, bottled, stored and distributed, providing the following operational characteristics:

- 10 staff are to be accommodated on-site at any given time;
- Hours of operation are proposed to be 7:00am – 6pm, seven days, however a majority of staff are expected to work 9:00am to 5:00pm weekdays; and
- The site use is expected to generate up to five HRVs per day.

3. SITE ACCESS, PARKING & INTERNAL CIRCULATION

3.1 Access Arrangements

3.1.1 Passenger Vehicle Access

Passenger vehicle access between the basement parking area and Minna Close is proposed via a 6m wide combined ingress / egress driveway in the south-western portion of the site.

AS2890.1:2004 provides driveway design specifications based on the proposed primary land use, the functional order of the access road and the number of spaces the driveway is to serve. Tables 3.1 and 3.2 of AS2890.1:2004 specify that, at minimum, a Category 2 type driveway is required, providing a minimum combined driveway width of between 6m and 9m based on the non-arterial functional order of Minna Close, the proposed land-use and the passenger vehicle parking provision in which the subject driveway is to service being between 25 and 100 spaces. The proposed combined 6m wide ingress / egress driveway therefore complies with the minimum AS2890.1:2004 specifications and accordingly, is considered to continue to be satisfactory.

Swept path plans have been prepared in order to demonstrate the ability of passenger vehicles to enter and exit the site in a forward direction, copies of which are included as **Appendix 2**. These swept paths also indicate that all vehicles are able to enter and exit the site in a forward direction.

The safety and efficiency of passenger vehicle access / egress movements are also proposed to be assisted by the following:

- The provision of a relatively level (1:20) grade within the first 6m inside the property boundary within the driveway;

- The reasonably consistent horizontal and vertical alignment of Minna Close in the vicinity of the subject site facilitates appropriate sight distance between the driveway and approaching public road traffic flow;

- No obstructions to visibility adjacent to the egress side (eastern side) of the driveway facilitating appropriate sight distance between exiting motorists and potential pedestrians travelling along Minna Close; and

- The passenger vehicle site access driveway is proposed to be offset from the adjacent proposed heavy vehicle egress driveway by approximately 4.5 metres to effectively facilitate a pedestrian refuge island between the two driveways.

3.1.2 Heavy Vehicle Access

Heavy vehicle access between the on-site heavy vehicle loading areas and Minna Close is proposed to be provided via the following access arrangements:

- Heavy vehicle ingress movements are proposed to be facilitated via an existing 7m wide driveway straddling the eastern boundary and connecting with Minna Close in the south-eastern in the eastern corner of the site. Minor modifications are proposed to this driveway in order to facilitate heavy vehicle entry including widening of the driveway to provide a total approximate width of 8.2m measured at the property boundary.

- Heavy vehicle egress movements are proposed to occur through the provision of a 5.8m wide egress driveway (not including proposed splays which result in an approximate total width of 11m measured at the property boundary) situated in the southern corner of the site.

Swept path plans have been prepared in order to demonstrate the ability of vehicles up to and including AVs to enter and exit the site, copies of which are included as **Appendix 2**. These plans indicate that the largest vehicles required to service the site are capable of entering and exiting the site without unreasonable encroachment on driveway extents, internal development obstructions and potential adjoining public road kerb-side parking.

The safety and efficiency of access / egress movements are also proposed to be assisted by the provision of a relatively level (maximum of 1:20) grade within the development on immediate approach to the property boundary.

3.2 Parking Provision

3.2.1 Passenger Vehicle Parking

The development is proposed to be serviced by 26 off-street passenger vehicle parking spaces, including two disabled parking spaces, provided within the basement parking area.

WDCP 2011 specifies the following locally sensitive relevant off-street parking rates relevant to the subject development:

Industry
1.3 spaces per 100m^2 GFA

(Including up to 20% of floor area as office premises space component. Office premises component above 20% determined at office premises rate).

On the basis of 1,551.52m^2 of proposed gross floor area of warehouse and 175.47m^2 of proposed mezzanine office space, the following calculation applies utilising the above parking rates:

(1.3 x (1,727m^2 / 100m^2) = 22.5 (adopt 23) spaces

The development is accordingly required to provide 23 passenger vehicle parking spaces in accordance with WDCP 2011.

The proposed total parking provision of 26 spaces therefore exceeds the minimum WDCP 2011 requirements and accordingly, is considered to be satisfactory.

3.2.2 Heavy Vehicle Loading Facilities

WDCP 2011 specifies the following locally sensitive relevant loading / unloading area requirements relevant to the subject development:

> *On-site Loading and Unloading*
> *Facilities for the loading and unloading of service, delivery and emergency vehicles are to be:*
>
> *Appropriate to the size and nature of the development, screened from public view; and designed so that vehicles may enter and leave in a forward direction.*

The proposed warehouse development is to be serviced by two internal heavy vehicle loading bays capable of accommodating vehicles up to and including 12.5m long HRVs in the northern portion of the site at ground level being accessed via the provision of roller doors. The loading bays are to be accessed via an internal roadway that connects to the ingress and egress driveways situated in the eastern and southern corner of the site, respectively. The internal roadway and internal loading bays have been designed so that all heavy vehicles can enter and exit the site in a forward direction.

Section 2.2 of the report presents that the proposed development use is expected to generate five heavy vehicles per day. The provision of two formalised loading bays, representing a rate of approximately of one bay per 1,500m^2 total GFA, is accordingly envisaged to readily accommodate peak operational demands and therefore, is satisfactory.

3.2.3 Motorcycle Parking

The development is proposed to be serviced by two motorcycle parking spaces provided within the basement parking area.

WDCP 2011 does not specify motorcycle parking requirements relevant to the subject development.

The proposed motorcycle parking provision of two spaces, representing approximately one space per 13 car spaces, is considered to be satisfactory.

3.2.4 Bicycle Parking

The development is proposed to be serviced by 14 bicycle parking spaces comprising 10 x Class B spaces situated within a bicycle storage room provided at the ground floor level of the warehouse building and 4 x Class C spaces situated at the lower ground floor level in close proximity to the basement lobby door.

WDCP 2011 specifies the following locally sensitive relevant off-street bicycle parking rates relevant to the subject development:

Light and General Industry
High-Medium Security Level: 1 per 200m^2 GFA
Visitors: 1 per 600m^2 GFA

On the basis of a total development GFA of 1,727m^2, the following calculation applies utilising the above parking rates:

High-Medium Security Level: (1,727m^2 / 200m^2) = 8.6 (adopt 9) spaces
Visitors: (1,727m^2 / 600m^2) = 2.9 (adopt 3) spaces

The development is accordingly required to provide 9 x Class B and 3 x Class C bicycle parking spaces in accordance with WDCP 2011 and AS2890.3:2015.

The proposed total bicycle parking provision of 14 spaces, comprising 10 x Class B spaces and 4 x Class C spaces, therefore complies with the minimum WDCP 2011 requirements and accordingly, is considered to be satisfactory.

3.2.5 On-Street Parking Impacts

The proposed development includes the creation of two access driveways situated in the south-western corner of the site. The two access driveways are proposed to provide a total width of 22m (including the 4.5-metre offset between the two driveways). It is therefore acknowledged that the creation of the two driveways associated with the subject site will result in the loss of on-street kerb-side parking supply, equivalent to approximately four parking spaces.

Minna Close currently accommodates the following on-street parking infrastructure in close proximity to the subject site between the terminating cul-de-sac bulb in the east and Narabang Way in the west:

- Approximately 21 unrestricted parking spaces along the northern kerb alignment (including seven parking spaces directly adjacent to the subject site); and

- Approximately 19 unrestricted parking spaces along the southern kerb alignment.

In order to obtain the existing demand for on-street parking throughout the year in the vicinity of the site, this Practice has reviewed aerial imagery from Nearmap.com.au which captures the time and day the photo was taken. Aerial imagery was observed on available days during the years 2019 and 2022, during which time there were no COVID-19 lockdowns in place potentially impacting parking demand.

A summary of the on-street parking demand within Minna Close is provided overleaf in **Table 2**.

TABLE 2: SUMMARY OF ON-STREET KERB-SIDE PARKING DEMAND MINNA CLOSE					
Survey Details			North Side (Capacity = 21)	South Side (Capacity = 19)	Total (Capacity = 40)
Date	Day	Time			
12/03/2019	Tuesday	4:43pm	9	7	16
14/05/2019	Tuesday	12:49pm	15	15	30
2/07/2019	Tuesday	1:10pm	13	12	25
27/09/2019	Friday	12:11pm	17	9	26
12/11/2019	Saturday	9:40am	1	1	2
05/04/2022	Tuesday	12:09pm	15	11	26
18/05/2022	Wednesday	10:47am	15	9	24
28/07/2022	Thursday	2:17pm	17	15	32
21/08/2022	Sunday	11:04am	0	2	2

Table 2 indicates that the highest parking demand of the survey period occurred on Thursday the 28th of July 2022, when a total of 32 car parking spaces were occupied, representing an available supply of eight on-street parking spaces in close proximity of the site.

Therefore, incorporating the creation of the two access driveways associated with the subject site, it is considered that Minna Close will continue to provide capacity for up to four additional parking spaces during peak periods.

It is accordingly concluded that there is ready capacity within Minna Close to continue to accommodate the on-street parking demand, notwithstanding the implementation of the site access driveways and therefore the loss of four on-street parking spaces.

3.3 Internal Circulation and Manoeuvrability

3.3.1 Passenger Vehicle Circulation

Passenger vehicles will gain entry to the basement parking area via the proposed 6m wide combined ingress / egress driveway situated in the south-western corner of the site, connecting with Minna Close. The site access driveway provides direct connectivity to an internal ramp / roadway that connects directly with the parking circulation aisle.

The basement parking area comprises one parking circulation aisle provided in an east-west alignment providing access to two rows of 90-degree angled parking spaces.

The passenger vehicle parking spaces have been designed to accord with the relevant requirements of AS2890.1:2004 and AS2890.6:2022, providing the following minimum dimensions:

- Standard 90-degree angled vehicular parking space width = 2.4m;
- Disabled vehicular parking space width = 2.4m (with adjoining 2.4m wide shared area);

- Additional vehicular space width where parking spaces adjoins an obstruction = 0.3m;
- Standard 90-degree angled parking space length = 5.4m;
- Minimum parking aisle width adjoining 90-degree angled parking spaces = 6.1m;
- Minimum headroom = 2.2m;
- Minimum headroom above disabled parking space = 2.5m;
- Maximum grade within 6m of the property boundary = 1:20; and
- Maximum ramp grade = 1:8.

Safe and efficient internal manoeuvring and parking space accessibility is anticipated to result, taking into consideration the above compliance with the relevant AS2890.1:2004 and AS2890.6:2009 specifications.

In order to demonstrate the internal passenger vehicle manoeuvrability within the internal parking areas, a number of swept path plans have been prepared which are included as **Appendix 2**. The turning paths provided on the plans have been generated using Autoturn software and derived from B85 and B99 vehicle specifications provided within AS2890.1-2004.

Section B4.4 of AS2890.1:2004 states the following with regard to the use of templates to assess vehicle manoeuvring:

'Constant radius swept turning paths, based on the design vehicle's minimum turning circle are not suitable for determining the aisle width needed for manoeuvring into and out of parking spaces. Drivers can manoeuvre vehicles within smaller spaces than swept turning paths would suggest.'

It would therefore appear that whilst the turning paths provided within AS 2890.1:2004 can be utilised to provide a 'general indication' of the suitability or otherwise of internal parking and manoeuvring areas, vehicles can generally manoeuvre more efficiently than the paths indicate. Notwithstanding this, the swept path plans illustrate that passenger vehicles can manoeuvre throughout and enter and exit the most difficult passenger vehicle parking spaces within the parking area. The proposed site layout as it relates to passenger vehicle manoeuvrability is considered satisfactory.

3.3.2 Heavy Vehicle Circulation

The warehouse has been designed to accommodate vehicles up to and including 12.5m long HRVs through the provision of two internal loading bays situated in the northern portion of the site and accessed via a roller door connecting with the internal roadway at ground level.

The heavy vehicle servicing arrangements have been designed to comply with the relevant requirements of AS2890.2:2018, providing the following minimum dimensions:

- Minimum Roller door width servicing internal loading bays = 3.5m;
- Minimum width of loading bay = 3.5m;
- Minimum length of loading bay accommodating vehicles up to and including HRVs = 12.5m (whereby a portion of the HRV cab is to be situated outside of the building);
- Minimum clearance of loading bay accommodating vehicles up to and including Heavy Rigid vehicles = 4.5m;
- Maximum gradient throughout heavy vehicle manoeuvring area = level grade;
- Maximum grade throughout internal circulation area = 1:10;
- Maximum grade on approach to exit driveway = 1:20; and
- Maximum instantaneous change in grade = 1:16 over 10m of travel.

A series of swept path plans have been prepared and included as **Appendix 2** which demonstrate the manoeuvring of HRVs to and from the internal loading bays. These paths indicate that the proposed building and site design is capable of accommodating the manoeuvring requirements of the largest vehicles expected to service the building. In consideration of this and the above discussion, the subject development design is considered to be capable of accommodating vehicles up to and including 12.5m long HRVs in a safe and efficient manner.

3.3.3 Bicycle Parking Design

The development is proposed to provide 14 bicycle parking spaces comprising 10 x Class B spaces and 4 x Class C spaces. The bicycle parking facilities are proposed to provide the following minimum design parameters in accordance with the relevant requirements of WDCP 2011 and the specifications of AS2890.3:2015:

Class B Parking Spaces:

- Situated within a secure and enclosed room at ground floor level of the warehouse building;
- Rack depth / length = 1.8m;
- Rack spacing = 0.5m; and
- Aisle width adjoining racks = 1.5m.

Class C Parking Spaces (Visitor Parking):

- Situated at basement level, accessed via the footpath and in close proximity to the basement lobby entrance;
- Rack depth / length = 1.8m;
- Rack spacing = 0.5m; and
- Aisle width adjoining racks = 1.5m.

3.3.4 Motorcycle Parking Design

Two motorcycle parking spaces are proposed to be situated within the north-eastern corner of the basement parking area.

The motorcycle parking spaces are to provide the following minimum design parameters in accordance with the relevant specifications of AS2890.1:2004:

- Parking space width = 1.2m; and
- Parking space length = 2.5m.

4. EXISTING TRAFFIC CONDITIONS

4.1 Surrounding Road Network

- **Minna Close** performs a local access function under the care and control of Northern Beaches Council, primarily providing an east-west alignment, facilitating access between abutting commercial / industrial properties prior to terminating in a cul-de-sac with a bulb diameter of approximately 28m some 200m to the east of Narabang Way.

