TRAFFIX
TRAFFIC AND TRANSPORT PLANNERS

TRAFFIC IMPACT ASSESSMENT (TIA)

Proposed Residential, Child Care and Community Hall Development
12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards NSW 2065

Reference: 21.519r01v04
Date: June 2022

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Project	12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards NSW 2065			
Client	Aqualand St Leonard Development 3 P/L			
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TRAFFIX

CONTENTS

1. INTRODUCTION

TRAFFIX has been commissioned by Aqualand St Leonard 3 Development P/L to undertake a traffic impact assessment (TIA) in support of a development application (DA) relating to a Proposed Residential, Child Care and Community Hall Development at 12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards NSW 2065, comprising 130 apartments, a child care centre and community hall. The development is located within the Lane Cove Municipal Council Local Government Area (LGA) and has been assessed under that Council's controls.

This report documents the findings of our investigations and should be read in the context of the Statement of Environmental Effects (SEE) prepared separately. The development is a minor development and does not require referral to Transport for NSW (TfNSW) under the provisions of State Environmental Planning Policy (Transport and Infrastructure) 2021.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Presents the overall study conclusions

2. LOCATION AND SITE

The subject site is known as 12-20 Berry Road & 11-19 Holdsworth Avenue, St Leonards NSW 2065 and is located on the northern side of River Road, about 120 metres south of Marshall Avenue. It is also located about 425 metres west of St Leonards Railway Station and 5.1 kilometres northwest of the Sydney CBD.

The site has a total site area of approximately 5,015m^2 and consists of 10 residential dwellings. It has a eastern frontage of 76 metres to Holdsworth Avenue and a western frontage of 61 metres to Berry Road. It is bounded to the north, south by residential developments.

Vehicular access to the site is currently provided via driveways to the residential properties along Holdsworth Avenue and Berry Road.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**.

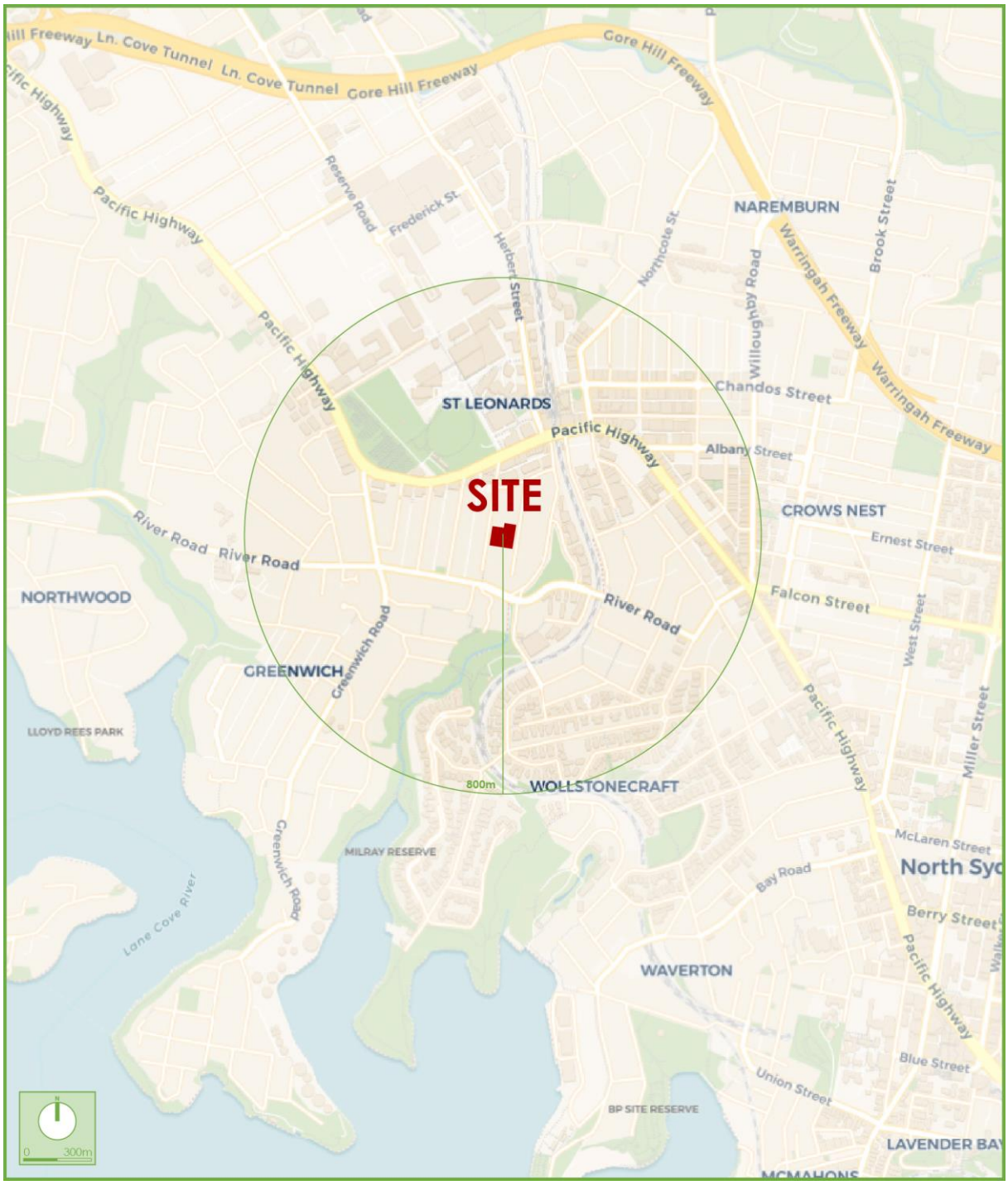

Figure 1: Location Plan

Figure 2: Site Plan

3. EXISTING TRAFFIC CONDITIONS

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads of particular interest:

- Pacific Highway: a TfNSW Classified Highway (HW 10) that traverses north-south between the Queensland border in the north and the Warringah Freeway in the south. Pacific Highway accommodates three (3) lanes of traffic in each direction with T3 transit lanes operating in both left lanes during the morning peak southbound only and northbound only in the evening peak. Pacific Highway is subject to a 60km/h speed zoning. Within the vicinity of the site, Pacific Highway permits time limited kerbside parking on both sides outside of T3 operations.
- Berry Road: a local road that traverses north-south between Pacific Highway in the north and a cul-de-sac in the south. Berry Road generally accommodates a single of traffic in each direction and is subject to a 50km/h speed zoning. In the vicinity of the site unrestricted kerbside parking is generally permitted along both sides of Berry Road.
- Marshall Avenue: a local road that traverses east west between Canberra Avenue in the east and Berry Road in the west. Marshall Avenue has a speed limit of 50 km/h and generally accommodates a single lane of traffic in each direction. Marshall Avenue permits time limited kerbside parking on both sides.
- Holdsworth Avenue: a local road that traverses north-south between Marshall Avenue in the north and a cul-de-sac in the south. Holdsworth Avenue generally accommodates a single of traffic in each direction and is subject to a 50km/h speed zoning. Within the vicinity of the site, unrestricted kerbside parking is generally permitted along both sides of Holdsworth Avenue.

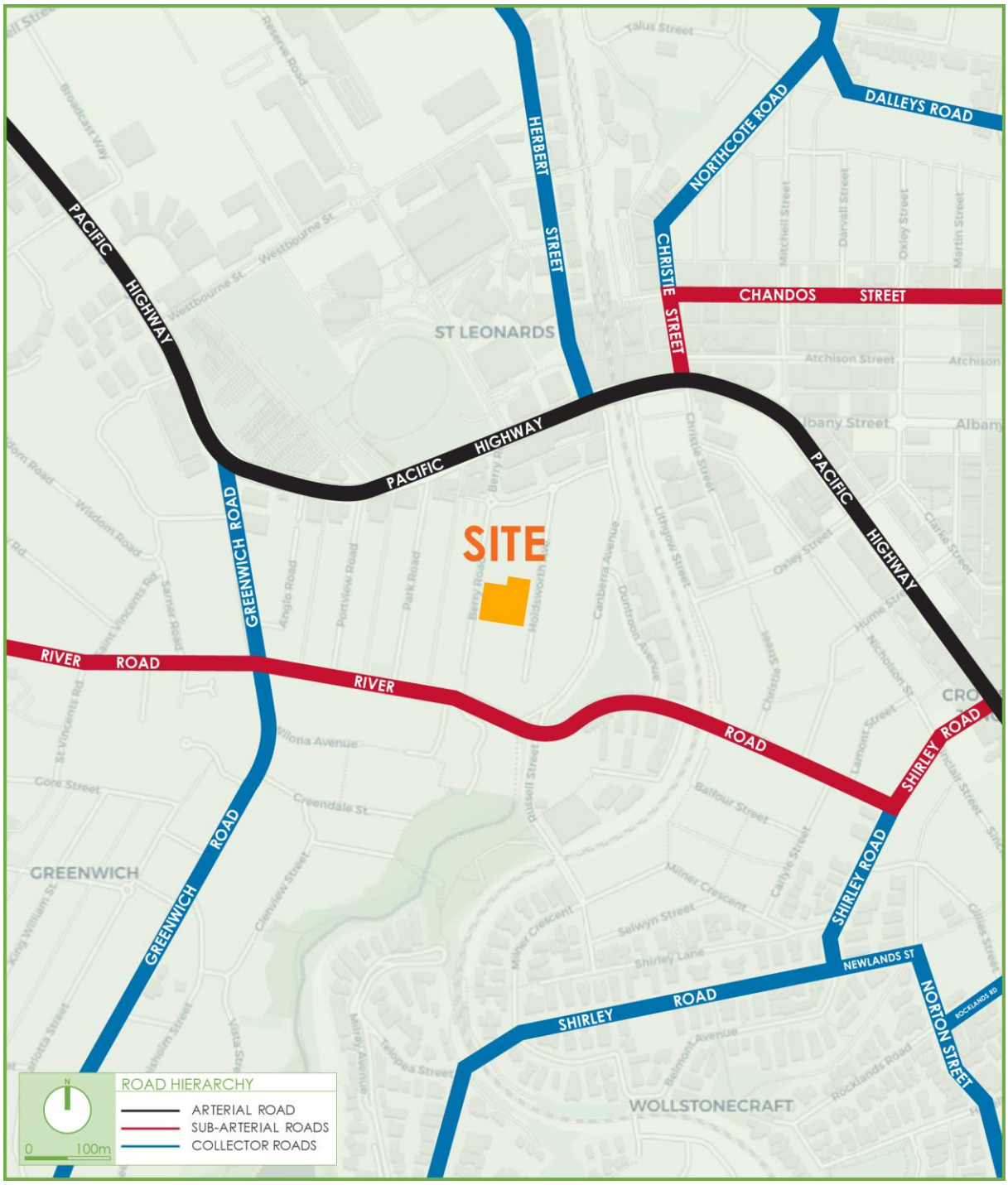

Figure 3: Road Hierarchy

3.2 Public Transport

The existing bus services that operate in the locality are shown in **Figure 4**. It is evident that the development benefits from good bus services with bus stops in either direction being situated within 400 metres of the site along River Road. These bus services are summarised as follows:

- 114 – Balmoral to Royal North Shore Hospital
- 114 – Manly to Chatswood
- 200 – Bondi Junction to Gore Hill
- 252 – Gladesville to City King Street Wharf.
- 254 – Riverview to McMahons Point
- 261 – Lane Cove to City King Street Wharf
- 265 – Lane Cove to North Sydney
- 286 – Denistone East to Milsons Point
- 287 – Ryde to Milsons Point
- 290 – Epping to City Erskine St
- 291 – Epping to McMahons Point
- 320 – Green Square to Gore Hill
- 602X – Bella Vista Station to North Sydney (Express Service)
- 612X – Castle Hill to North Sydney (Express Service)
- 622 – Dural to Milsons Point

St Leonards and Wollstonecraft Railway Stations are located approximately 500 and 800 metres from site, respectively. These stations provide services on the Central Coast and Newcastle, T1 North Shore and Western Line, T9 Northern Line, connecting the site to the City and the wider rail network.