  In the vicinity of the site, Minna Close provides an 11m wide pavement providing one through lane of traffic in conjunction with parallel parking along both kerb alignments. Traffic flow within Mina Close is governed by a sign posted speed limit of 50km/h.

  To the south-west of the site, Minna Close forms an intersection with Narabang Way and a development access driveway operating under two-lane circulating roundabout control.

- **Narabang Way** performs a collector access function under the care and control of Northern Beaches Council, primarily providing connectivity between Mona Vale Road in the north-west Garigal Way in the south-east, prior to extending further to the south, providing a local access function and terminating cul-de-sac bulb 250m to the south of Garigal Way.

  Narabang Way primarily provides a dual carriageway providing one lane of traffic in each direction in conjunction with parallel parking providing along the outside kerb alignment being separated by a vegetated median. Traffic flow within Narabang Way is governed by a sign posted speed limit of 50km/h.

  At its northern extremity, Narabang Way connects with Mona Vale Road, providing on and off-ramps / merge lanes with the westbound carriageway and a grade separated off-ramp from the eastbound carriageway.

  To the south-east of the site, Narabang Way forms an intersection with Garigal Way and Niangala Close operating under two-lane circulating roundabout control.

- **Mona Vale Road** performs a State Road function operating under the care and control of TfNSW primarily providing an east-west alignment between Mona Vale in the east and Gordon in the south-west, where it forms Ryde Road.

  Mona Vale Road provides a dual carriageway providing two lanes of traffic in each direction in the vicinity of the site. Traffic flow within Mona Vale Road in the vicinity of the site is governed by a sign posted speed limit of 90km/h.

4.2 Existing Traffic Volumes

4.2.1 Junction of Minna Close and Narabang Way

This Practice has commissioned peak hour traffic surveys to be completed of the intersection of Minna Close and Narabang Way, in order to accurately ascertain existing traffic demands within the immediate precinct.

Surveys were undertaken between 7:00am – 9:00am and 4:00pm – 6:00pm on Friday the 29th of July 2022.

Figure 3 below provides a summary of the surveyed peak hour intervals of traffic flows at the subject intersection including a morning peak hour which has been identified as 8:00am — 9:00am (AM Peak) and 4:15pm – 5:15pm (PM Peak), whilst full details are contained within **Appendix 3**.

FIGURE 3: EXISTING WEEKDAY COMMUTER PEAK HOUR TRAFFIC VOLUMES INTERSECTION OF MINNA CLOSE AND NARABANG WAY

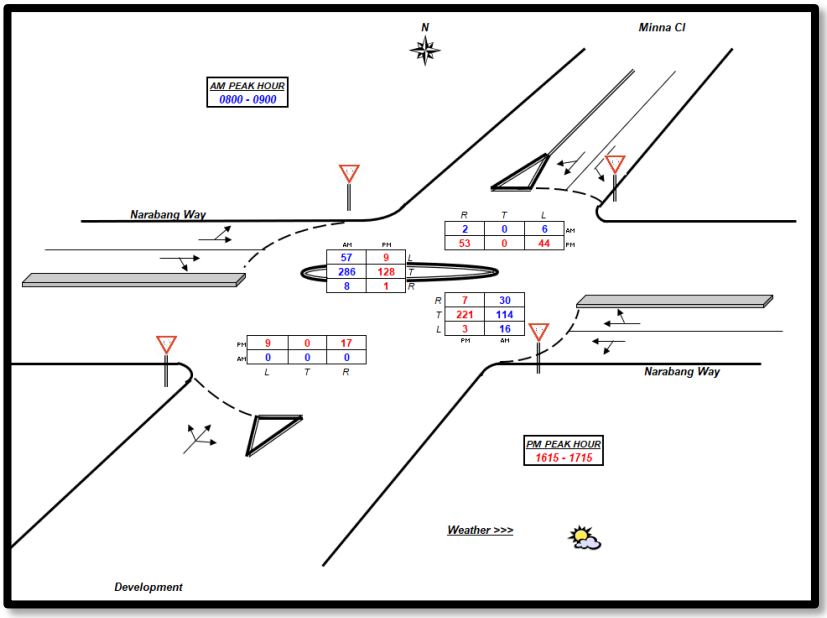


Figure 3 indicates the following:

- Narabang Way accommodates tidal traffic demands with southbound flow predominating during the morning peak hour and northbound demands predominating during the afternoon peak hour;
- Narabang Way accommodates predominate directional traffic demands of between approximately 250 – 350 vehicles during weekday peak hours;
- Mina Close accommodates tidal traffic demands with eastbound flow predominating during the morning peak hour and westbound flow predominating during the afternoon peak hour; and

- Minna Close accommodates predominate directional traffic demands of approximately 100 vehicles during weekday peak hours.

4.3 Existing Road Network Operation

The surveyed intersection of Minna Close and Narabang Way has been analysed utilising the SIDRA computer intersection analysis program in order to objectively assess the operation of the nearby public road network.

SIDRA is a computerised traffic arrangement program which, when volume and geometrical configurations of an intersection are imputed, provides an objective assessment of the operation efficiency under varying types of control (i.e. signs, signal and roundabouts). Key indicators of SIDRA include level of service where results are placed on a continuum from A to F, with A providing the greatest intersection efficiency and therefore being the most desirable by TfNSW.

SIDRA uses detailed analytical traffic models coupled with an iterative approximation method to provide estimates of the abovementioned key indicators of capacity and performance statistics. Other key indicators provided by SIDRA are average vehicle delay, the number of stops per hour and the degree of saturation. Degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach. Degree of saturation is a useful and professionally accepted measure of intersection performance.

SIDRA provides analysis of the operating conditions that can be compared to the performance criteria set out in **Table 3** below (being TfNSW method calculation of Level of Service).

TABLE 3: LEVEL OF SERVICE CRITERIA FOR ROUNDABOUT CONTROLLED INTERSECTIONS

Level of Service	Average Delay per Vehicle (secs/veh)	Expected Delay
A	Less than 14	Little or no delay
B	15 to 28	Minimal delay and spare capacity
C	29 to 42	Satisfactory delays with spare capacity
D	43 to 56	Satisfactory but near capacity
E	57 to 70	At capacity, incidents will cause excessive delays
F	> 70	Extreme delay, unsatisfactory

The existing conditions have been modelled utilising the peak hour traffic volumes presented within **Figure 3**.

Table 4 overleaf provides a summary of the SIDRA output data whilst more detailed summaries are included as **Appendix 4**.

TABLE 4: SIDRA OUTPUT - EXISTING WEEKDAY PEAK HOUR PERFORMANCE INTERSECTION OF MINNA CLOSE AND NARABANG WAY		
	AM PEAK (8:00AM – 9:00AM)	**PM PEAK (4:15PM – 5:15PM)**
Narabang Way North Approach		
Delay (seconds / vehicle)	7.6	7.6
Degree of Saturation	0.22	0.10
Level of Service	A	A
Narabang Way South Approach		
Delay (seconds / vehicle)	7.5	7.7
Degree of Saturation	0.09	0.14
Level of Service	A	A
Minna Close Approach		
Delay (seconds / vehicle)	9.7	8.3
Degree of Saturation	0.006	0.05
Level of Service	A	A
Development Driveway		
Delay (seconds / vehicle)	0.4	1.0
Degree of Saturation	0.003	0.03
Level of Service	A	A
Total Intersection		
Delay (seconds / vehicle)	7.6	8.3
Degree of Saturation	0.22	0.14
Level of Service	A	A

Table 4, in conjunction with more detailed output contained within **Appendix 4**, indicates that the intersection of Minna Close and Narabang Way provides all movements with a level of service 'A' during peak periods, representing good operation with spare capacity.

4.3.1 Site Access Assessment

Turning movements between abutting sites and Minna Close are generally assisted by particularly low traffic volumes and a low traffic speed within Minna Close. This situation, combined with acceptable sight distance conditions, results in vehicles being able to undertake entry and egress movements between abutting developments and Minna Close in a safe and efficient manner.

4.4 Public Transport

4.4.1 Buses

The following bus routes operate in the vicinity of the subject site:

- Route 141 – Austlink to Manly via Frenchs Forest & Seaforth;
- Route 193 – Austlink to Warringah Mall via Frenchs Forest;
- Route 196 – Mona Vale to Gordon;
- Route 197 – Mona Vale to Macquarie University via Gordon;

- Route 260 – Terrey Hills to North Sydney;
- Route 270 – Terrey Hills to City QVB;
- Route 271 – Belrose to City QVB; and
- Route 284 – Duffys Forest to Terrey Hills & Chatswood.

The above routes provide an approximate collective service frequency of 20 minutes during weekday peak periods, 30 minutes during weekday business hours and hourly on weekends.

The closest bus stop to the subject site is situated at approximately 170m walking distance (or approximately 2-minute walk) to the south of the site situated on the northern side of Narabang Way.

4.5 Pedestrians / Cyclists

Pedestrians and cyclists are provided with the following access and mobility infrastructure within the immediate vicinity of the subject site:

- A footpath is provided along the northern side of Minna Close and sections of the southern side of Minna Close;
- Footpaths are provided along both sides of Narabang Way, Niangala Close and Garigal Road;
- A pedestrian refuge is provided across the eastern approach of the roundabout controlled intersection of Narabang way, Niangala Close and Garigal Way;
- Signalised pedestrian crossings are provided over the northern and western approaches of the junction of Garigal Way and Forest Way; and
- A pedestrian crossing is provided across the left turn slip lane of Forest Way.

5. PROJECTED TRAFFIC CONDITIONS

5.1 Traffic Generation

5.1.1 TfNSW Rates

Traffic generation rates for various land-uses have been established through extensive surveys undertaken throughout NSW and published within TfNSW's *Guide to Traffic Generating Developments*. The following provides a summary of the traffic generating potential of the existing and proposed site uses with respect to those rates established by TfNSW:

Warehouse (Industry)
0.5 peak hour trip per 100m^2 of gross floor area

Office and Commercial Premises
2 peak hour trips per 100m^2 of gross floor area

Section 2.1 of this report presents that the subject development is proposed to provide an office gross floor area of 175.47m^2 and warehouse gross floor area of 1,551.52m^2. Application of TfNSW's traffic generation rates to the proposed development results in the following peak hour traffic generation provided in **Table 5** below.

TABLE 5: SUMMARY OF TRAFFIC GENERATING POTENTIAL OF EXISTING SITE STRUCTURES BASED UPON STANDARD INDUSTRIAL USAGE

Use	Size GFA	Rate	Peak Hour Trips
Office	175.47	2 trips per 100m^2 GFA	3.5 (adopt 4)
Warehouse	1,551.52	0.5 trips per 100m^2 GFA	7.8 (adopt 8)
Total			**12**

The proposed development is therefore estimated to generate in the order of 12 peak hour vehicle trips to and from the subject site, based on established average TfNSW traffic generation rates.

5.1.2 Operational Traffic Generation Assessment

An operational traffic generation assessment is based upon the following development characteristics presented within Section 2.2 of this report:

- 10 staff are anticipated to service the site during operational hours being between 9:00am – 5:00pm; and
- The site is anticipated to generate the servicing of five heavy vehicles per day (five inbound and five outbound movements).

According to the above, the site is anticipated to generate 10 inbound movements during the morning peak hour associated with staff arriving and 10

outbound movements during the afternoon peak hour associated with staff leaving. Additionally, it is considered that the development is to be serviced by five heavy vehicles (10 movements) per day between 9:00am – 5:00pm, resulting in approximately one heavy vehicle movement per hour.

For purposes of the assessment, it is therefore considered that the development is anticipated to generate approximately 11 vehicles trips per weekday commuter peak hours based on the operational characteristics of the development.

5.2 Trip Assignment and Projected Traffic Volumes

The proposed development has been projected to generate up to 12 trips during the morning afternoon peak hours in accordance with the traffic generation rates specified within TfNSW's *Guide to Traffic Generating Developments.* Whilst the operational traffic generating analysis concludes that the development is anticipated generate approximately 11 peak hour trips, in order to provide a conservative estimate of the traffic generating ability of the proposed development, the projected conditions as a result of 12 peak hour trips have been assessed.

The development-generated peak hour trips are likely to be evenly distributed between inbound and outbound movements associated with the typical journey to work behaviour as the traffic generated by the subject site is largely to be staff arriving in the morning and leaving in the evening. Therefore, it has been estimated that the morning peak hour trips are to comprise 80% inbound trips and 20% outbound trips. Conversely, the afternoon peak hour trips are to comprise 20% inbound trips and 80% outbound trips. The development is therefore projected to generate 10 ingress movements and 2 egress movements during the morning peak hour and 2 ingress movements and 10 egress movements during the evening peak hour.

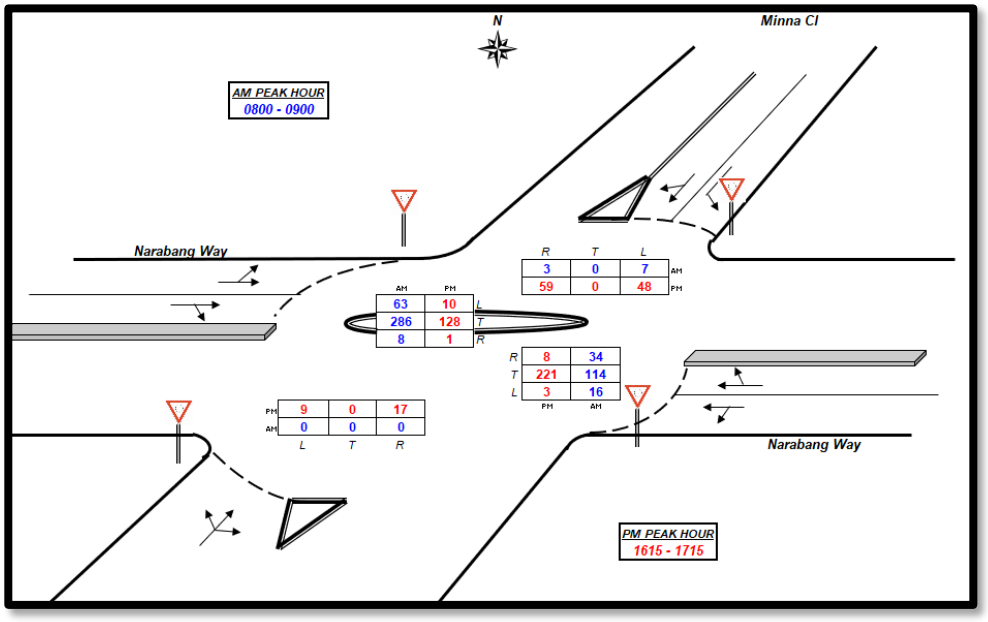
For the purposes of this assessment, it has been assumed that the ingress and trips have been assigned with a proportional distribution throughout the possible approaches to the site. Therefore, development generated traffic has been assigned as follows:

Trip Assignment

- 60% to / from the north along Narabang Way; and
- 40% to / from the south along Narabang Way.

On this basis, the projected peak hour traffic volumes at the junction of Minna Close and Narabang Way has been formulated by adding the abovementioned traffic generation and trip assignment to the existing demands presented within **Figure 4. Figure 5** below provides an estimation of the future traffic demands at the nearby public road intersection.

FIGURE 4: PROJECTED WEEKDAY PEAK HOUR TRAFFIC VOLUMES JUNCTION OF MINNA CLOSE AND NARABANG WAY



5.3 Traffic Impacts

5.3.1 Projected Intersection Performance

The junction of Minna Close and Narabang Way has been modelled in order to estimate the likely impact on traffic safety and efficiency utilising the projected traffic volumes illustrated within **Figure 5.** A summary of the most pertinent results is indicated overleaf within **Table 6** whilst more detailed summaries are provided within **Appendix 6**.

TABLE 6: SIDRA OUTPUT - PROJECTED CONDITIONS INTERSECTION OF MINNA CLOSE AND NARABANG WAY				
	Existing Conditions		Projected Conditions	
	AM	PM	AM	PM
Narabang Way North Approach				
Delay (seconds / vehicle)	7.6	7.6	7.7	7.6
Degree of Saturation	0.22	0.10	0.22	0.10
Level of Service	A	A	A	A
Narabang Way South Approach				
Delay (seconds / vehicle)	7.5	7.7	7.5	7.7
Degree of Saturation	0.09	0.14	0.09	0.14
Level of Service	A	A	A	A
Minna Close Approach				
Delay (seconds / vehicle)	9.7	8.3	9.6	8.4
Degree of Saturation	0.006	0.05	0.007	0.05
Level of Service	A	A	A	A
Development Driveway				
Delay (seconds / vehicle)	0.5	1.1	0.5	1.1
Degree of Saturation	0.003	0.03	0.003	0.03
Level of Service	A	A	A	A
Total Intersection				
Delay (seconds / vehicle)	9.7	8.3	9.6	8.4
Degree of Saturation	0.22	0.14	0.22	0.14
Level of Service	A	A	A	A

Table 6 indicates that the additional traffic generated by the proposed development is not projected to result in significant impacts on the existing operational performance of the surveyed intersection. In this regard, whilst it is expected that the additional traffic will result in some minor increases to the average vehicle delay and the degree of saturation, the prevailing level of service of the intersection is projected to remain unaltered.

5.3.2 Road Network Assessment

The surrounding public road network has been assessment to provide motorists with a good level of service with spare capacity.

The proposed development has been projected to generate up to 22 peak hour trips to and from the site. This equates to approximately one additional vehicle movement every three minutes during commuter peak periods. Such a level of additional traffic is not projected to, in itself, result in any unreasonable impacts on the existing operational performance of the surrounding local road network.

In consideration of the above, the impact of the development is most likely to be a result of the safety and efficiency with which motorists are capable of entering and exiting the development.

5.3.3 Site Access Assessment

Traffic demands within Minna Close have been observed to be low. Additionally, roundabout intersection control at the intersection of Minna Close and Narabang Way to the south-west of the site therefore results in regular and extended gaps in traffic whereby vehicles are envisaged to be able to enter and exit the site in a safe and efficient manner.

Adequate sight distance between the subject site and Minna Close is facilitated through the relatively consistent horizontal and vertical alignment of Minna Close and the low travel speeds of vehicles within Minna Close.

5.4 Parking Impacts

The proposed development provides an off-street parking provision which exceeds the relevant parking requirements of WDCP 2011. It is however acknowledged that the creation of two site access driveways in the south-western corner of the site will result in the loss of two on-street parking spaces. However, Section 3.2.5 presents that there will continue to be ready capacity within the on-street parking provision of Minna Close to accommodate the parking demand.

It is accordingly not expected that the development will result in unreasonable impacts on surrounding public road parking supply / capacity.

5.5 Transport Impacts

The subject site is located within reasonably close walking distance to bus services operating along Narabang Way. It is accordingly expected that a portion of the future centre users / staff will utilise the surrounding public transport infrastructure to access the site and other destinations throughout the Sydney metropolitan area. The capacity of the existing public transport system is however not envisaged to be measurably affected by any additional demand associated with the development, given its limited scale.

6. CONCLUSION

This report assesses the potential traffic and parking implications associated with the construction of an industrial development at 4 Minna Close, Belrose. Based on this assessment, the following conclusions are now made:

- The proposed passenger vehicle and heavy vehicle site access arrangements are compliant with the relevant AS2890.1:2004 and AS2890.2:2018 specifications and are capable of accommodating the largest vehicles expected to service the site;

- The proposed off-street passenger vehicle, motorcycle and bicycle parking provision complies with the relevant requirements of WDCP 2011;

- The on-site loading and unloading arrangements are provided in accordance with the relevant requirements of WDCP 2011;

- The internal passenger vehicle circulation arrangements as well as the internal heavy vehicle servicing arrangements are capable of providing for safe and efficient internal manoeuvring;

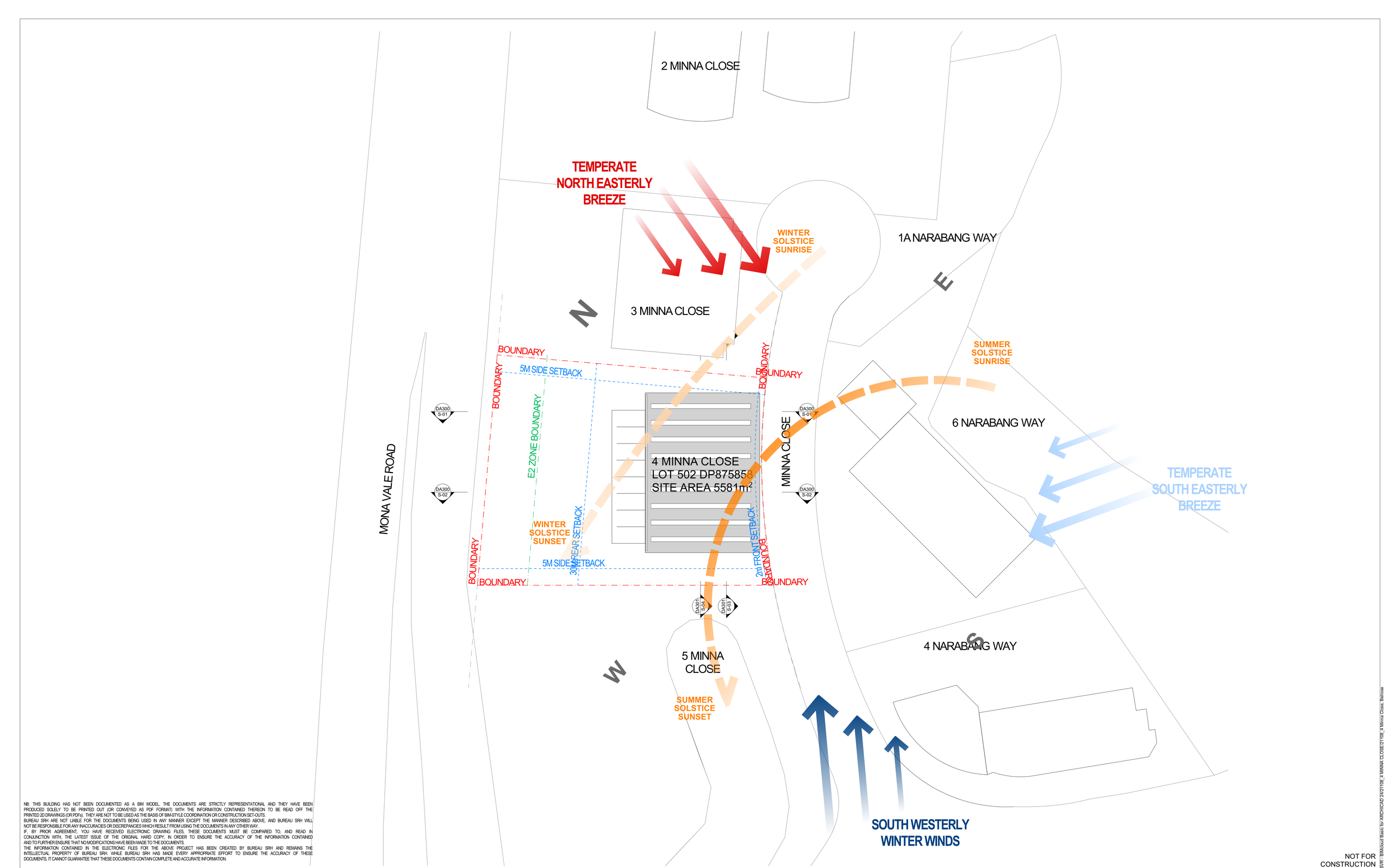
- The surrounding road network operates with a reasonable level of service during peak periods;

- The subject development has been projected to generate up to 12 peak hour vehicle trips to and from the subject site; and

- The adjoining road network is capable of accommodating the additional traffic projected to be generated by the subject development.

It is considered, based on the contents of this report and the conclusions contained herein, there are no traffic or parking related issues that should prevent construction of the subject development.

APPENDIX 1



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NOMINATED ARCHITECT: SIMON HANSON # 6739

LEGEND:

INDUSTRIAL DEVELOPMENT

REV	DATE	NAME
A	16/05/2023	Issue for DA submission

4 MINNA CLOSE, BELROSE NSW 2085

PROJECT No: 21108

STAGE: DA

DRAWING TITLE: SITE PLAN + SITE ANALYSIS

DRAWING No: DA002

REVISION: A

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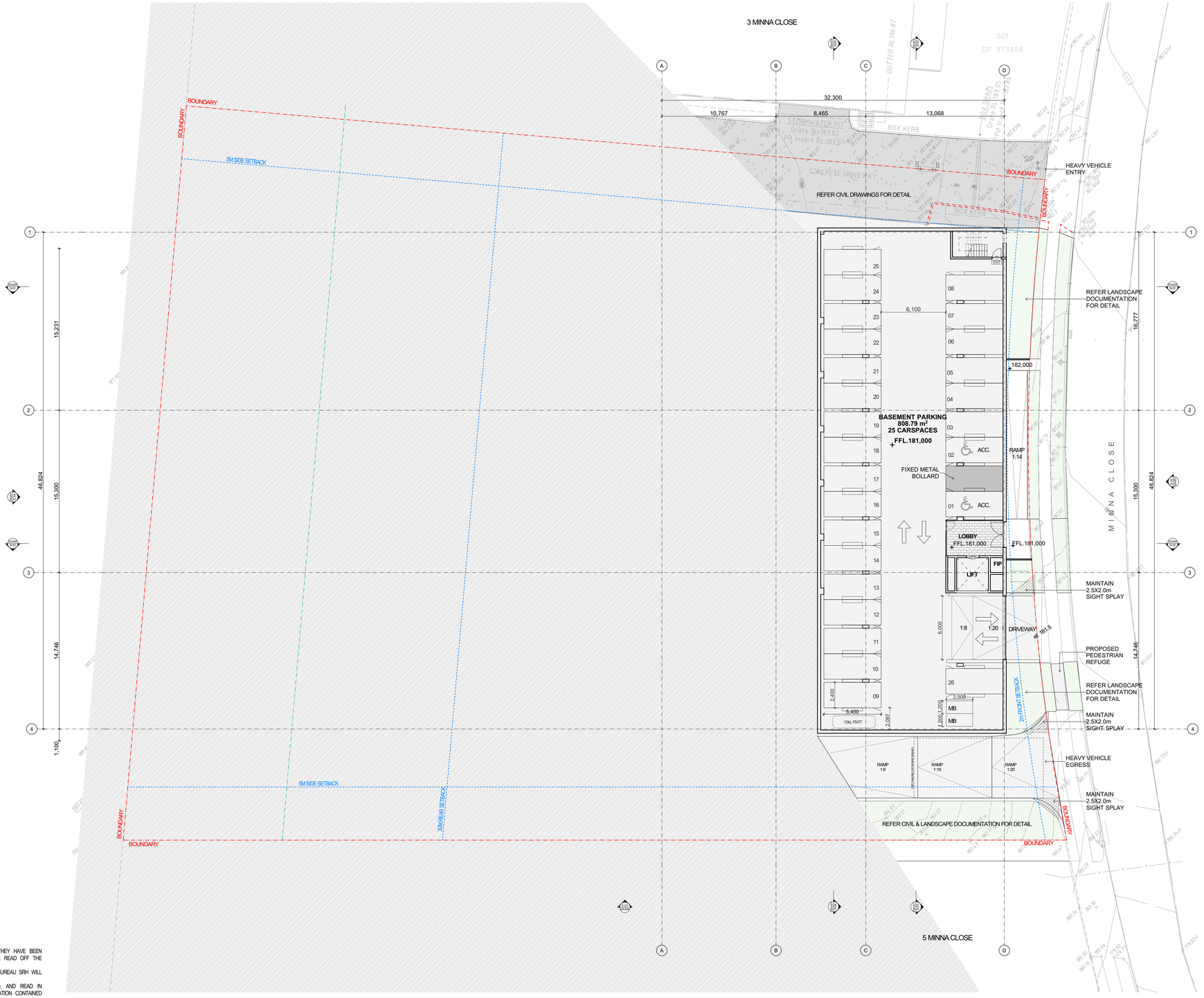
SCALE @ A3: 1:1000

CLIENT: WU PROPERTIES | CHECKED: EO
DRAWN: AS | APPROVED: SRH



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4 MINNA CLOSE, BELROSE NSW 2085

PROJECT No: **21108**

STAGE: **DA**

DRAWING TITLE: **BASEMENT PLAN**

DRAWING No: **DA100**

REVISION: **A**

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4 MINNA CLOSE, BELROSE NSW 2085

PROJECT No: **21108**

STAGE: **DA**

DRAWING TITLE: **GROUND FLOOR PLAN**

DRAWING No: **DA101**

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DRAWN: **AS** | APPROVED: **SRH**