In addition, a Sydney Metro station is currently under construction in Crows Nest which is due for completion inn 2024 and will provide services along the exiting Metro North West Line and the under construction City and Southwest line. These services will provide access to stations including the Sydney CBD, North Sydney, Chatswood and Epping.

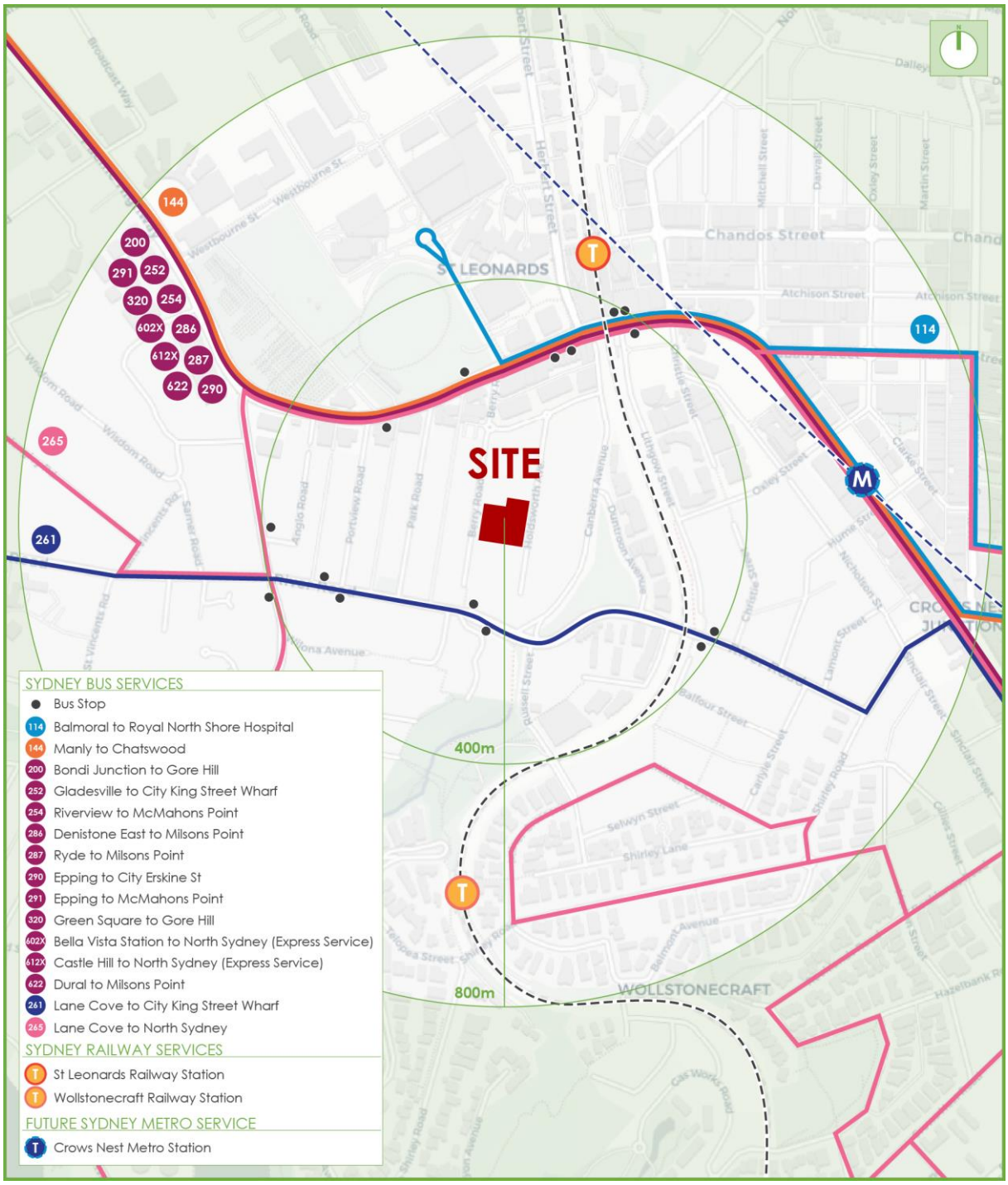

Figure 4: Public Transport

4. DESCRIPTION OF PROPOSED DEVELOPMENT

A detailed description of the proposed development is provided in the Statement of Environmental Effects prepared separately. In summary, the development for which approval is now sought is a 10-storey, with two (2) partially excavated floors, mixed-use development comprising of the following components:

- Demolition of existing dwellings on the site.
- Construction of residential flat building containing 130 apartments made up of the following:
  - 26 x one-bedroom apartments
  - 59 x two-bedroom apartments;
  - 35 x three-bedroom apartments; and,
  - 10 x four-bedroom apartments.
- A 450m^2 childcare centre, a community hall and green link.
- A basement car park over four levels providing parking for 180 vehicles.

The parking and traffic impacts arising from the development are discussed in **Section 5** and **Section 6**. Reference should be made to the plans submitted separately to Council which are presented at reduced scale in **Appendix A**.

5. PARKING REQUIREMENTS

5.1 Car Parking

5.1.1 Residential - Council Controls

The Lane Cove Development Control Plan (DCP) 2010, Part R.3 – Parking, requires parking for mixed use developments to be provided at the rates shown in **Table 1**. The development is located near St Leonards Railway Station and therefore qualifies for reduced parking rates, which have been used in Table 1.

Table 1: Council Parking Rates

Type	Units	Parking Rate	Minimum Spaces Required
1 Bed	26	0.5 spaces per dwelling	**135**
2 Bed	59	0.9 spaces per dwelling	
3 Bed	35	1.4 spaces per dwelling	
4+ Bed	10	2 spaces per dwelling	
Visitor	130	1 space per 5 dwellings	**26**
		Totals	**161**

In addition to the above parking requirements, the site is within 800 metres of St Leonards Railway Station. Therefore, the State Environment Planning Policy No 65 (SEPP 65) also applies to the proposed development which is discussed below.

5.1.2 Residential – SEPP65 Controls

In addition, the State Environmental Planning Policy No. 65 allows parking to be provided in accordance with the Apartment Design Guide (ADG). For developments within 800 metres of a railway station the ADG requires whichever is lower of either Council's parking requirement or the requirement as stated in the RMS Guide to Traffic Generating Developments (RMS Guide). Therefore, the high-density residential parking rates for 'metropolitan sub-regional centres' have been used to for the SEPP 65 parking requirement, which are outlined in the **Table 2** below:

Table 2: SEPP 65 Parking Rates

Type	Units	Minimum Parking Rate	Minimum Spaces Required
1 Bed	26	0.4 spaces per unit	106
2 Bed	59	0.7 spaces per unit	
3+ Bed	45	1.2 spaces per unit	
Residential Visitor	130	1 space per 7 units	19
		Total	**125**

5.1.3 Community Hall Parking

Council's DCP does not provide a parking rate for community hall but rather recommends analysing similar developments within the locality to determine an appropriate parking provision. As such further assessment will be required to determine an appropriate parking requirement for this use.

5.1.4 Child Care Parking

Council's DCP requires parking for child care centres to be provided between at the rates shown in **Table 3**:

Table 3: Council Parking Rates

Type	Staff/Children*	Parking Rate	Minimum Spaces Required
Employee	15	1 space per 2 employees	8
Visitors	60	1 space per 6 children	10
		Totals	**18**

* Staff and children are indicative for the parking assessment only.

5.1.5 Proposed Parking Provision

The parking rates for each use based on Council's DCP and SEPP 65 have been determined in the previous subsections. **Table 4** provides the parking requirements and proposed parking provision for the development as per the above assessments.

Table 4: Required Car Parking and Provision

Type	Required Parking Provision		Current Basement Provision
	Minimum (SEPP65) Requirement	Council DCP Requirement	
Residential	106	135	135
Visitors	19	26	26
Community Hall	-	-	-
Child Care Centre	-	18	19
Total	**143 (Minimum)**		**180**

It can be seen from Table 3 that the development is required to provide at least 143 car parking spaces including 106 spaces for residents, 19 spaces for visitors and 18 child care centre parking spaces. In response, the development provides 180 car parking spaces of which 135 spaces are for residents, 26 visitor spaces and 19 child care centre spaces. Therefore, the development complies with the requirements of SEPP 65 and Council's DCP and is expected to accommodate all parking demands within the site.

5.2 Accessible Parking

According to Council's DCP, the development is required to provide accessible parking for each use at the rates specified in **Table 5**.

Table 5: Accessible Parking Requirements and Provision

Type	Units / Staff / Visitors	Minimum Parking Rate	Minimum Spaces Required	Proposed Provision
Adaptable Dwellings	26	1 space per dwelling	26	26
Residential Visitors	26	1 space per 10 visitor spaces (minimum 1 space)	3	3
Community Hall	-	-	-	-
Child care centre visitors	10	1 space per 50 spaces (minimum 1 space)	1	1
		Total	**30**	**30**

Therefore, for the proposed development, 30 adaptable apartments are required. In response, the development provides 26 accessible parking spaces for residents and visitors in accordance with Council's requirement.

Bicycle Parking

Council's DCP requires bicycle parking to be provided in accordance with the minimum rates outlined in **Table 5** below.

Table 5: Council Bicycle Parking Rates

Type	Units / Staff / Centre	Minimum Parking Rate	Minimum Spaces Required	Proposed Provision
Residents	128	1 spaces per 4 dwellings	32	38
Residential Visitors	128	1 rack + 1 spaces per 10 dwellings	14	14
Community Hall	-	-	-	-
Child care centre staff	15 staff	1 space per 10 staff	2	2
Child care centre visitors	1 centre	2 racks per centre	2	2
		Total	**50**	**56**

Accordingly, the development requires a total of 50 bicycle parking spaces, including 32 spaces for residents, 14 spaces for residential visitors, two (2) spaces for child care staff and two (2) spaces for child care centre visitors. In response, the development provides a total of 56 bicycle parking spaces within the Lower Ground Floor in accordance with the DCP.

5.4 Motorcycle Parking

Council's DCP requires motorcycle parking to be provided at a rate of 1 space per 15 car parking spaces. Therefore, for the 180 parking spaces the development is required to provide 12 motorcycle spaces to comply with Council's requirements. In response, the development provides 12 motorcycle spaces which meets Council's requirement.

5.5 Car Wash Bay

Council's DCP E1.2.4 C4 specifies that car wash bays must be provided for residential developments with over 20 dwellings. As this development has more than 20 units, a dedicated car wash bay must be provided at a rate of 1 bay per 50 dwellings, and hence for 130 units,

three (3) dedicated car wash bays provided are required. In response, the proposed development provides three dedicated car wash bays in accordance with the DCP requirement.

5.6 Refuse Collection and Servicing

Council's DCP requires service and delivery areas to be provided in accordance with the RMS Guide to Traffic Generating Developments. The RMS Guide recommends a rate of 1 service space per 50 flats or unit homes. Application of this rate to the proposed 130 units requires the development to nominally provide three (3) servicing bays. A single loading area for waste collection vehicles on the Lower Ground floor with a turntable to allow for forward entry and exit. However, this loading area can allow for up to three loading and unloading parking spaces outside of waste collection times. Therefore, the loading area is considered sufficient to accommodate allow servicing demands on-site, including waste collection and allowing for up to three service vehicles outside of waste collection times.

6. TRAFFIC AND TRANSPORT IMPACTS

6.1 Existing Site Generation

The subject site currently accommodates 10 low density residential dwellings within the proposed site boundary. In August 2013, RMS released Technical Direction TDT 2013/04a, which provides revised trip generation advice for a number of land uses based on survey data obtained since 2009. One of the land uses covered by TDT 2013/04a is low density residential development. The average Sydney weekday trip rates provided by TDT 2013/04a have been adopted for assessing the traffic generating potential of the subject development. The relevant trip rates are as follows:

- 0.99 vehicle trips per unit during the morning peak hour; and
- 0.95 vehicle trips per unit during the evening peak hour.

Application of these trip rates to the existing 10 residential dwellings, and adopting an 80:20 split, results in the following predicted trip generation volumes:

- 10 vehicle trips per hour (2 in, 8 out) during the morning peak hour; and
- 10 vehicle trips per hour (8 in, 2 out) during the evening peak hour.

6.2 Existing Intersection Performance

Intersection surveys were conducted of the following intersections in the vicinity of the site. :

- Holdsworth Avenue and Marshall Avenue;
- Marshall Avenue and Berry Road; and,
- Pacific Highway, Berry Road and Reserve Road.

The intersections were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below in **Table 6**:

Table 6: Intersection Performance Parameters

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table 7** below. Reference should also be made to the detailed SIDRA outputs included in **Appendix B**.

Table 7: Intersection Performance - Existing Volumes

Intersection	Control Type	Period	Intersection Degree of Saturation (DOS)	Average Delay (AVD)	Level of Service (LOS)
Holdsworth Avenue and Marshall Avenue	Roundabout	AM	0.064	11.3	A
		PM	0.072	11.2	A
Marshall Avenue and Berry Road	Roundabout	AM	0.093	8.8	A
		PM	0.102	8.6	A
Pacific Highway, Berry Road and Reserve Road	Signals	AM	0.719	20.1	B
		PM	0.597	17.9	B

It is evident that both intersections perform acceptably under all scenarios with a Level of Service B or better. However, this analysis serves to provide a comparison of the relative change in the performance parameters as a result of the subject proposal. This is discussed further in **Section 6.5**.

6.3 Development Trip Generation

The impacts of the proposed development on the external road network have been assessed having regard for the indicative yield scenarios as summarised in **Section 4** above. This assessment has been undertaken in accordance with the requirements of the RMS Guideline to Traffic Generating Developments (2002) and as such, the traffic generation rates published in the RMS Guide have been adopted for each individual land use. The result of this assessment is summarised below.

6.3.1 Residential

In August 2013, RMS released Technical Direction TDT 2013/04a, which provides revised trip generation advice for a number of land uses based on survey data obtained since 2009. One of the land uses covered by TDT 2013/04a is high density residential development. The average Sydney weekday trip rates provided by TDT 2013/04a have been adopted for assessing the traffic generating potential of the subject development. The relevant trip rates are as follows:

- 0.19 vehicle trips per unit during the morning peak hour; and

- 0.15 vehicle trips per unit during the evening peak hour.

Application of these trip rates to the 130 residential units proposed, and adopting an 80:20 split, results in the following predicted trip generation volumes:

- 25 vehicle trips per hour during the morning peak hour; and (5 in, 20 out)
- 20 vehicle trips per hour during the evening peak hour. (16 in, 4 out)

6.3.2 Child-care centre

To undertake a conservative assessment of the proposed child care centre, the RMS Guide to Traffic Generation (2002) provides rates for long day care centres which classifies as a child care centre as well. This component attracts a trip rate of 0.8 trips in the AM peak period and a trip rate of 0.7 in the PM peak period based on RMS trip rates for child care centres. The application of this rate for an indicative 60 children visiting the child care centre predicts the following generation:

- 48 vehicle trips per hour during the morning peak hour period; and, (24 in, 24 out)
- 42 vehicle trips per hour during the evening peak hour. (21 in, 21 out)

6.3.3 Combined Generation

The combined generation of the residential and commercial components can be summarised as follows:

- 73 vehicle trips per hour during the morning peak hour; and (29 in, 44 out)
- 62 vehicle trips per hour during the evening peak hour. (37 in, 25 out)

6.3.4 Net Traffic Impacts

The above traffic generation for the prop0osed development does not take into account the existing traffic generation of the site. As such, the traffic generation assessment of the existing site in Section 6.1 has been taken into account for the following net traffic generation assessment of the proposed development.

- +63 vehicle trips per hour during the morning peak hour; and (+27 in, +36 out)

- +52 vehicle trips per hour during the evening peak hour. (+29 in, +23 out)

6.4 Traffic Distribution

The net traffic generation has been distributed around the network to undertake modelling of the surrounding road network. The distribution of the increase in traffic generation was assessed separately for each use to reflect the different origins and destinations for the proposed uses. The residential traffic distribution was based on Journey to Work Data rom the 2016 Census. The child care centre distribution was based on the assumption that higher proportion of local than the residential commuter traffic. Therefore, a more even distribution around the network has been assumed but with a majority still arriving and departing from the Pacific Highway. These assumptions are provided in **Table 8** with graphical distributions provided in **Figures 5 and 6**.

Table 8: Distribution for Each Use

Routes	Residential	Child Care
Pacific Highway (Southbound)	80%	40%
Pacific Highway (Northbound)	20%	40%
Canberra Avenue	-	20%

The distributions provided in the figures below have been assessed in the SIDRA model with the results provided in **Section 6.5.**

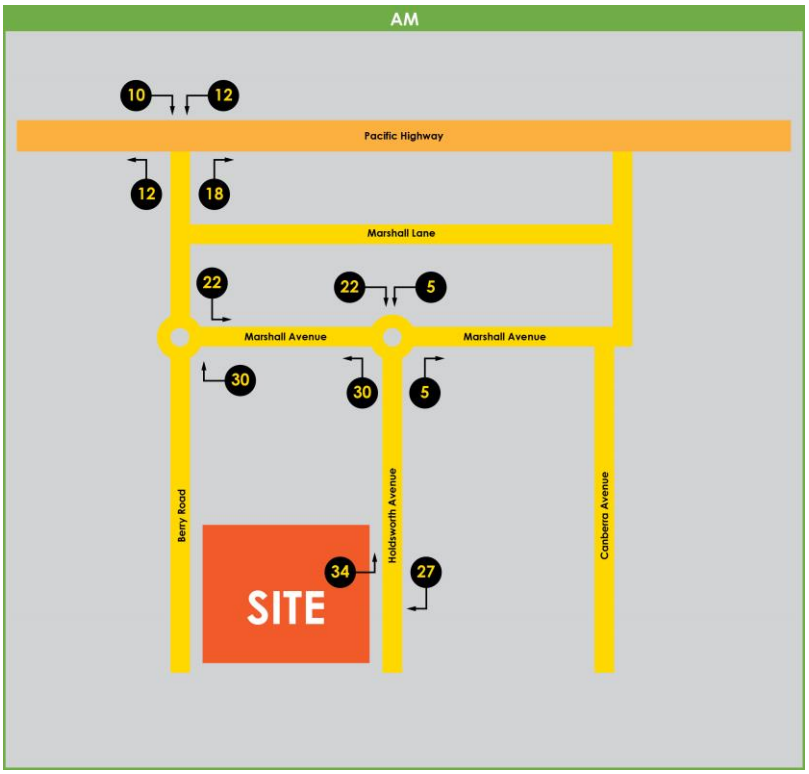

Figure 5: AM Peak Distribution

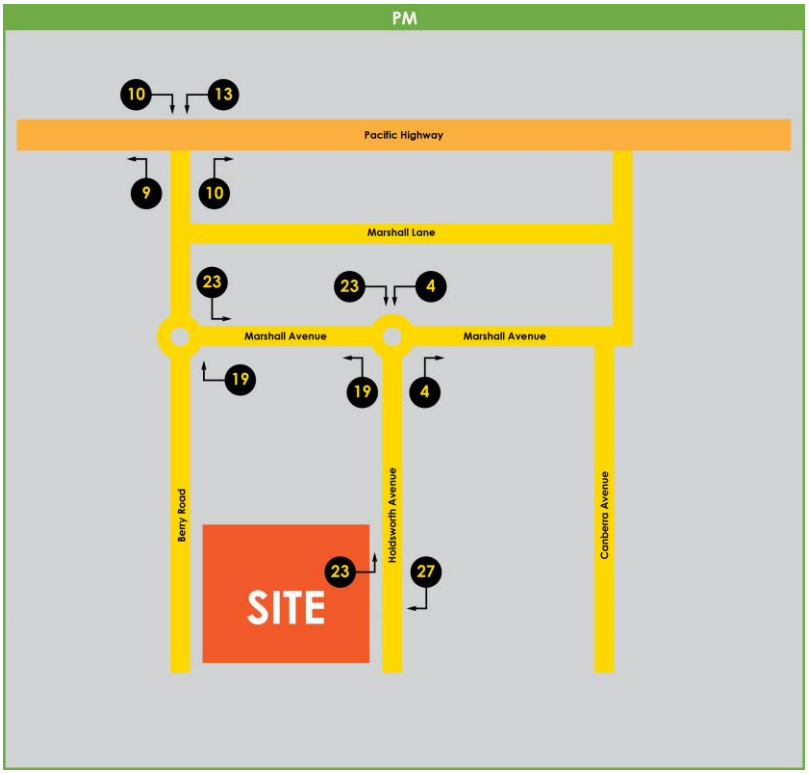

Figure 6: PM Peak Distribution

6.5 Peak Period Intersection Performance

The development volumes have been applied to the network model discussed in Section 3.2, which has been expanded to include the proposed site access driveway. This additional traffic has been distributed according to the abovementioned splits with the results of software modelling for future conditions summarised in **Table 9**. Reference should be made to the SIDRA Outputs in **Appendix B** for detailed information on individual movements.