REVISION: **A**

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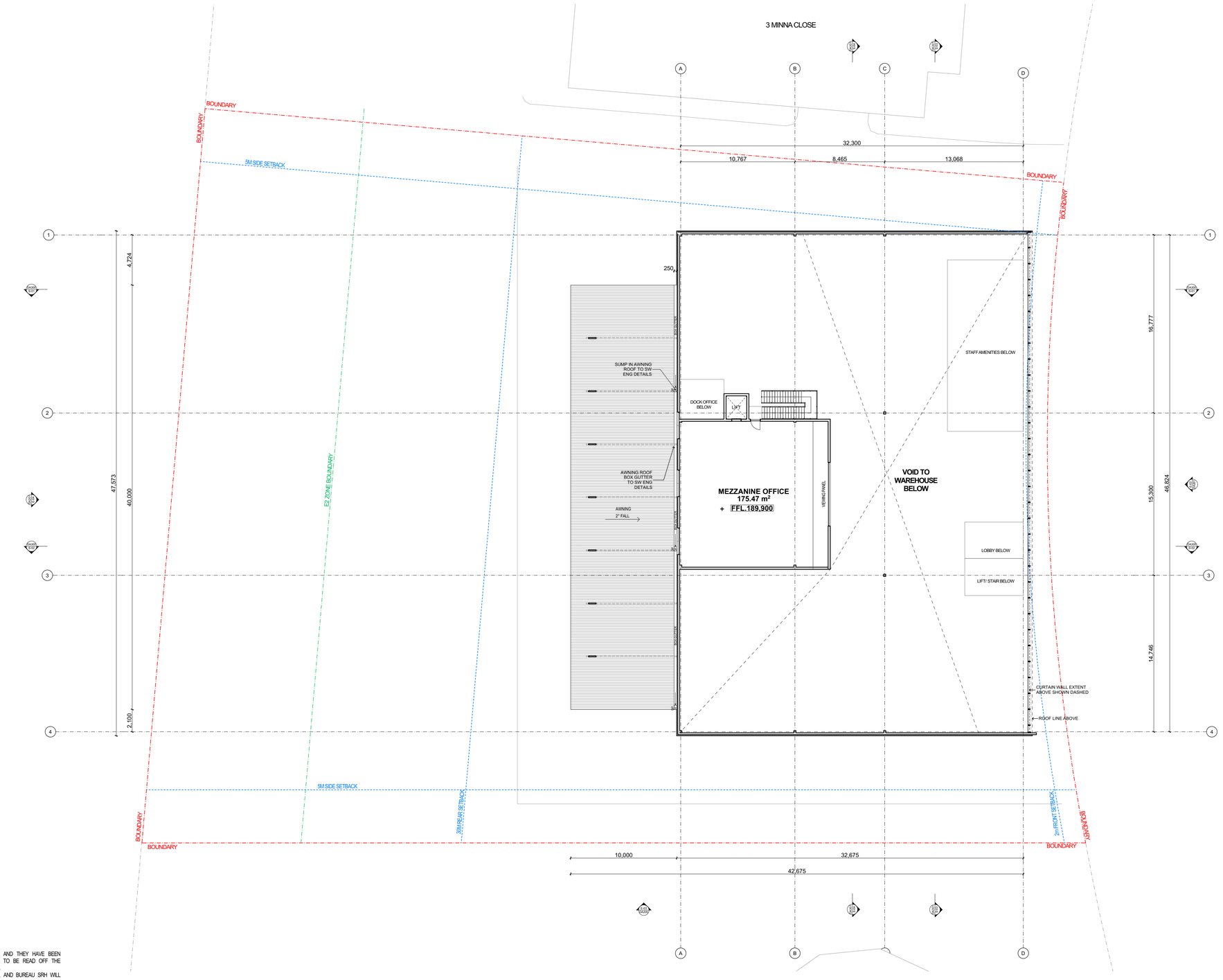

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4 MINNA CLOSE, BELROSE NSW 2085

PROJECT No: **21108**

STAGE: **DA**

DRAWING TITLE: **FIRST FLOOR PLAN**

DRAWING No: **DA102**

REVISION: **A**

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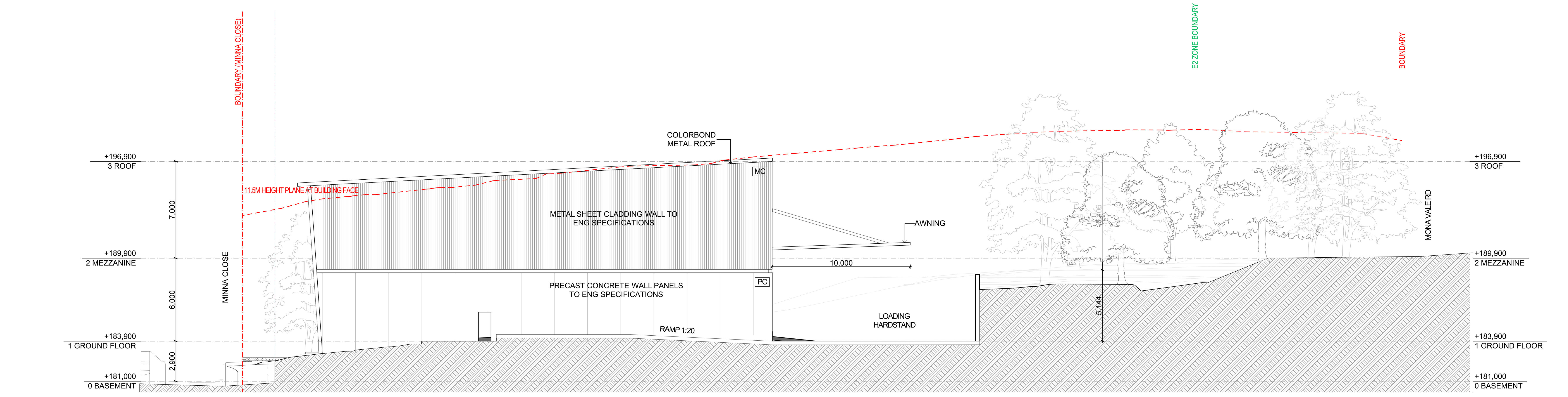

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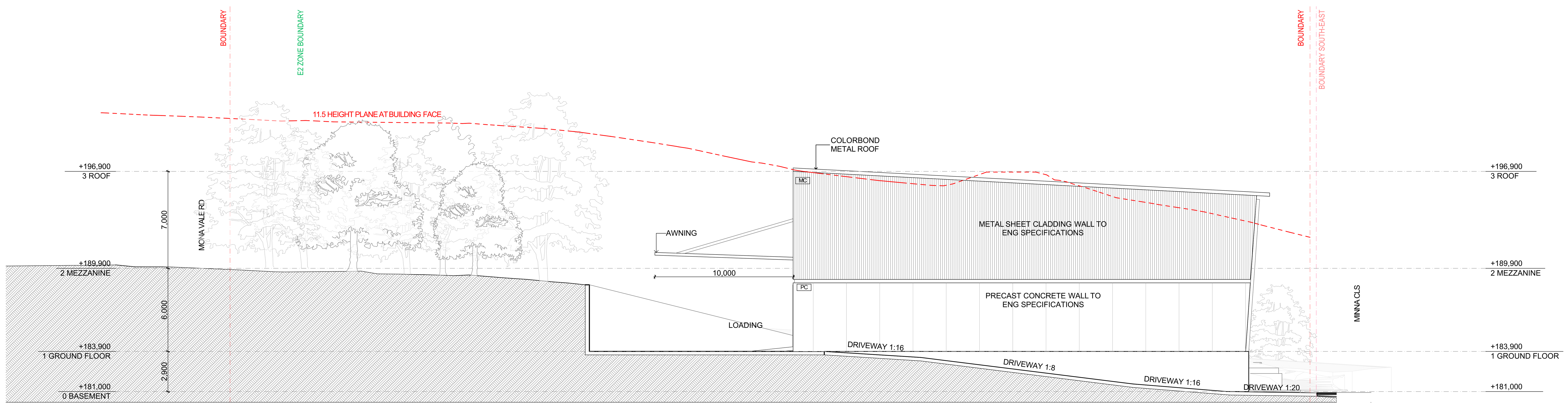

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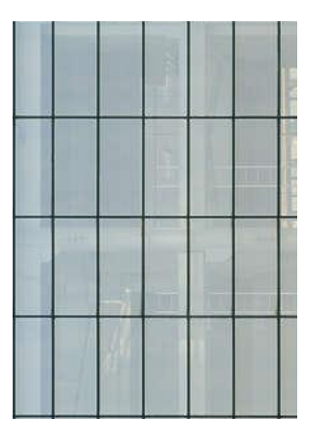

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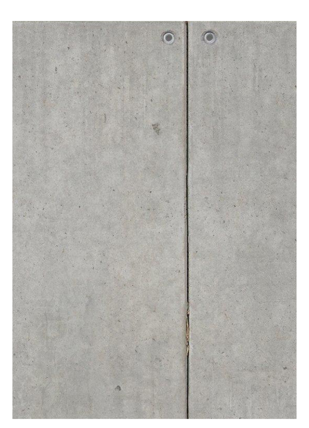

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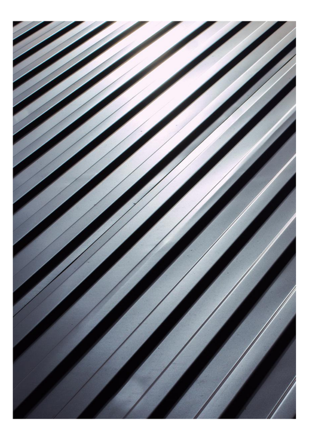

MS - METAL ROOF SHEETING

MC - METAL SHEET CLADDING

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PROJECT No: **21108**

STAGE: **DA**

SCALE @ A1: **1:200**
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DRAWING TITLE:
ELEVATIONS SHEET 01

CLIENT: **WU PROPERTIES**
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CHECKED: **EO**
APPROVED: **SRH**

DRAWING No:
DA200

REVISION:
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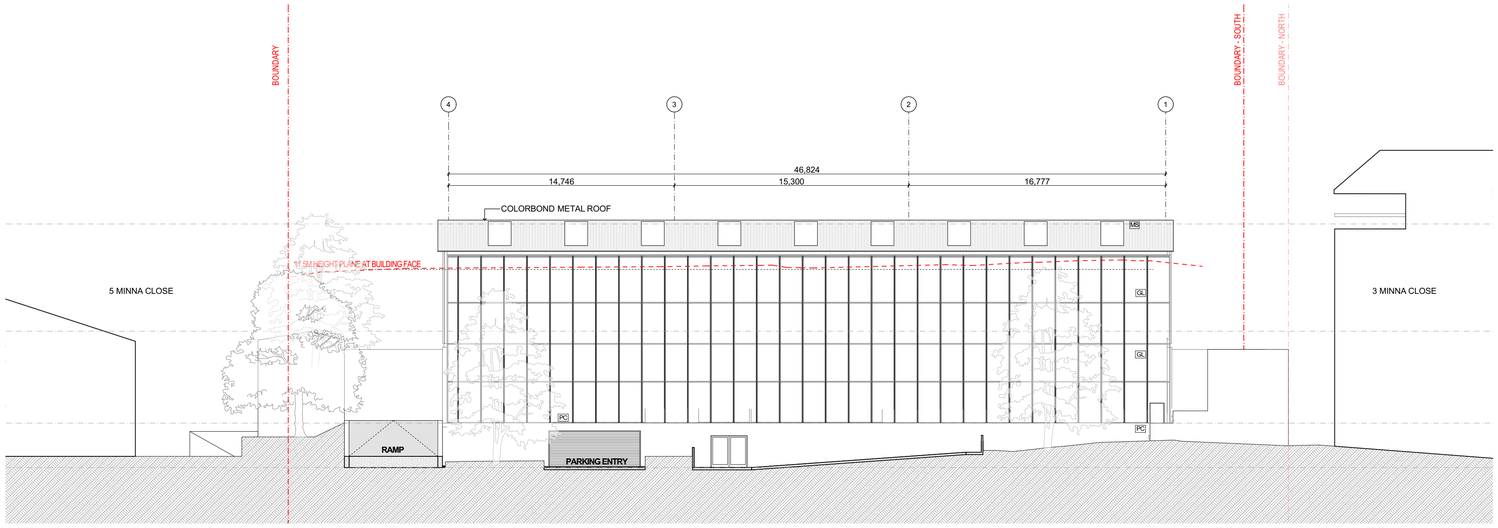

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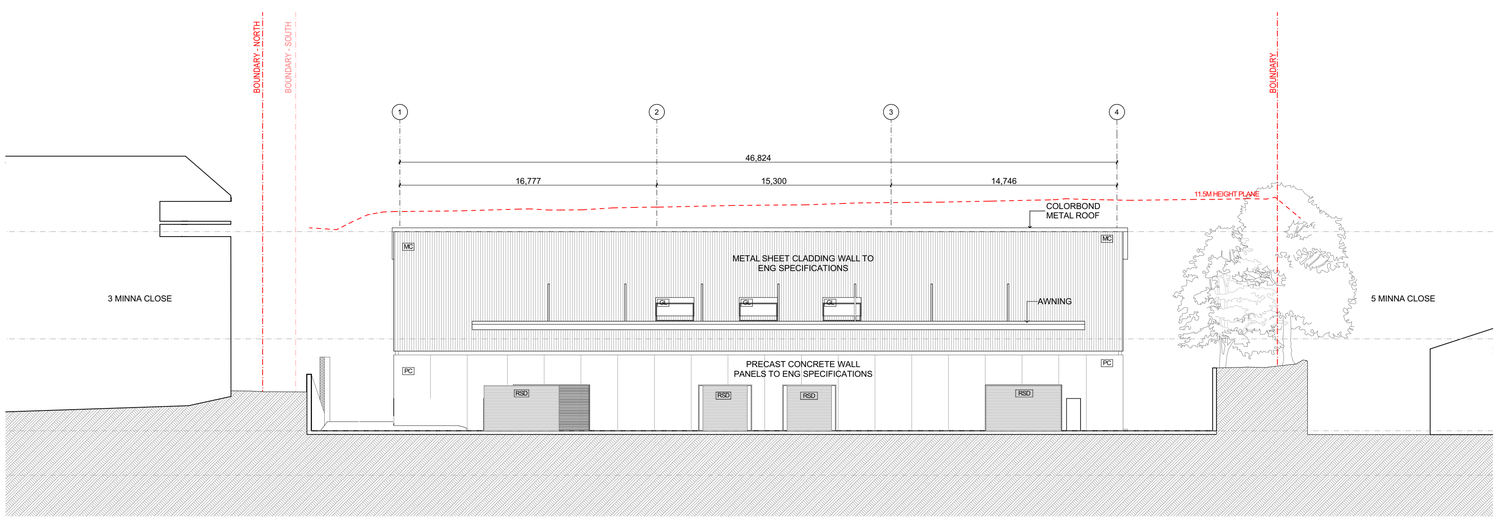

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PC - PRECAST PANEL

MS - METAL ROOF SHEETING

MC - METAL SHEET CLADDING

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REV	DATE	NAME
A	16/05/2023	Issue for DA submission