Table 9: Intersection Performance - Existing and Development Volumes

Intersection	Control Type	Period	Scenario	Intersection Degree of Saturation (DOS)	Average Delay (AVD)	Level of Service (LOS)
Holdsworth Avenue and Marshall Avenue	Roundabout	AM	Existing	0.064	11.3	A
			Development	0.072	11.5	A
		PM	Existing	0.072	11.2	A
			Development	0.090	11.4	A
Marshall Avenue and Berry Road	Roundabout	AM	Existing	0.093	8.8	A
			Development	0.117	9.0	A
		PM	Existing	0.102	8.6	A
			Development	0.116	8.7	A
Pacific Highway, Berry Road and Reserve Road	Signals	AM	Existing	0.719	20.1	B
		PM	Development	0.702	18.7	B
		AM	Existing	0.597	17.9	B
		PM	Development	0.625	19.0	B

It is evident that the above intersections will continue to perform adequately with the addition of the development volumes. The intersections experience no change in level of service and only minimal increases as a result of the additional traffic generated. Therefore, no upgrades to the surrounding road network are required to accommodate the proposed development. As such, the development is expected to have minimal impact on the surrounding road network.

7. ACCESS AND INTERNAL DESIGN ASPECTS

7.1 Site Vehicular Access

The development proposes a total of 180 residential parking spaces with access to Holdsworth Avenue, a local road. It will therefore requires a Category 3 driveway under AS2890.1 (2004), being a separate entry and exit driveways with a width of 6.0 metres and 4.0 to 6.0 metres, respectively. In response, a combined entry and exit driveway with a width of 6 metres has been provided for the vehicular access. This arrangement, while not strictly compliant, is considered acceptable as Holdsworth Avenue is a cul-de-sac to the south of site which means all vehicles will turn right into the site and all vehicles will turn left out of the site. As such the additional width for a Category 3 driveway to allow for simultaneous left and right entry and exit movements is not required where all entry and exit movements will be in the same direction. Therefore, the proposed access arrangement is considered acceptable to allow efficient entry and exit arrangements for the proposed development.

The vehicular access is also shared with the loading dock access for waste collection vehicles. These movements will occur outside of peak periods and therefore is considered acceptable for vehicles to use the entire driveway width to enter and exit the loading dock. However, the swept path analysis allows for passing opportunities of B99 vehicles in both directions to ensure vehicles can pass along driveway in the unlikely scenario that this occurs.

A swept path analysis of all design vehicles entering and exiting the proposed development, including the service vehicle, has been included in **Appendix C**, demonstrating satisfactory operation of the proposed Holdsworth Avenue access.

7.2 Internal Design

The internal car park complies with the requirements of AS 2890.1 (2004) and AS 2890.6 (2009), and the following characteristics are noteworthy:

7.2.1 Parking Modules

- All residential and child care staff car parking spaces have been designed in accordance with User Class 1A being for residential / employee parking. These spaces are provided with

a minimum space length of 5.4m, a minimum width of 2.4m and a minimum aisle width of 5.8m.

- All child care visitor car parking spaces have been designed in accordance with User Class 3 being for high turnover parking. These spaces are provided with a minimum space length of 5.4m, a minimum width of 2.6m and a minimum aisle width of 5.8m.
- All spaces located adjacent to obstructions of greater than 150mm in height are provided with an additional width of 300mm.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with **Figure 2.3** of AS2890.1 (2004).
- All accessible parking spaces have been designed in accordance with AS 2890.6 (2009), being 2.4m wide, 5.4m long and situated immediately adjacent to a dedicated shared area or the circulating aisle.

7.2.2 Ramps

- The internal ramp has a maximum gradient of 5.0% (1 in 20) for the first 6.0m inside the property boundary, in accordance with Section 3.3 (a) of AS 2890.1 (2004).
- The internal ramp has a maximum gradient of 20% (1 in 5) with sag and summit transitions of 10% (1:10) respectively. These provisions satisfy the requirements of AS 2890.1 (2004).

7.2.3 Clear Head Heights

- A minimum clear head height of 2.2m is provided for all areas within the basement car park as required by AS 2890.1 (2004).
- A minimum clear head height of 2.5m is to be provided above all disabled spaces in accordance with AS 2890.6 (2009).
- A minimum head height clearance of 4.5m is provided at the vehicular access and within the loading dock to accommodate Council's waste collection vehicle as specified in Council's DCP.

7.2.4 Loading

- Loading requirements in accordance with AS 2890.2.
- Head heights and bays.

7.2.5 Other Considerations

- All columns are located outside of the parking space design envelope shown in **Figure 5.2** of AS 2890.1 (2004).
- Visual splay has been provided at the access driveway in accordance with **Figure 3.3** of AS 2890.1 (2004).

7.3 Summary

In summary, the internal configuration of the car park has been designed in accordance with AS 2890.1 (2004), AS 2890.2 (2018), AS 2890.3 (2015) and AS 2890.6 (2009). It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

8. CONCLUSIONS

In summary:

- The proposal seeks approval to construct a 10 storey with two (2) partially excavated floors mixed use development at 12-20 Berry Road and 11-19 Holdsworth Avenue in St Leonards NSW 2065, containing 130 apartments, a 450m^2 child care centre, a community hall and four levels of basement car parking accommodating 180 vehicles.
- The subject site is well connected to the public transport network with reliable access to regular bus and rail services. These, along with existing pedestrian and cycle links, ensure the site is ideally situated for a high density residential development as it provides a good opportunity to encourage future tenants / visitors to use sustainable transport modes.
- The proposed development provides 180 parking spaces, including 135 residential parking spaces, 26 visitor parking spaces and 19 child care parking spaces, which meets the minimum requirements of Lane Cove Council's DCP (2010). As such, all normal parking demands will be readily accommodated on-site.
- The traffic generation arising from the development has been assessed as a net increase over existing conditions, and equates to an additional 63 vehicle trips per hour during the AM peak and 52 vehicle trips during the PM peak. SIDRA modelling of the increase in vehicle trips was undertaken which demonstrated no change to the LoS at any intersection and minimal increase in average delays. As such, no external improvements are required to facilitate the proposed development. The traffic impacts of the development are therefore considered acceptable.
- The basement car park has been assessed to comply with the requirements of AS 2890.1 (2004), AS 2890.2 (2018), AS 2890.3 (2015) and AS 2890.6 (2009), notwithstanding the acceptable minor variation at the vehicular access as discussed in **Section 7.1**, thereby ensuring safe and efficient operation.

This traffic impact assessment therefore demonstrates that the subject application is supportable on traffic planning grounds. TRAFFIX anticipates an ongoing involvement during the development approval process.

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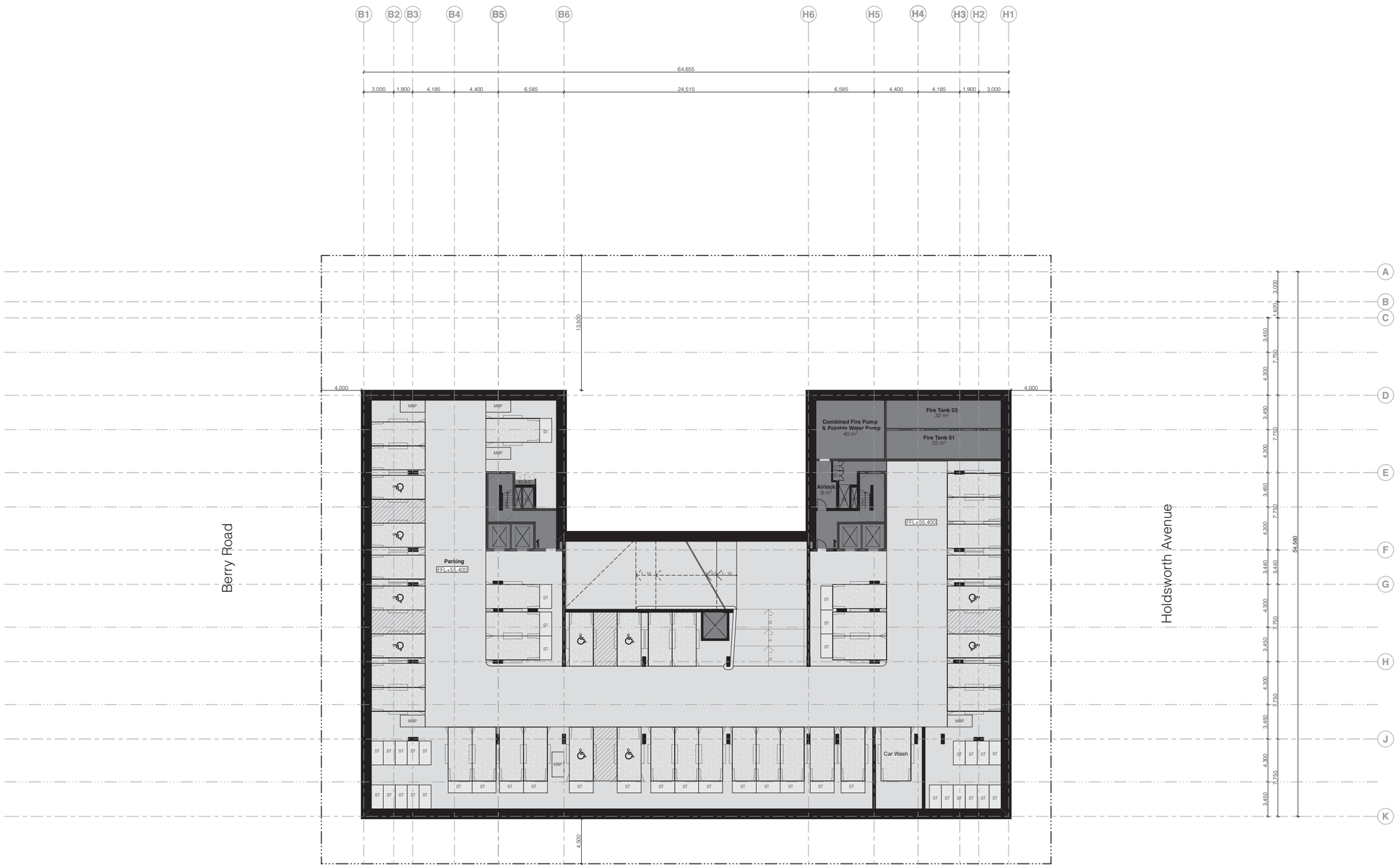
APPENDIX A

Reduced Plans



TOTAL RESIDENTIAL PARKING SCHEDULE		
TYPE	**LEVEL**	**COUNT**
Accessible 5400x2400		
	Basement 03	10
	Basement 02	12
	Basement 01	4
		26
Residential 5400x2400		
	Basement 03	32
	Basement 02	49
	Basement 01	28
		109
Visitor 5400x2400		
	Basement 01	26
		26
Total Parking		**161**
Carwash 5400x3000		
	Basement 03	1
	Basement 02	1
	Basement 01	1
		3
Motorbike 1200x2500		
	Basement 03	6
	Basement 02	3
	Basement 01	3
		12

PARKING SUMMARY		
LEVEL	**TYPE**	**COUNT**
Basement 03		
	Accessible 5400x2400	10
	Carwash 5400x3000	1
	Motorbike 1200x2500	6
	Residential 5400x2400	32

STORAGE SUMMARY	
LEVEL	**COUNT**
Basement 03	41

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not for construction

Rev	Date	Description	By	Chk.
A	14/6/22	Development Approval	SV BF JF	HS

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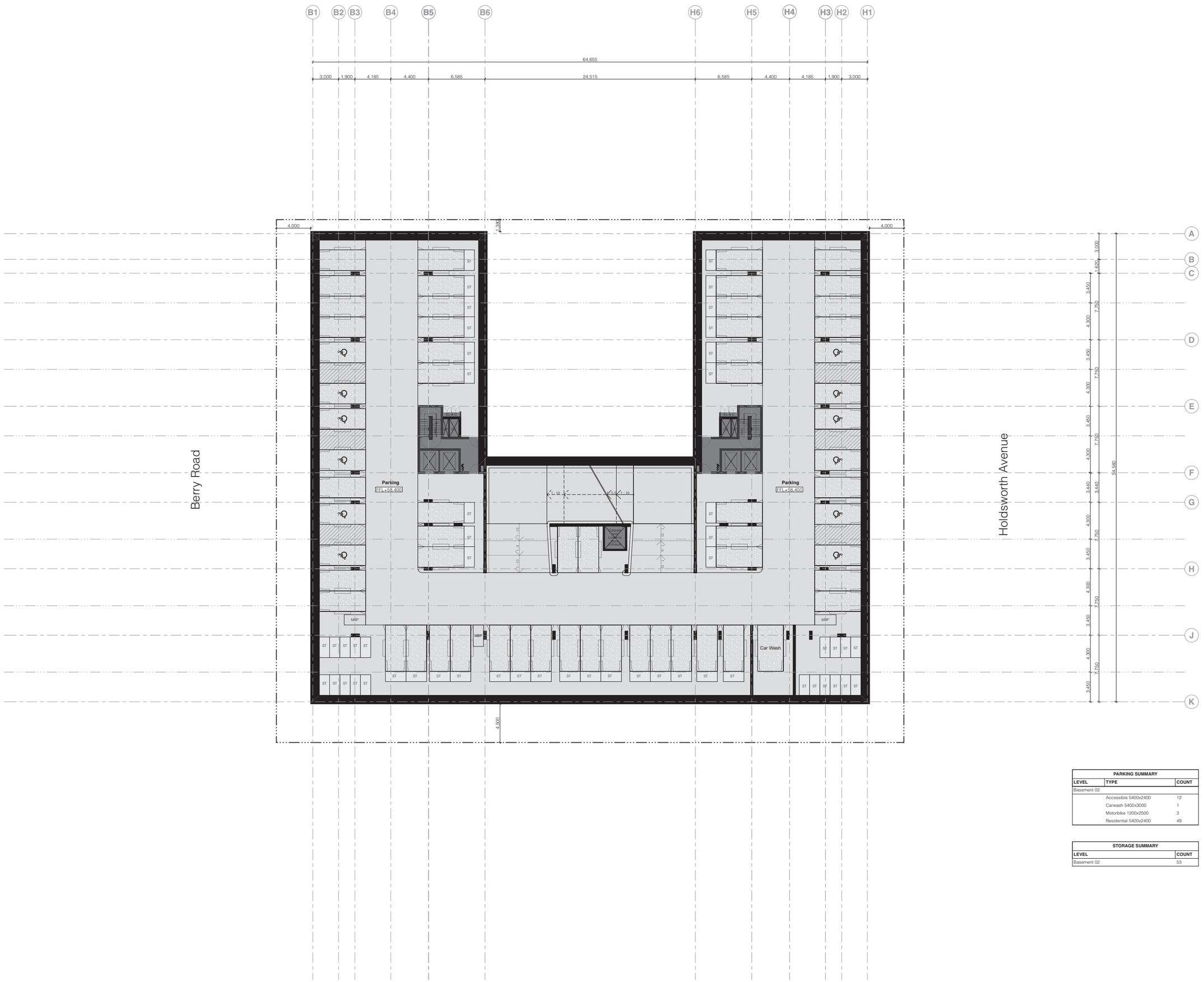
Scale	Sheet Size
1:200	A1

Drawn	Chk.	Project #
SV BF JF	HS	152

Project
Berry Holdsworth
12-20 Berry Road & 11-19 Holdsworth Avenue
St Leonards South NSW 2065 Australia

Drawing Name
GA PLAN
Basement 03

Drawing #	Revision
DA_A-110-001	**A**



PARKING SUMMARY		
LEVEL	TYPE	COUNT
Basement 02		
	Accessible 5400x2400	12
	Carwash 5400x3000	1
	Motorbike 1200x2500	3
	Residential 5400x2400	49

STORAGE SUMMARY	
LEVEL	COUNT
Basement 02	53

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Notes

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A	14/6/22	Development Approval	SV BF JF	HS

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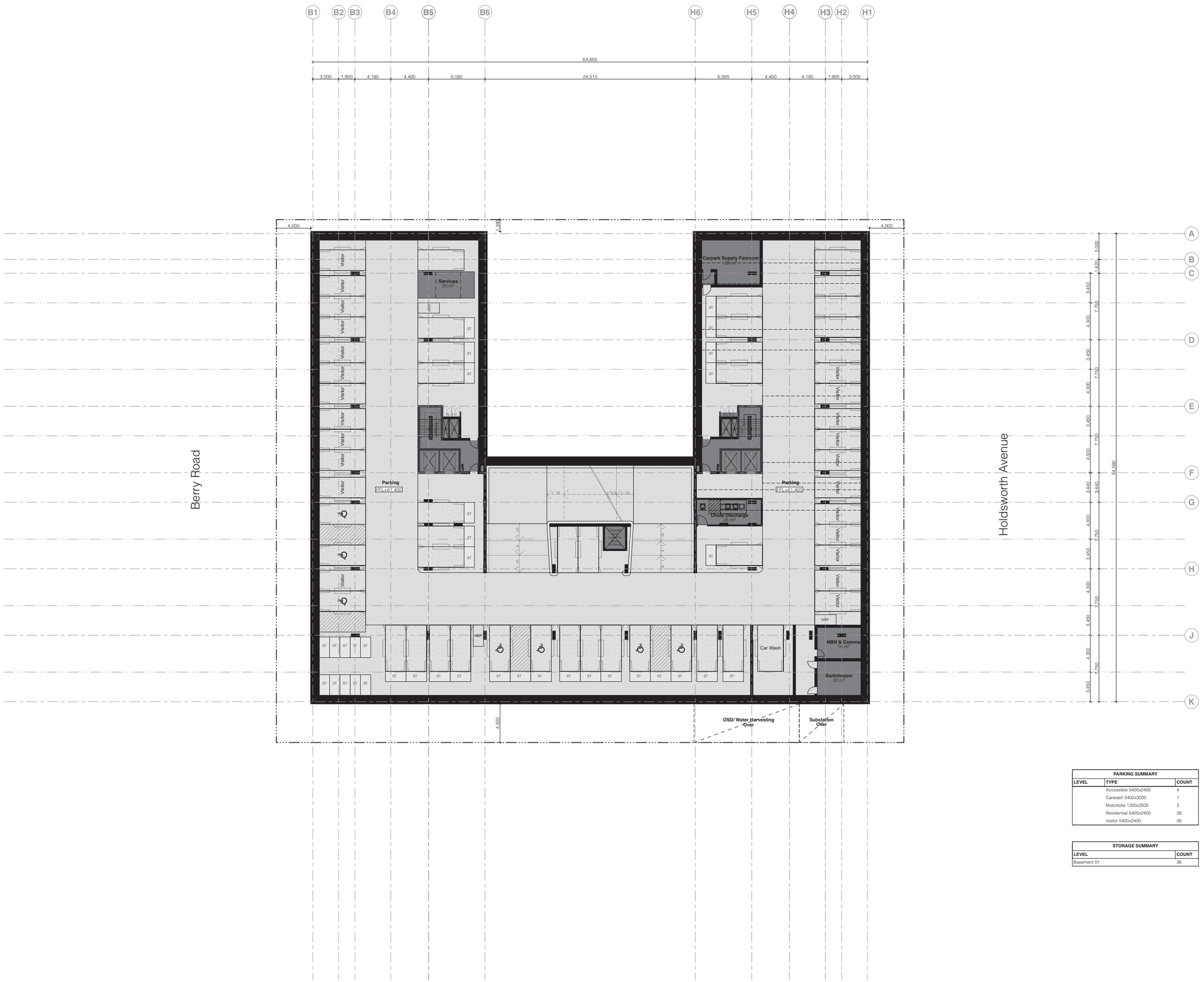
Scale	Sheet Size
1:200	A1

Drawn	Chk.	Project #
SV BF JF	HS	152

Project
Berry Holdsworth
12-20 Berry Road & 11-19 Holdsworth Avenue
St Leonards South NSW 2065 Australia

Drawing Name
GA PLAN
Basement 02

Drawing #	Revision
DA_A-110-002	A



PARKING SUMMARY		
LEVEL	TYPE	COUNT
	Accessible 5400x2400	4
	Carwash 5400x3000	1
	Motorbike 1200x2500	3
	Residential 5400x2400	28
	Visitor 5400x2400	26

STORAGE SUMMARY	
LEVEL	COUNT
Basement 01	36

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not for construction

Rev	Date	Description	By	Chk.
A	14/6/22	Development Approval	SV BF JF	HS

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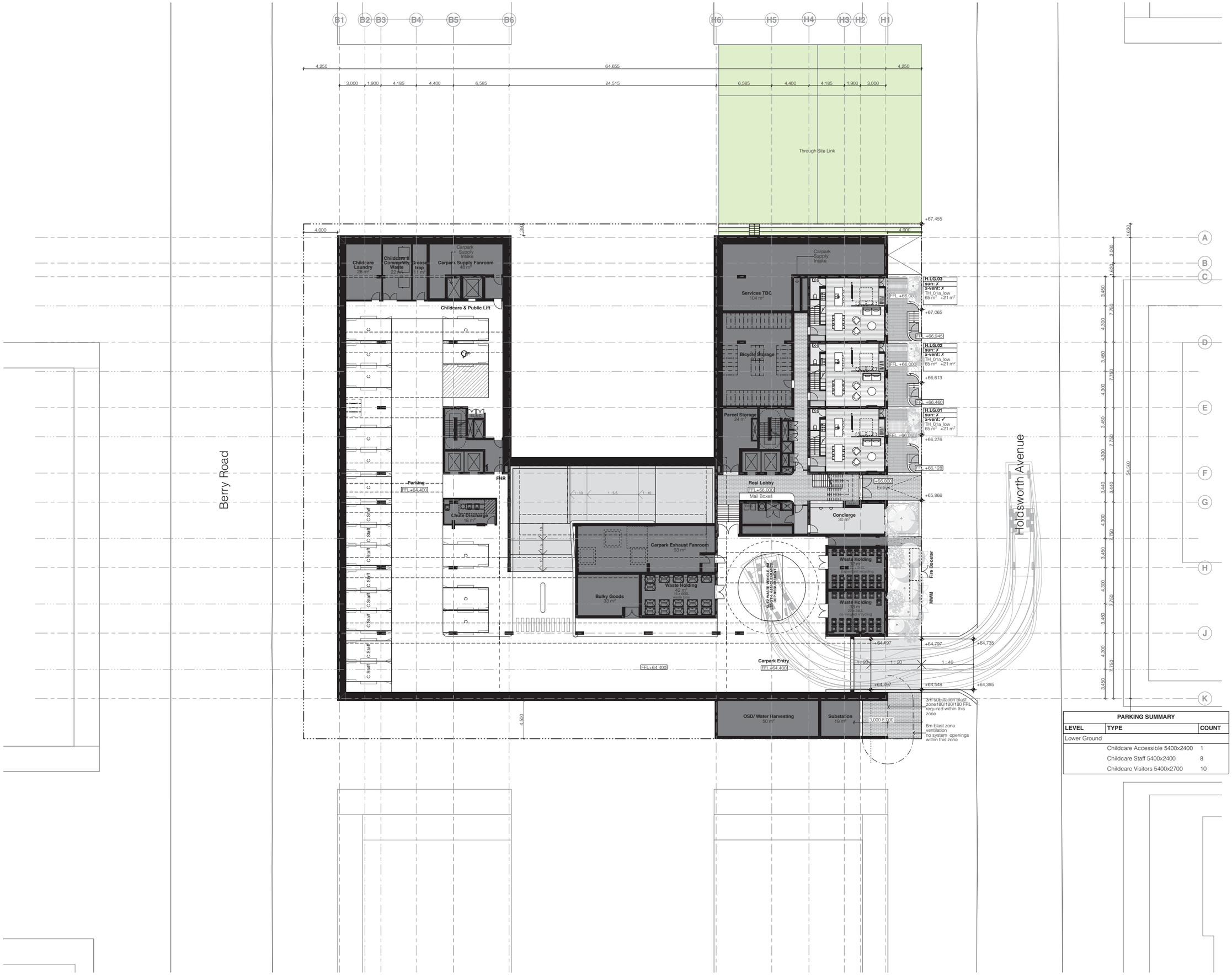
Scale	Sheet Size
1:200	A1