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PROJECT No: **21108**

STAGE: **DA**

DRAWING TITLE: **ELEVATIONS SHEET 02**

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REVISION: **A**

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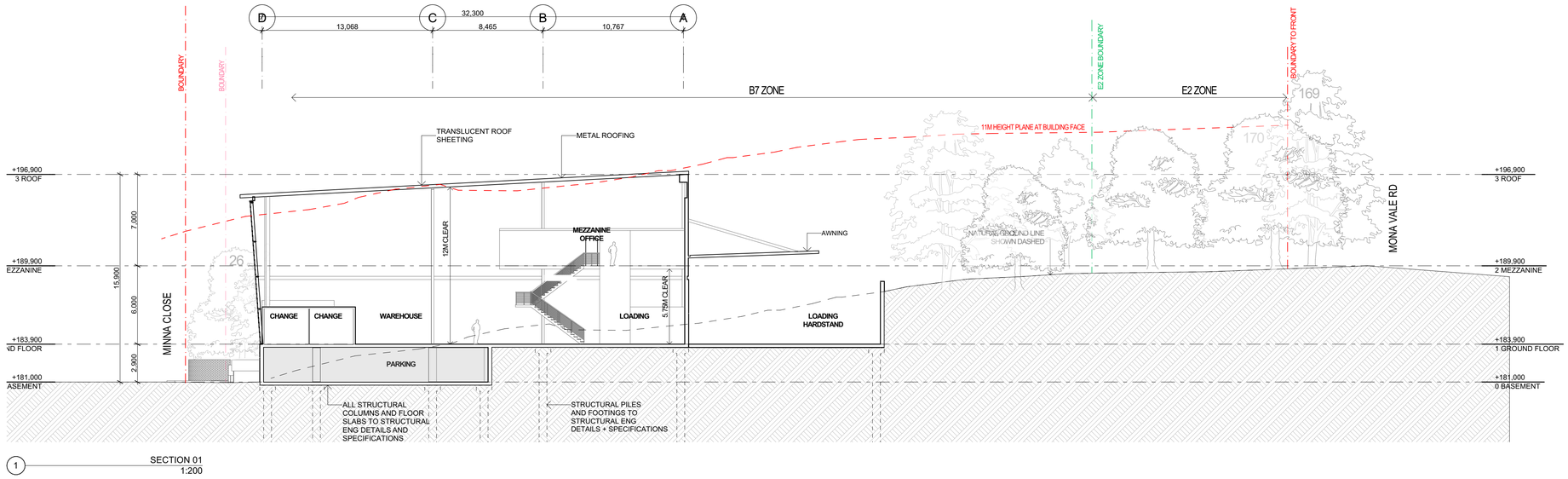

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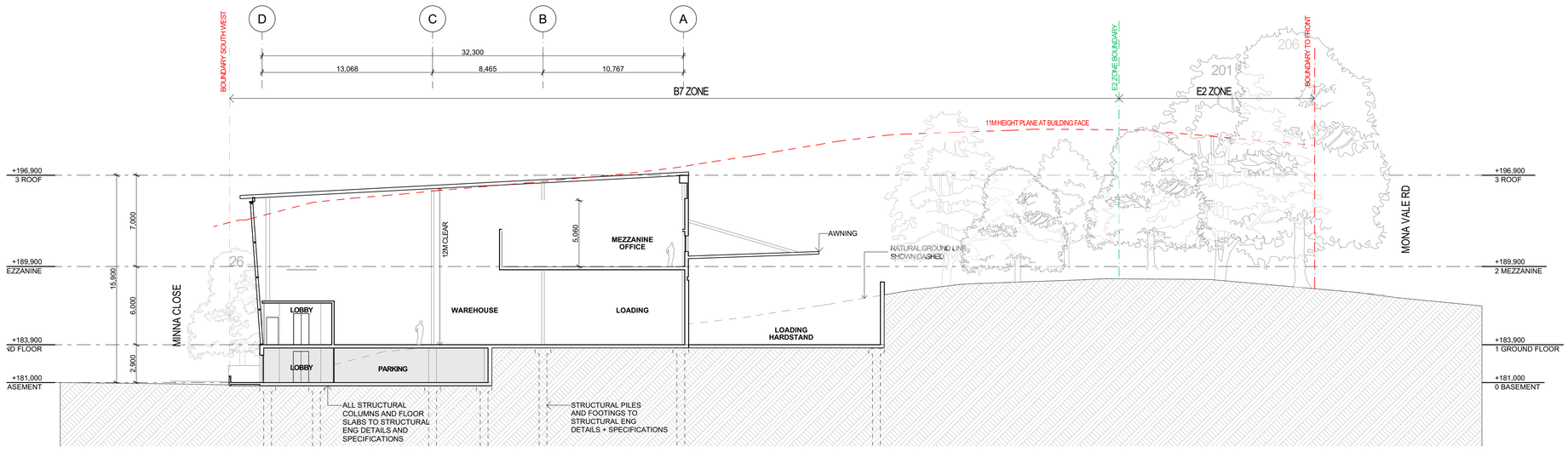

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REV	DATE	NAME
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4 MINNA CLOSE, BELROSE NSW 2085

PROJECT No: **21108**

STAGE: **DA**

DRAWING TITLE: **SECTIONS SHEET 01**

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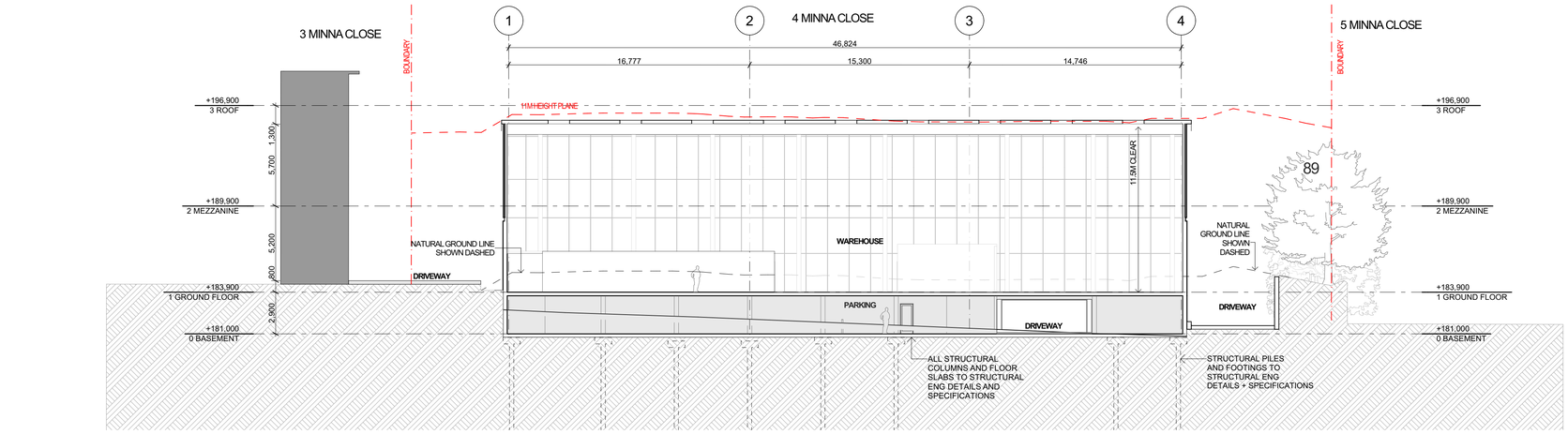

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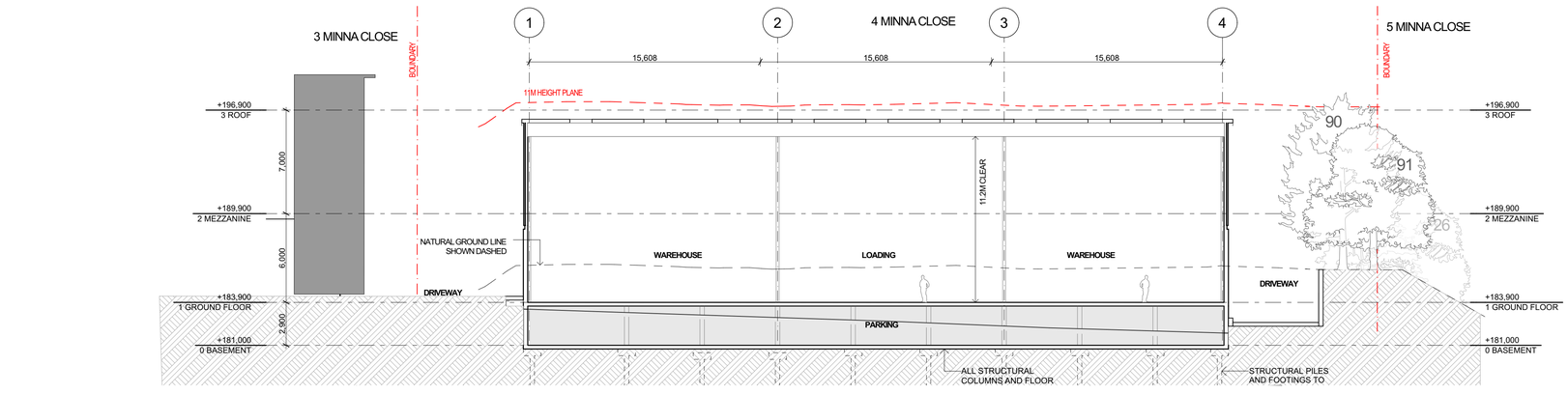

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BUREAU SRH | architecture
NOMINATED ARCHITECT: SIMON HANSON # 6739

STUDIO 3 | 2 VERONA STREET | PADDINGTON | NSW | 2021 | AUSTRALIA |
ABN: 94 115 880 834 | TEL: +61 2 9380 4666 | admin@bureausrh.com

LEGEND:

INDUSTRIAL DEVELOPMENT

REV	DATE	NAME
A	16/05/2023	Issue for DA submission

4 MINNA CLOSE, BELROSE NSW 2085

PROJECT No: **21108**

STAGE: **DA**

DRAWING TITLE: **SECTION SHEET 02**

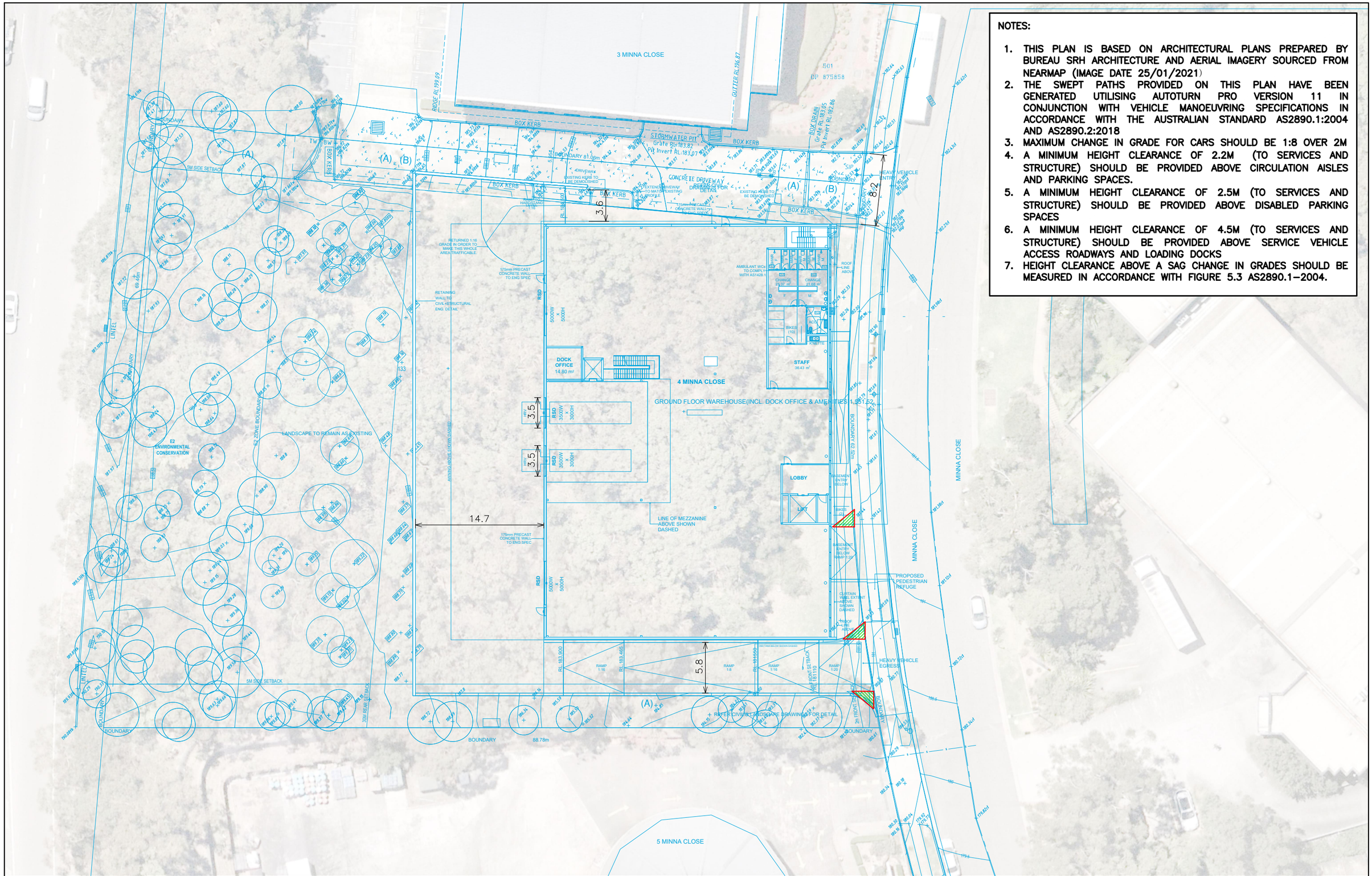
DRAWING No: **DA301**

SCALE @ A1: **1:200**
SCALE @ A3:

CLIENT: **WU PROPERTIES** | CHECKED: **EO**
DRAWN: **AS** | APPROVED: **SRH**

REVISION: **A**

APPENDIX 2



NOTES:

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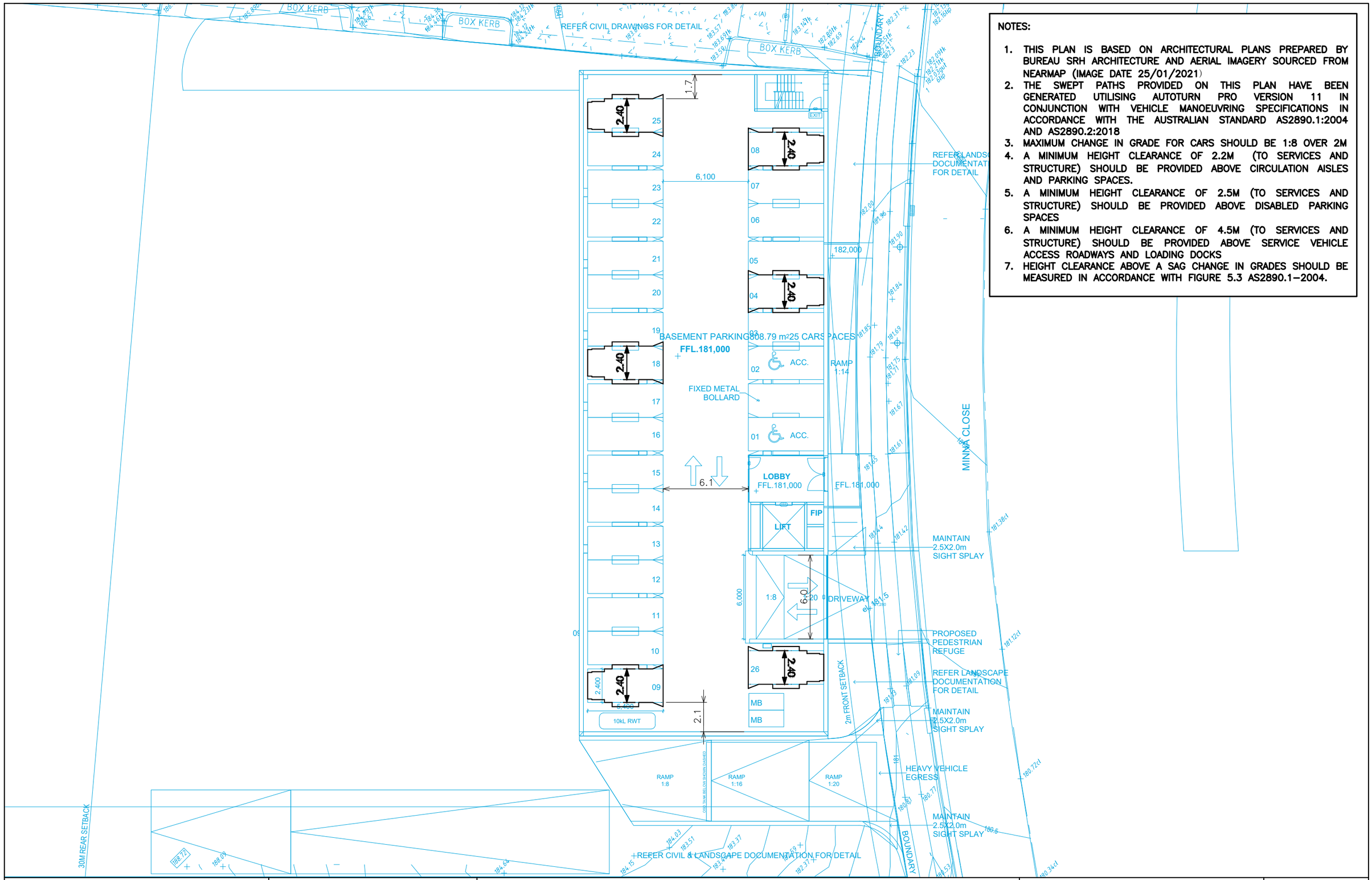
STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

ADDRESS: 401/380 HARRIS ST, PYRMONT
PH: (02) 8971 8314
EMAIL: info@stanburytraffic.com.au
WEBSITE: www.stanburytraffic.com.au

STANBURY TRAFFIC PLANNING

4 MINNA CLOSE BELROSE
CAR PARK COMPLIANCE REVIEW
CONCEPT LAYOUT
GROUND

SCALE 0 4.0 8.0	1:400@A3	CREATED BY Y.H
DRAWING NO.	22–003–04–V3	APPROVED BY M.S
DATE	18 May 2023	SHEET 01 / 07



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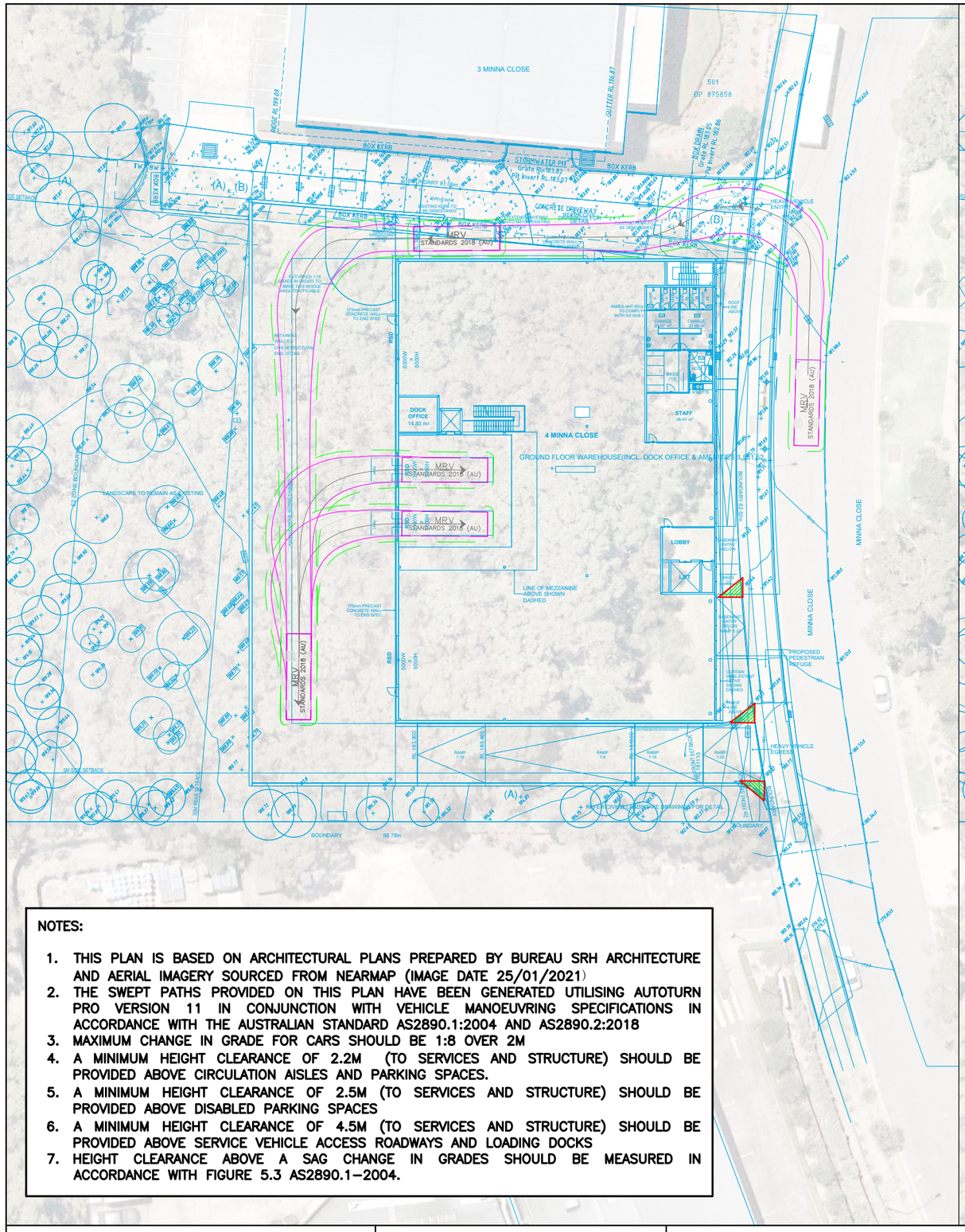
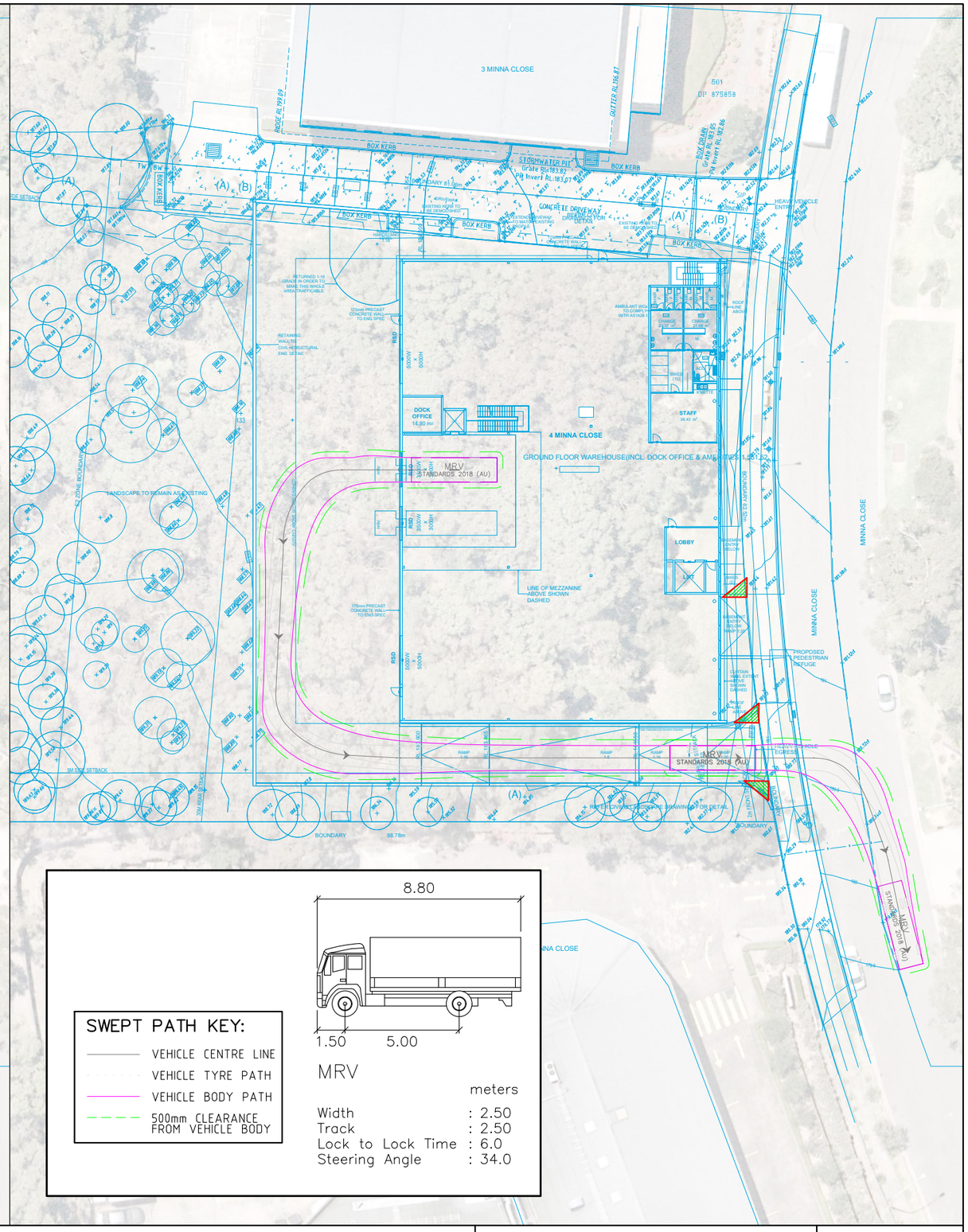
STANBURY TRAFFIC PLANNING

4 MINNA CLOSE BELROSE
CAR PARK COMPLIANCE REVIEW
CONCEPT LAYOUT
BASEMENT

SCALE 0 2.5 5.0	1:250@A3	CREATED BY Y.H
DRAWING NO.	22–003–04–V3	APPROVED BY M.S
DATE	18 May 2023	SHEET 02 / 07





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SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

MRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

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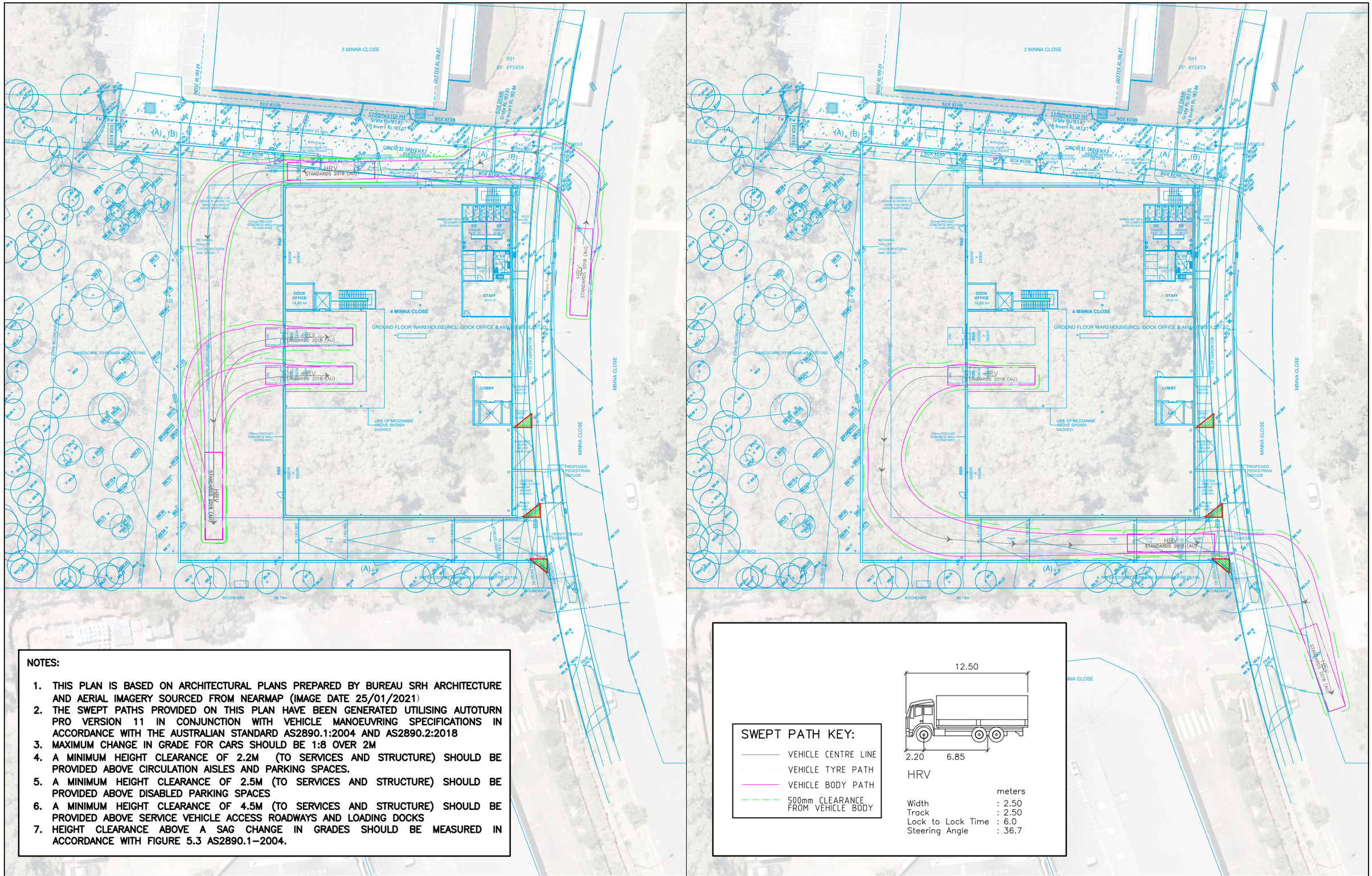
STANBURY TRAFFIC PLANNING

4 MINNA CLOSE BELROSE
CAR PARK COMPLIANCE REVIEW
SWEPT PATH ASSESSMENT
GROUND

SCALE	0 5.0 10.0 1:500@A3	CREATED BY	Y.H
DRAWING NO.	22–003–04–V3	APPROVED BY	M.S
DATE	18 May 2023	SHEET	03 / 07



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- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

HRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.7

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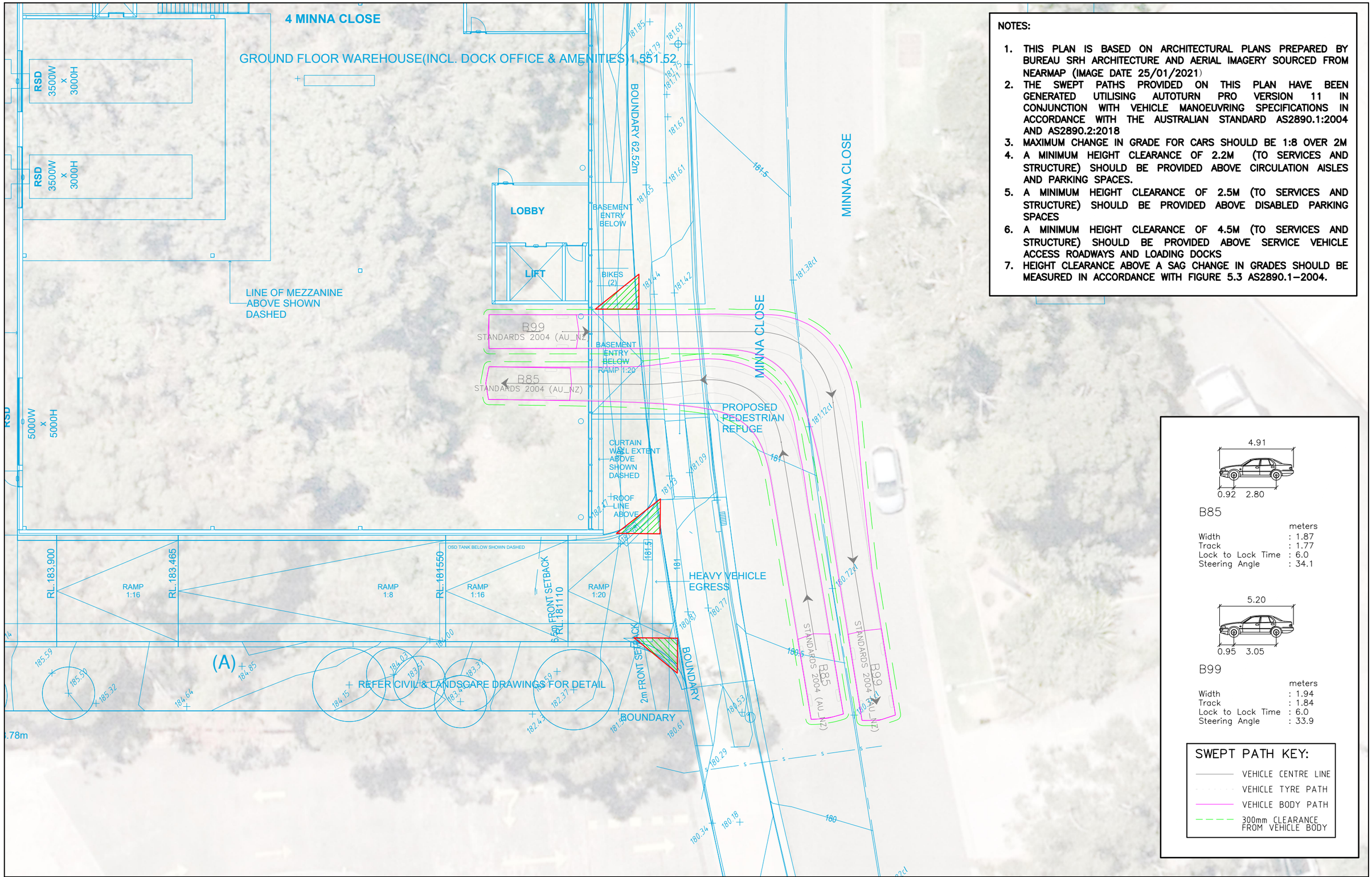
4 MINNA CLOSE BELROSE
CAR PARK COMPLIANCE REVIEW
SWEPT PATH ASSESSMENT
GROUND

SCALE	0 5.0 10.0 1:500@A3	CREATED BY	Y.H
DRAWING NO.	22–003–04–V3	APPROVED BY	M.S
DATE	18 May 2023	SHEET	04 / 07



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B85

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

B99

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

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

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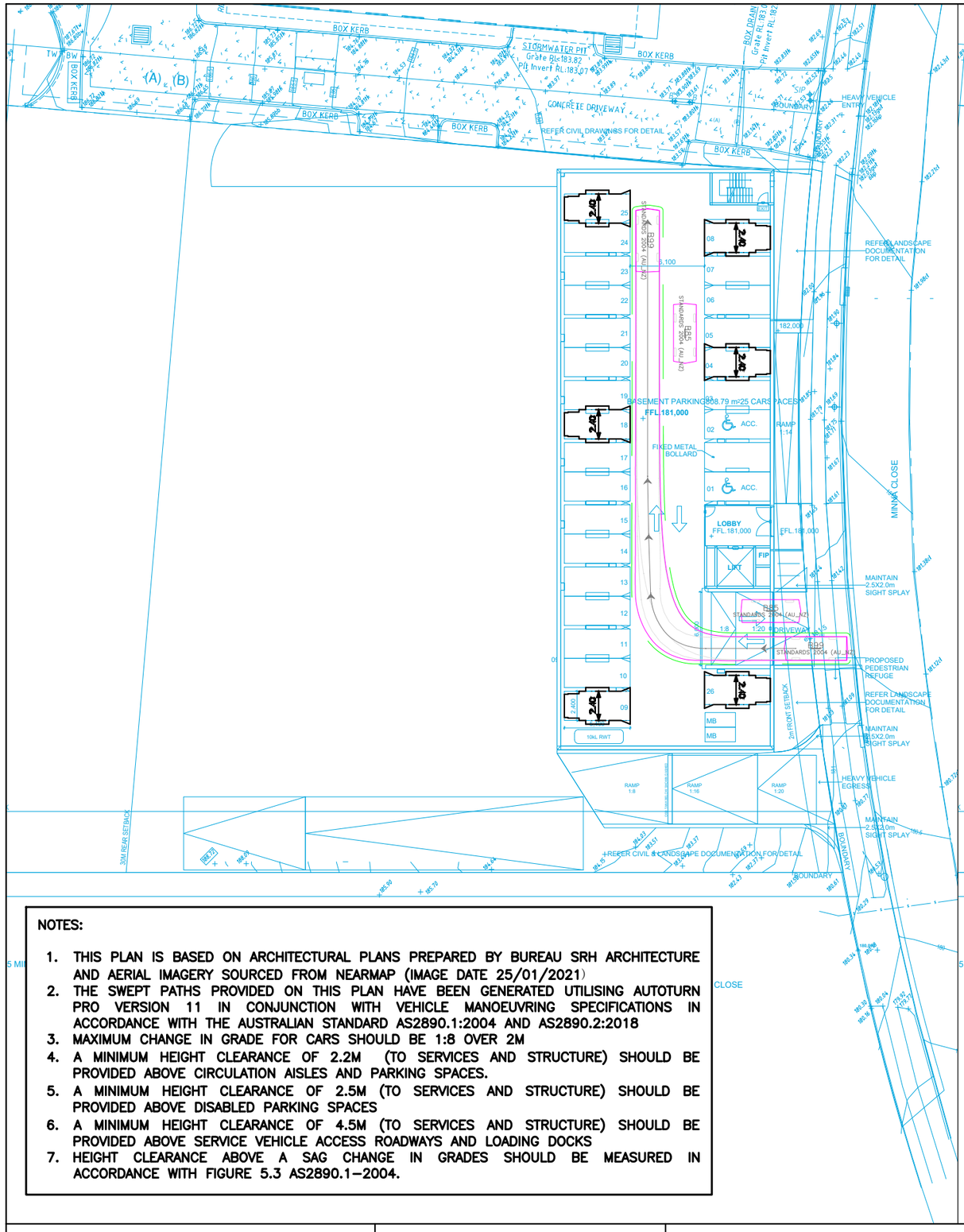
4 MINNA CLOSE BELROSE
CAR PARK COMPLIANCE REVIEW
SWEPT PATH ASSESSMENT
GROUND

SCALE 0 2.0 4.0	1:200@A3	CREATED BY Y.H
DRAWING NO.	22–003–04–V3	APPROVED BY M.S
DATE	18 May 2023	SHEET 05 / 07



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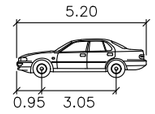
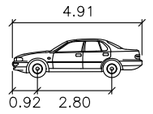


B99

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



B85

	meters
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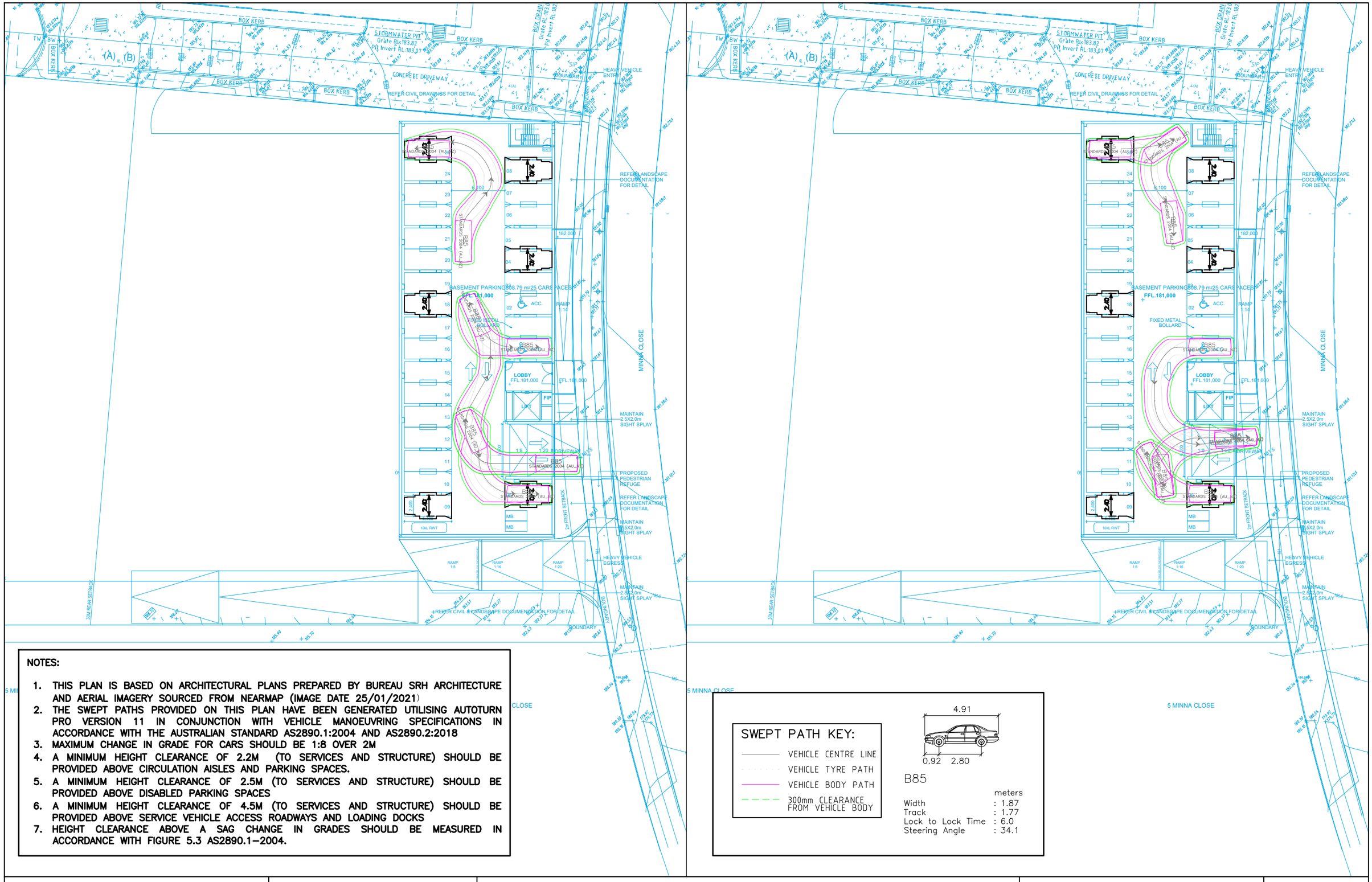
STANBURY TRAFFIC PLANNING