Drawn	Chk.	Project #
SV BF JF	HS	152

Project
Berry Holdsworth
12-20 Berry Road & 11-19 Holdsworth Avenue
St Leonards South NSW 2065 Australia

Drawing Name
GA PLAN
Basement 01

Drawing #	Revision
DA_A-110-003	**A**



PARKING SUMMARY		
LEVEL	TYPE	COUNT
Lower Ground		
	Childcare Accessible 5400x2400	1
	Childcare Staff 5400x2400	8
	Childcare Visitors 5400x2700	10

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not for construction

Rev	Date	Description	By	Chk.
A	14/6/22	Development Approval	SV BF JF	HS

Design Architect
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Scale	Sheet Size
1:200	A1

Drawn	Chk.	Project #
SV BF JF	HS	152

Project
Berry Holdsworth
12-20 Berry Road & 11-19 Holdsworth Avenue
St Leonards South NSW 2065 Australia

Drawing Name
GA PLAN
Lower Ground

Drawing #	Revision
DA_A-110-004	**A**

APPENDIX B

SIDRA Outputs

USER REPORT FOR SITE

All Movement Classes

Project: 21.519m01v01 TRAFFIX Pacific Hwy Berry Rd Model **Template: Site Layouts**

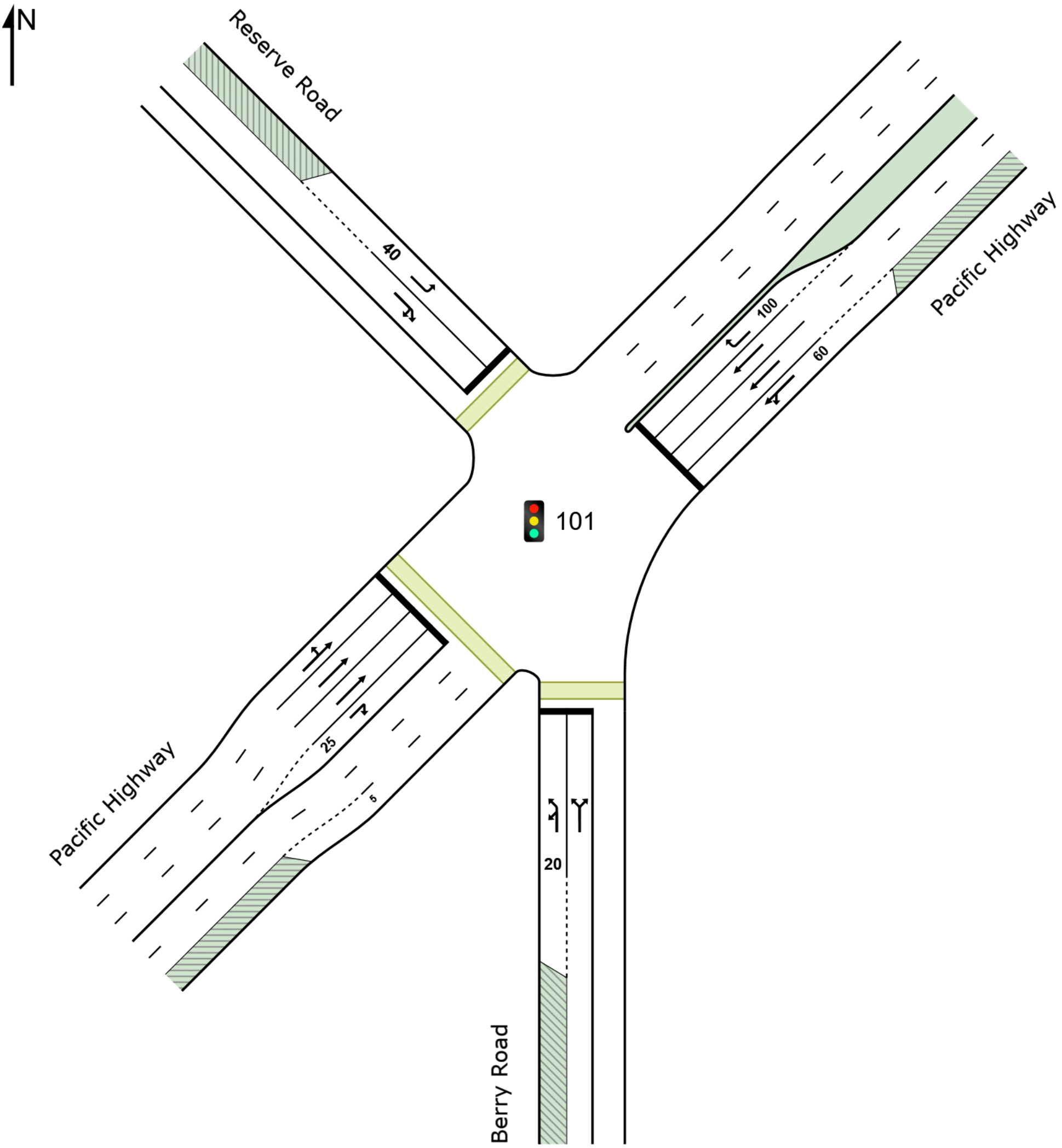
Site: 101 [101 EX AM Pacific Hwy, Berry Rd, Reserve Rd (Site Folder: Existing)]

Intersection: Pacific Highway, Berry Road and Reserve Road
Scenario: Exisiting AM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS Layout
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, E1*, E2*
Output Phase Sequence: A, D, E
(* Variable Phase)

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



USER REPORT FOR SITE

All Movement Classes

Project: 21.519m01v01 TRAFFIX Pacific Hwy Berry Rd Model

Template: Movement Summaries

Site: 101 [101 EX AM Pacific Hwy, Berry Rd, Reserve Rd (Site Folder: Existing)]

Intersection: Pacific Highway, Berry Road and Reserve Road
Scenario: Exisiting AM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS Layout
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, E1*, E2*
Output Phase Sequence: A, D, E
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1b	L3	64	2	67	3.1	0.141	38.3	LOS C	2.9	20.7	0.77	0.74	0.77	25.1
1a	L1	7	0	7	0.0	*0.445	57.7	LOS E	4.7	32.9	0.97	0.78	0.97	13.0
3a	R1	72	0	76	0.0	0.445	57.9	LOS E	4.7	32.9	0.97	0.78	0.97	9.8
Approach		143	2	151	1.4	0.445	49.1	LOS D	4.7	32.9	0.88	0.76	0.88	16.7
NorthEast: Pacific Highway														
24a	L1	85	1	89	1.2	0.125	16.7	LOS B	3.4	24.6	0.48	0.59	0.48	23.6
8	T1	1247	58	1313	4.7	0.627	16.8	LOS B	24.5	178.7	0.68	0.62	0.68	39.2
9	R2	149	9	157	6.0	*0.485	24.8	LOS B	6.0	44.5	0.91	0.83	0.91	24.3
Approach		1481	68	1559	4.6	0.627	17.6	LOS B	24.5	178.7	0.69	0.64	0.69	37.0
NorthWest: Reserve Road														
10	L2	58	0	61	0.0	0.103	36.3	LOS C	2.5	17.5	0.74	0.73	0.74	20.6
29a	R1	6	0	6	0.0	0.287	57.0	LOS E	2.8	20.0	0.95	0.75	0.95	13.9
12	R2	42	1	44	2.4	0.287	59.8	LOS E	2.8	20.0	0.95	0.75	0.95	20.9
Approach		106	1	112	0.9	0.287	46.8	LOS D	2.8	20.0	0.84	0.74	0.84	20.4
SouthWest: Pacific Highway														
1	L2	108	1	114	0.9	0.216	18.6	LOS B	6.3	45.1	0.52	0.59	0.52	37.9
2	T1	1526	95	1606	6.2	*0.719	18.2	LOS B	32.1	236.6	0.74	0.69	0.74	38.0
32b	R3	47	2	49	4.3	0.137	16.2	LOS B	0.9	6.8	0.58	0.72	0.58	36.3
Approach		1681	98	1769	5.8	0.719	18.2	LOS B	32.1	236.6	0.72	0.68	0.72	37.9
All Vehicles		3411	169	3591	5.0	0.719	20.1	LOS B	32.1	236.6	0.72	0.67	0.72	35.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Site: 103 [103 EX+DEV AM Pacific Hwy, Berry Rd, Reserve Rd (Site Folder: Existing + Development)]