4 MINNA CLOSE BELROSE
CAR PARK COMPLIANCE REVIEW
SWEPT PATH ASSESSMENT
BASEMENT

SCALE 0 4.0 8.0 1:400@A3
DRAWING NO. 22–003–04–V3
DATE 18 May 2023

CREATED BY Y.H
APPROVED BY M.S
SHEET 06 / 07



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CAR PARK COMPLIANCE REVIEW
SWEPT PATH ASSESSMENT
BASEMENT

SCALE 0 4.0 8.0	1:400@A3	CREATED BY Y.H
DRAWING NO.	22–003–04–V3	APPROVED BY M.S
DATE	18 May 2023	SHEET 07 / 07

APPENDIX 3

R.O.A.R. DATA

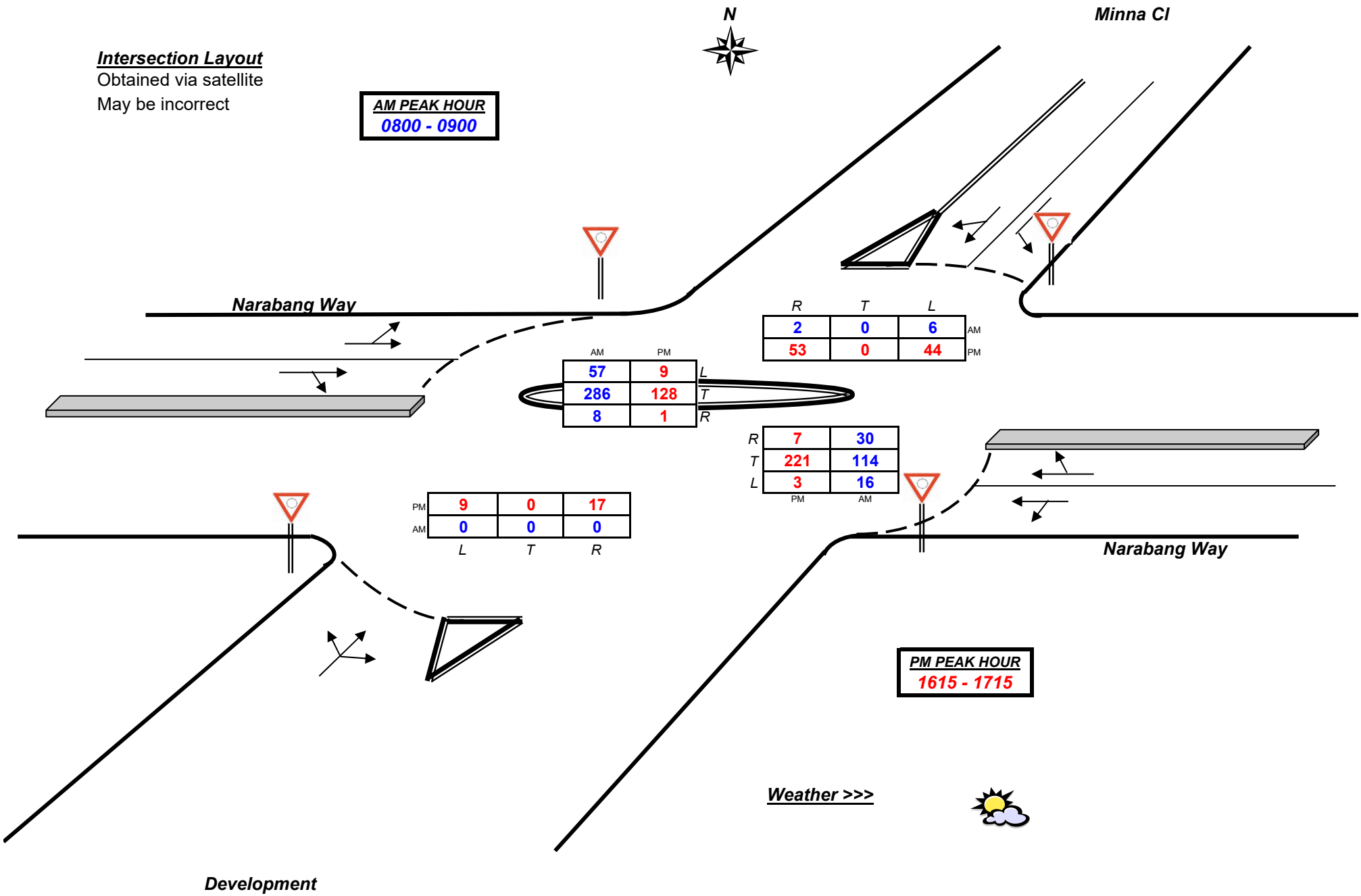
Reliable, Original & Authentic Results

Ph. Mob.0418-239019

Client : Stanbury Traffic Planning
Job No/Name : 7720 BELROSE Minna Close
Day/Date : Friday 29th July 2022

Intersection Layout
Obtained via satellite
May be incorrect

AM PEAK HOUR
0800 - 0900



PM PEAK HOUR
1615 - 1715

Weather >>>

APPENDIX 4

MOVEMENT SUMMARY

Site: 101 [Minna Close and Narabang Way - AM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

AM Existing Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Narabang Way South															
1	L2	All MCs	17	10.0	17	10.0	0.038	2.9	LOS A	0.2	1.3	0.08	0.31	0.08	36.4
2	T1	All MCs	120	10.0	120	10.0	0.086	2.2	LOS A	0.4	3.0	0.07	0.35	0.07	46.7
3	R2	All MCs	32	10.0	32	10.0	0.086	7.5	LOS A	0.4	3.0	0.07	0.36	0.07	44.6
Approach			168	10.0	168	10.0	0.086	3.3	LOS A	0.4	3.0	0.07	0.35	0.07	45.4
East: Minna Close															
4	L2	All MCs	6	10.0	6	10.0	0.006	4.2	LOS A	0.0	0.2	0.47	0.43	0.47	45.2
5	T1	All MCs	1	10.0	1	10.0	0.004	4.4	LOS A	0.0	0.1	0.50	0.52	0.50	26.8
6	R2	All MCs	2	10.0	2	10.0	0.004	9.7	LOS A	0.0	0.1	0.50	0.52	0.50	38.9
Approach			9	10.0	9	10.0	0.006	5.4	LOS A	0.0	0.2	0.48	0.46	0.48	42.5
North: Narabang Way North															
7	L2	All MCs	60	10.0	60	10.0	0.069	3.2	LOS A	0.3	2.6	0.18	0.39	0.18	43.6
8	T1	All MCs	301	10.0	301	10.0	0.215	2.3	LOS A	1.2	9.3	0.15	0.27	0.15	47.0
9	R2	All MCs	8	10.0	8	10.0	0.215	7.6	LOS A	1.2	9.3	0.15	0.27	0.15	20.5
Approach			369	10.0	369	10.0	0.215	2.6	LOS A	1.2	9.3	0.16	0.29	0.16	46.1
West: Site Driveway															
10	L2	All MCs	1	10.0	1	10.0	0.003	0.5	LOS A	0.0	0.0	0.15	0.06	0.15	23.2
11	T1	All MCs	1	10.0	1	10.0	0.003	0.3	LOS A	0.0	0.0	0.15	0.06	0.15	19.5
12	R2	All MCs	1	10.0	1	10.0	0.003	0.3	LOS A	0.0	0.0	0.15	0.06	0.15	30.1
Approach			3	10.0	3	10.0	0.003	0.4	LOS A	0.0	0.0	0.15	0.06	0.15	25.1
All Vehicles			551	10.0	551	10.0	0.215	2.8	LOS A	1.2	9.3	0.14	0.31	0.14	45.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Minna Close and Narabang Way - PM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

PM Existing Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Narabang Way South															
1	L2	All MCs	3	10.0	3	10.0	0.061	3.3	LOS A	0.3	2.2	0.22	0.30	0.22	36.1
2	T1	All MCs	233	10.0	233	10.0	0.140	2.5	LOS A	0.7	5.5	0.20	0.29	0.20	46.8
3	R2	All MCs	7	10.0	7	10.0	0.140	7.7	LOS A	0.7	5.5	0.20	0.29	0.20	44.8
Approach			243	10.0	243	10.0	0.140	2.7	LOS A	0.7	5.5	0.20	0.29	0.20	46.6
East: Minna Close															
4	L2	All MCs	46	10.0	46	10.0	0.043	3.5	LOS A	0.2	1.7	0.35	0.41	0.35	45.6
5	T1	All MCs	1	10.0	1	10.0	0.049	3.0	LOS A	0.3	1.9	0.34	0.57	0.34	26.6
6	R2	All MCs	56	10.0	56	10.0	0.049	8.3	LOS A	0.3	1.9	0.34	0.57	0.34	38.4
Approach			103	10.0	103	10.0	0.049	6.1	LOS A	0.3	1.9	0.35	0.50	0.35	41.9
North: Narabang Way North															
7	L2	All MCs	9	10.0	9	10.0	0.011	3.1	LOS A	0.1	0.4	0.15	0.38	0.15	43.8
8	T1	All MCs	135	10.0	135	10.0	0.097	2.3	LOS A	0.5	3.9	0.13	0.26	0.13	47.2
9	R2	All MCs	1	10.0	1	10.0	0.097	7.6	LOS A	0.5	3.9	0.13	0.26	0.13	20.6
Approach			145	10.0	145	10.0	0.097	2.3	LOS A	0.5	3.9	0.13	0.27	0.13	46.9
West: Site Driveway															
10	L2	All MCs	9	10.0	9	10.0	0.027	1.1	LOS A	0.1	0.5	0.24	0.15	0.24	22.4
11	T1	All MCs	1	10.0	1	10.0	0.027	0.6	LOS A	0.1	0.5	0.24	0.15	0.24	18.9
12	R2	All MCs	18	10.0	18	10.0	0.027	0.6	LOS A	0.1	0.5	0.24	0.15	0.24	29.2
Approach			28	10.0	28	10.0	0.027	0.8	LOS A	0.1	0.5	0.24	0.15	0.24	27.1
All Vehicles			520	10.0	520	10.0	0.140	3.2	LOS A	0.7	5.5	0.21	0.32	0.21	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

APPENDIX 5

MOVEMENT SUMMARY

Site: 101 [Minna Close and Narabang Way - AM (Site Folder: Projected - 2)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

AM Projected Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Narabang Way South															
1	L2	All MCs	17	10.0	17	10.0	0.039	2.9	LOS A	0.2	1.3	0.08	0.31	0.08	36.4
2	T1	All MCs	120	10.0	120	10.0	0.089	2.2	LOS A	0.4	3.2	0.07	0.36	0.07	46.6
3	R2	All MCs	36	10.0	36	10.0	0.089	7.5	LOS A	0.4	3.2	0.07	0.37	0.07	44.5
Approach			173	10.0	173	10.0	0.089	3.4	LOS A	0.4	3.2	0.07	0.35	0.07	45.3
East: Minna Close															
4	L2	All MCs	7	10.0	7	10.0	0.007	4.2	LOS A	0.0	0.3	0.47	0.43	0.47	45.2
5	T1	All MCs	1	10.0	1	10.0	0.005	4.3	LOS A	0.0	0.2	0.49	0.54	0.49	26.6
6	R2	All MCs	3	10.0	3	10.0	0.005	9.6	LOS A	0.0	0.2	0.49	0.54	0.49	38.6
Approach			12	10.0	12	10.0	0.007	5.7	LOS A	0.0	0.3	0.48	0.47	0.48	42.4
North: Narabang Way North															
7	L2	All MCs	66	10.0	66	10.0	0.077	3.3	LOS A	0.4	2.9	0.19	0.39	0.19	43.6
8	T1	All MCs	301	10.0	301	10.0	0.217	2.3	LOS A	1.2	9.4	0.17	0.28	0.17	47.0
9	R2	All MCs	8	10.0	8	10.0	0.217	7.7	LOS A	1.2	9.4	0.17	0.28	0.17	20.5
Approach			376	10.0	376	10.0	0.217	2.6	LOS A	1.2	9.4	0.17	0.30	0.17	46.0
West: Site Driveway															
10	L2	All MCs	1	10.0	1	10.0	0.003	0.5	LOS A	0.0	0.0	0.15	0.06	0.15	23.2
11	T1	All MCs	1	10.0	1	10.0	0.003	0.4	LOS A	0.0	0.0	0.15	0.06	0.15	19.5
12	R2	All MCs	1	10.0	1	10.0	0.003	0.3	LOS A	0.0	0.0	0.15	0.06	0.15	30.1
Approach			3	10.0	3	10.0	0.003	0.4	LOS A	0.0	0.0	0.15	0.06	0.15	25.1
All Vehicles			563	10.0	563	10.0	0.217	2.9	LOS A	1.2	9.4	0.15	0.32	0.15	45.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Minna Close and Narabang Way - PM (Site Folder: Projected - 2)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

PM Projected Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Narabang Way South															
1	L2	All MCs	3	10.0	3	10.0	0.062	3.4	LOS A	0.3	2.2	0.23	0.30	0.23	36.1
2	T1	All MCs	233	10.0	233	10.0	0.142	2.6	LOS A	0.7	5.6	0.21	0.30	0.21	46.7
3	R2	All MCs	8	10.0	8	10.0	0.142	7.7	LOS A	0.7	5.6	0.21	0.30	0.21	44.7
Approach			244	10.0	244	10.0	0.142	2.8	LOS A	0.7	5.6	0.21	0.30	0.21	46.5
East: Minna Close															
4	L2	All MCs	51	10.0	51	10.0	0.047	3.5	LOS A	0.2	1.9	0.35	0.41	0.35	45.6
5	T1	All MCs	1	10.0	1	10.0	0.054	3.0	LOS A	0.3	2.2	0.34	0.57	0.34	26.6
6	R2	All MCs	62	10.0	62	10.0	0.054	8.4	LOS A	0.3	2.2	0.34	0.57	0.34	38.4
Approach			114	10.0	114	10.0	0.054	6.1	LOS A	0.3	2.2	0.35	0.50	0.35	41.8
North: Narabang Way North															
7	L2	All MCs	11	10.0	11	10.0	0.012	3.1	LOS A	0.1	0.4	0.15	0.38	0.15	43.8
8	T1	All MCs	135	10.0	135	10.0	0.097	2.3	LOS A	0.5	3.9	0.13	0.26	0.13	47.2
9	R2	All MCs	1	10.0	1	10.0	0.097	7.6	LOS A	0.5	3.9	0.13	0.26	0.13	20.6
Approach			146	10.0	146	10.0	0.097	2.4	LOS A	0.5	3.9	0.13	0.27	0.13	46.9
West: Site Driveway															
10	L2	All MCs	9	10.0	9	10.0	0.027	1.1	LOS A	0.1	0.5	0.25	0.15	0.25	22.4
11	T1	All MCs	1	10.0	1	10.0	0.027	0.7	LOS A	0.1	0.5	0.25	0.15	0.25	18.9
12	R2	All MCs	18	10.0	18	10.0	0.027	0.6	LOS A	0.1	0.5	0.25	0.15	0.25	29.2
Approach			28	10.0	28	10.0	0.027	0.8	LOS A	0.1	0.5	0.25	0.15	0.25	27.0
All Vehicles			533	10.0	533	10.0	0.142	3.3	LOS A	0.7	5.6	0.22	0.33	0.22	44.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.