Intersection: Pacific Highway, Berry Road and Reserve Road
Scenario: Exisiting + Development AM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS Layout
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, E1*, E2*
Output Phase Sequence: A, D, E
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1b	L3	76	2	80	2.6	0.191	45.6	LOS D	3.9	28.2	0.82	0.75	0.82	22.8
1a	L1	7	0	7	0.0	* 0.702	66.4	LOS E	6.6	46.1	1.00	0.86	1.12	11.7
3a	R1	90	0	95	0.0	0.702	66.6	LOS E	6.6	46.1	1.00	0.86	1.12	8.8
Approach		173	2	182	1.2	0.702	57.4	LOS E	6.6	46.1	0.92	0.81	0.99	14.9
NorthEast: Pacific Highway														
24a	L1	97	1	102	1.0	0.116	14.9	LOS B	3.3	23.5	0.42	0.60	0.42	24.7
8	T1	1247	58	1313	4.7	0.582	14.3	LOS A	23.8	173.2	0.61	0.56	0.61	41.3
9	R2	149	9	157	6.0	* 0.569	24.8	LOS B	6.7	49.3	0.92	0.84	0.92	24.3
Approach		1493	68	1572	4.6	0.582	15.4	LOS B	23.8	173.2	0.63	0.59	0.63	38.7
NorthWest: Reserve Road														
10	L2	58	0	61	0.0	0.117	43.0	LOS D	2.9	20.1	0.78	0.73	0.78	18.6
29a	R1	6	0	6	0.0	0.301	62.5	LOS E	3.1	21.8	0.96	0.75	0.96	13.0
12	R2	42	1	44	2.4	0.301	65.2	LOS E	3.1	21.8	0.96	0.75	0.96	19.9
Approach		106	1	112	0.9	0.301	52.9	LOS D	3.1	21.8	0.86	0.74	0.86	19.0
SouthWest: Pacific Highway														
1	L2	108	1	114	0.9	0.201	16.7	LOS B	6.1	43.7	0.46	0.55	0.46	39.2
2	T1	1526	95	1606	6.2	* 0.669	15.4	LOS B	31.0	228.6	0.66	0.61	0.66	40.2
32b	R3	57	2	60	3.5	0.183	15.6	LOS B	1.1	8.2	0.55	0.72	0.55	36.7
Approach		1691	98	1780	5.8	0.669	15.5	LOS B	31.0	228.6	0.64	0.61	0.64	40.0
All Vehicles		3463	169	3645	4.9	0.702	18.7	LOS B	31.0	228.6	0.66	0.62	0.66	36.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

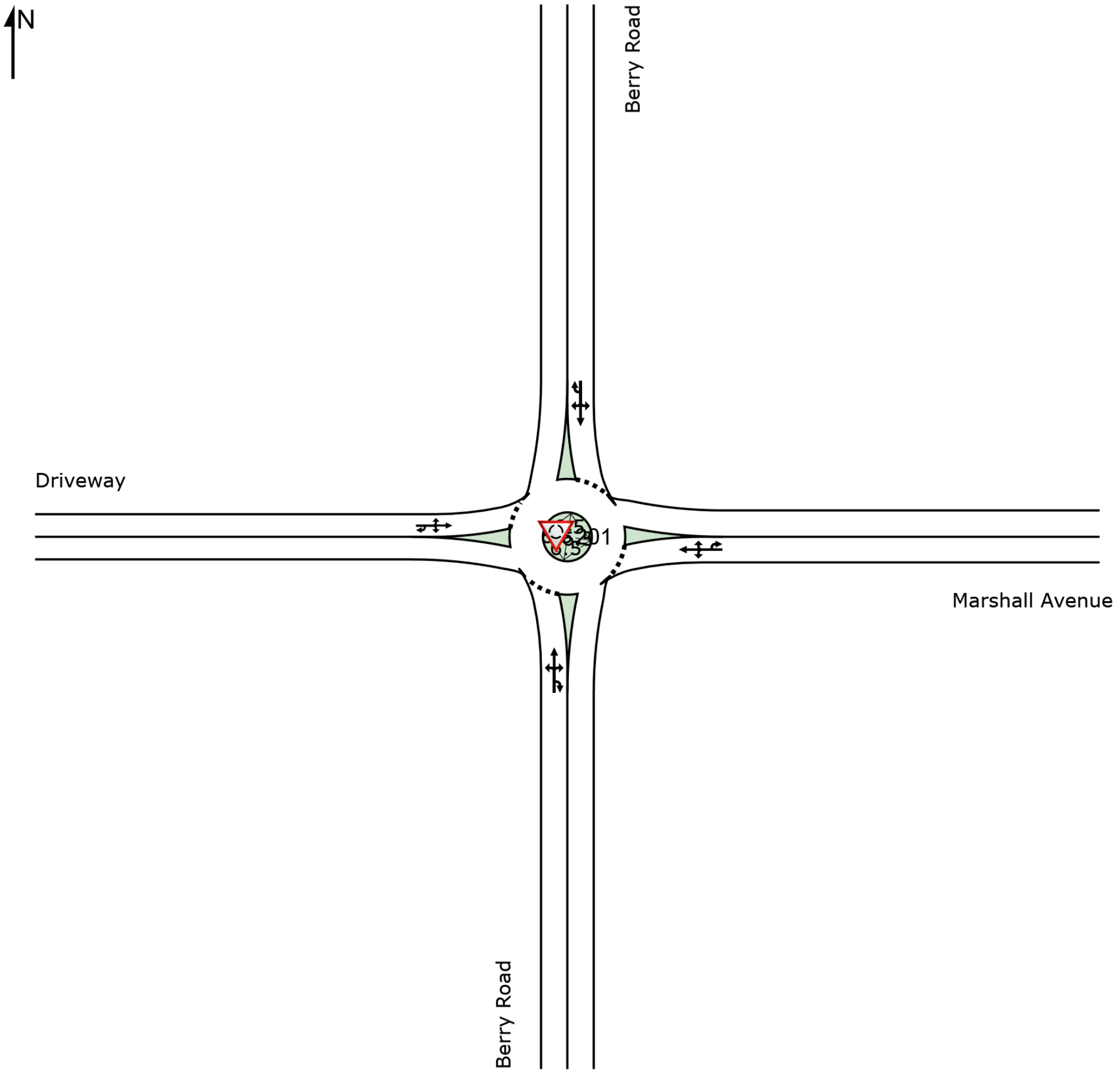
* Critical Movement (Signal Timing)

Site: 201 [201 EX AM Berry Rd, Marshall Ave (Site Folder: Existing)]

Intersection: Berry Road and Marshall Avenue
Scenario: Exisitng AM Peak
Site Category: (None)
Roundabout

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Site: 201 [201 EX AM Berry Rd, Marshall Ave (Site Folder: Existing)]

Intersection: Berry Road and Marshall Avenue
Scenario: Exisitng AM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1	L2	1	0	1	0.0	0.016	5.9	LOS A	0.1	0.6	0.33	0.48	0.33	26.5
2	T1	13	0	14	0.0	0.016	4.7	LOS A	0.1	0.6	0.33	0.48	0.33	28.3
3	R2	1	0	1	0.0	0.016	7.4	LOS A	0.1	0.6	0.33	0.48	0.33	28.1
3u	U	1	0	1	0.0	0.016	8.8	LOS A	0.1	0.6	0.33	0.48	0.33	43.9
Approach		16	0	17	0.0	0.016	5.2	LOS A	0.1	0.6	0.33	0.48	0.33	29.2
East: Marshall Avenue														
4	L2	5	0	5	0.0	0.093	4.2	LOS A	0.6	4.1	0.21	0.59	0.21	38.0
5	T1	1	0	1	0.0	0.093	4.6	LOS A	0.6	4.1	0.21	0.59	0.21	13.1
6	R2	101	1	106	1.0	0.093	7.0	LOS A	0.6	4.1	0.21	0.59	0.21	16.6
6u	U	3	0	3	0.0	0.093	8.3	LOS A	0.6	4.1	0.21	0.59	0.21	17.3
Approach		110	1	116	0.9	0.093	6.9	LOS A	0.6	4.1	0.21	0.59	0.21	17.6
North: Berry Road														
7	L2	69	2	73	2.9	0.089	4.2	LOS A	0.4	2.9	0.05	0.55	0.05	31.7
8	T1	19	0	20	0.0	0.089	3.7	LOS A	0.4	2.9	0.05	0.55	0.05	41.3
9	R2	9	0	9	0.0	0.089	6.7	LOS A	0.4	2.9	0.05	0.55	0.05	25.3
9u	U	27	0	28	0.0	0.089	8.0	LOS A	0.4	2.9	0.05	0.55	0.05	28.9
Approach		124	2	131	1.6	0.089	5.1	LOS A	0.4	2.9	0.05	0.55	0.05	33.1
West: Driveway														
10	L2	1	0	1	0.0	0.004	2.8	LOS A	0.0	0.2	0.36	0.53	0.36	15.7
11	T1	1	0	1	0.0	0.004	2.8	LOS A	0.0	0.2	0.36	0.53	0.36	17.3
12	R2	1	0	1	0.0	0.004	5.1	LOS A	0.0	0.2	0.36	0.53	0.36	44.8
12u	U	1	0	1	0.0	0.004	6.5	LOS A	0.0	0.2	0.36	0.53	0.36	8.6
Approach		4	0	4	0.0	0.004	4.3	LOS A	0.0	0.2	0.36	0.53	0.36	22.9
All Vehicles		254	3	267	1.2	0.093	5.9	LOS A	0.6	4.1	0.14	0.56	0.14	24.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 203 [203 EX+DEV AM Berry Rd, Marshall Ave (Site Folder: Existing + Development)]

Intersection: Berry Road and Marshall Avenue
Scenario: Exisitng + Development AM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1	L2	1	0	1	0.0	0.016	6.1	LOS A	0.1	0.6	0.37	0.49	0.37	26.4
2	T1	13	0	14	0.0	0.016	4.9	LOS A	0.1	0.6	0.37	0.49	0.37	28.2
3	R2	1	0	1	0.0	0.016	7.6	LOS A	0.1	0.6	0.37	0.49	0.37	28.0
3u	U	1	0	1	0.0	0.016	9.0	LOS A	0.1	0.6	0.37	0.49	0.37	43.7
Approach		16	0	17	0.0	0.016	5.4	LOS A	0.1	0.6	0.37	0.49	0.37	29.0
East: Marshall Avenue														
4	L2	5	0	5	0.0	0.117	4.2	LOS A	0.7	5.3	0.21	0.59	0.21	38.0
5	T1	1	0	1	0.0	0.117	4.6	LOS A	0.7	5.3	0.21	0.59	0.21	13.1
6	R2	131	1	138	0.8	0.117	7.0	LOS A	0.7	5.3	0.21	0.59	0.21	16.6
6u	U	3	0	3	0.0	0.117	8.3	LOS A	0.7	5.3	0.21	0.59	0.21	17.3
Approach		140	1	147	0.7	0.117	6.9	LOS A	0.7	5.3	0.21	0.59	0.21	17.3
North: Berry Road														
7	L2	91	2	96	2.2	0.103	4.2	LOS A	0.5	3.5	0.05	0.55	0.05	31.8
8	T1	19	0	20	0.0	0.103	3.7	LOS A	0.5	3.5	0.05	0.55	0.05	41.4
9	R2	9	0	9	0.0	0.103	6.7	LOS A	0.5	3.5	0.05	0.55	0.05	25.5
9u	U	27	0	28	0.0	0.103	8.0	LOS A	0.5	3.5	0.05	0.55	0.05	29.0
Approach		146	2	154	1.4	0.103	5.0	LOS A	0.5	3.5	0.05	0.55	0.05	33.0
West: Driveway														
10	L2	1	0	1	0.0	0.004	3.0	LOS A	0.0	0.2	0.40	0.53	0.40	15.6
11	T1	1	0	1	0.0	0.004	3.0	LOS A	0.0	0.2	0.40	0.53	0.40	17.1
12	R2	1	0	1	0.0	0.004	5.3	LOS A	0.0	0.2	0.40	0.53	0.40	44.5
12u	U	1	0	1	0.0	0.004	6.8	LOS A	0.0	0.2	0.40	0.53	0.40	8.5
Approach		4	0	4	0.0	0.004	4.5	LOS A	0.0	0.2	0.40	0.53	0.40	22.7
All Vehicles		306	3	322	1.0	0.117	5.9	LOS A	0.7	5.3	0.15	0.56	0.15	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 202 [202 EX PM Berry Rd, Marshall Ave (Site Folder: Existing)]

Intersection: Berry Road and Marshall Avenue
Scenario: Exisitng PM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1	L2	1	0	1	0.0	0.022	5.7	LOS A	0.1	0.8	0.28	0.48	0.28	26.6
2	T1	19	0	20	0.0	0.022	4.4	LOS A	0.1	0.8	0.28	0.48	0.28	28.3
3	R2	3	0	3	0.0	0.022	7.2	LOS A	0.1	0.8	0.28	0.48	0.28	28.2
3u	U	1	0	1	0.0	0.022	8.6	LOS A	0.1	0.8	0.28	0.48	0.28	44.0
Approach		24	0	25	0.0	0.022	5.0	LOS A	0.1	0.8	0.28	0.48	0.28	28.9
East: Marshall Avenue														
4	L2	4	0	4	0.0	0.062	4.1	LOS A	0.4	2.6	0.18	0.59	0.18	38.2
5	T1	1	0	1	0.0	0.062	4.5	LOS A	0.4	2.6	0.18	0.59	0.18	13.2
6	R2	68	0	72	0.0	0.062	6.9	LOS A	0.4	2.6	0.18	0.59	0.18	16.7
6u	U	1	0	1	0.0	0.062	8.2	LOS A	0.4	2.6	0.18	0.59	0.18	17.4
Approach		74	0	78	0.0	0.062	6.7	LOS A	0.4	2.6	0.18	0.59	0.18	17.8
North: Berry Road														
7	L2	101	0	106	0.0	0.102	4.2	LOS A	0.5	3.4	0.05	0.55	0.05	31.8
8	T1	12	0	13	0.0	0.102	3.7	LOS A	0.5	3.4	0.05	0.55	0.05	41.4
9	R2	1	0	1	0.0	0.102	6.7	LOS A	0.5	3.4	0.05	0.55	0.05	25.3
9u	U	31	0	33	0.0	0.102	8.0	LOS A	0.5	3.4	0.05	0.55	0.05	28.9
Approach		145	0	153	0.0	0.102	5.0	LOS A	0.5	3.4	0.05	0.55	0.05	32.5
West: Driveway														
10	L2	5	0	5	0.0	0.008	2.6	LOS A	0.0	0.3	0.33	0.48	0.33	15.7
11	T1	1	0	1	0.0	0.008	2.6	LOS A	0.0	0.3	0.33	0.48	0.33	17.4
12	R2	1	0	1	0.0	0.008	5.0	LOS A	0.0	0.3	0.33	0.48	0.33	46.5
12u	U	1	0	1	0.0	0.008	6.4	LOS A	0.0	0.3	0.33	0.48	0.33	8.1
Approach		8	0	8	0.0	0.008	3.4	LOS A	0.0	0.3	0.33	0.48	0.33	19.5
All Vehicles		251	0	264	0.0	0.102	5.4	LOS A	0.5	3.4	0.12	0.55	0.12	25.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 204 [204 EX+DEV PM Berry Rd, Marshall Ave (Site Folder: Existing + Development)]

Intersection: Berry Road and Marshall Avenue
Scenario: Exisitng + Development PM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1	L2	1	0	1	0.0	0.023	5.8	LOS A	0.1	0.8	0.31	0.49	0.31	26.5
2	T1	19	0	20	0.0	0.023	4.6	LOS A	0.1	0.8	0.31	0.49	0.31	28.3
3	R2	3	0	3	0.0	0.023	7.3	LOS A	0.1	0.8	0.31	0.49	0.31	28.1
3u	U	1	0	1	0.0	0.023	8.7	LOS A	0.1	0.8	0.31	0.49	0.31	43.9
Approach		24	0	25	0.0	0.023	5.1	LOS A	0.1	0.8	0.31	0.49	0.31	28.8
East: Marshall Avenue														
4	L2	4	0	4	0.0	0.077	4.1	LOS A	0.5	3.3	0.18	0.59	0.18	38.1
5	T1	1	0	1	0.0	0.077	4.5	LOS A	0.5	3.3	0.18	0.59	0.18	13.2
6	R2	87	0	92	0.0	0.077	6.9	LOS A	0.5	3.3	0.18	0.59	0.18	16.7
6u	U	1	0	1	0.0	0.077	8.2	LOS A	0.5	3.3	0.18	0.59	0.18	17.4
Approach		93	0	98	0.0	0.077	6.8	LOS A	0.5	3.3	0.18	0.59	0.18	17.6
North: Berry Road														
7	L2	123	0	129	0.0	0.116	4.2	LOS A	0.6	3.9	0.05	0.54	0.05	32.0
8	T1	12	0	13	0.0	0.116	3.7	LOS A	0.6	3.9	0.05	0.54	0.05	41.5
9	R2	1	0	1	0.0	0.116	6.7	LOS A	0.6	3.9	0.05	0.54	0.05	25.4
9u	U	31	0	33	0.0	0.116	8.0	LOS A	0.6	3.9	0.05	0.54	0.05	29.0
Approach		167	0	176	0.0	0.116	4.9	LOS A	0.6	3.9	0.05	0.54	0.05	32.5
West: Driveway														
10	L2	5	0	5	0.0	0.008	2.7	LOS A	0.0	0.3	0.35	0.49	0.35	15.6
11	T1	1	0	1	0.0	0.008	2.7	LOS A	0.0	0.3	0.35	0.49	0.35	17.3
12	R2	1	0	1	0.0	0.008	5.1	LOS A	0.0	0.3	0.35	0.49	0.35	46.2
12u	U	1	0	1	0.0	0.008	6.5	LOS A	0.0	0.3	0.35	0.49	0.35	8.0
Approach		8	0	8	0.0	0.008	3.5	LOS A	0.0	0.3	0.35	0.49	0.35	19.4
All Vehicles		292	0	307	0.0	0.116	5.5	LOS A	0.6	3.9	0.12	0.55	0.12	25.3

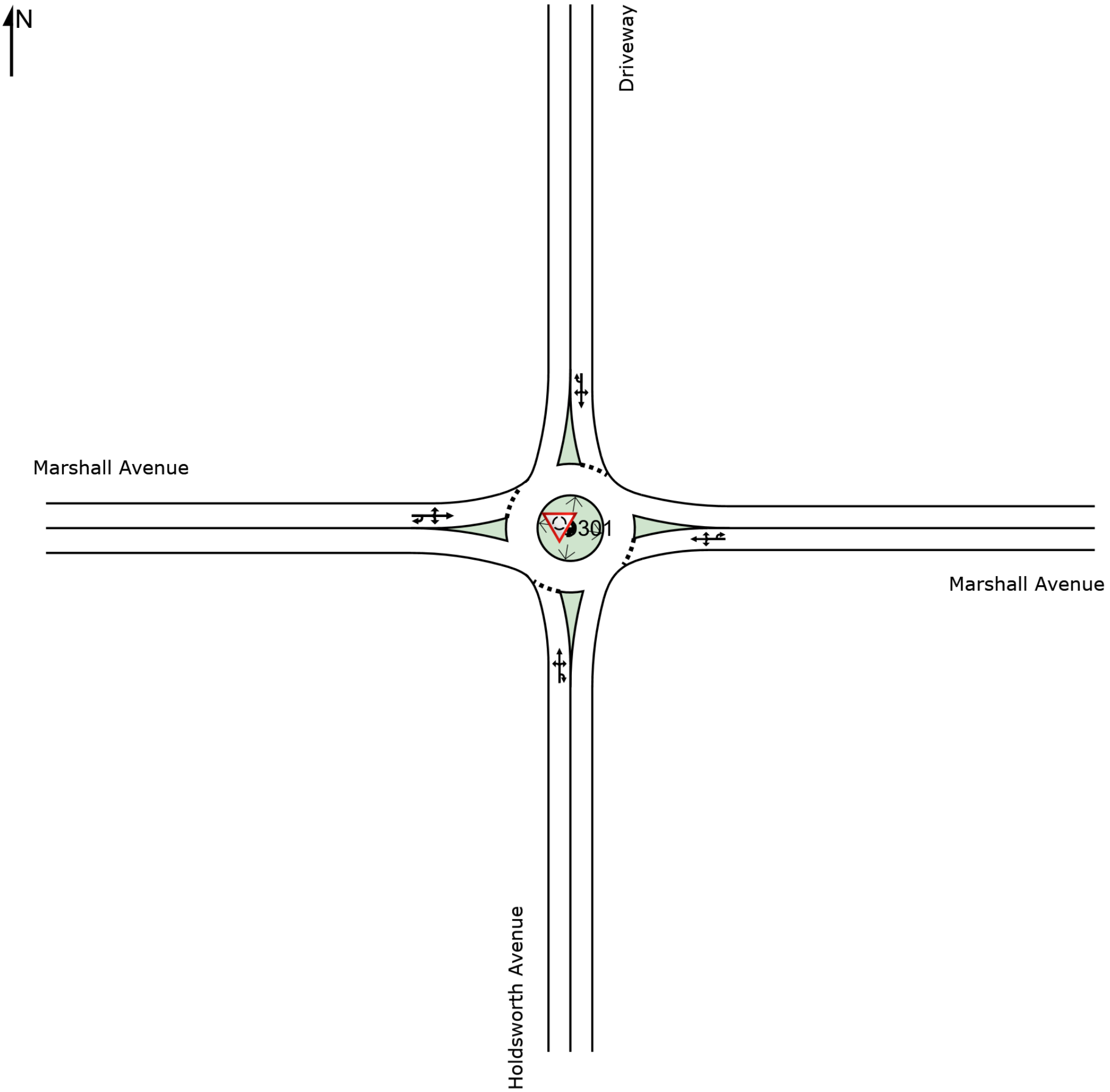
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 301 [301 EX AM Marshall Ave, Holdsworth Ave (Site Folder: Existing)]

Intersection: Marshall Avenue and Holdsworth Avenue
Scenario: Existing AM Peak
Site Category: (None)
Roundabout

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Site: 301 [301 EX AM Marshall Ave, Holdsworth Ave (Site Folder: Existing)]

Intersection: Marshall Avenue and Holdsworth Avenue
Scenario: Existing AM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holdsworth Avenue														
1	L2	8	0	8	0.0	0.011	4.5	LOS A	0.1	0.4	0.30	0.53	0.30	39.7
2	T1	1	0	1	0.0	0.011	9.4	LOS A	0.1	0.4	0.30	0.53	0.30	27.8
3	R2	2	0	2	0.0	0.011	7.4	LOS A	0.1	0.4	0.30	0.53	0.30	27.8
3u	U	1	0	1	0.0	0.011	8.8	LOS A	0.1	0.4	0.30	0.53	0.30	44.1
Approach		12	0	13	0.0	0.011	5.8	LOS A	0.1	0.4	0.30	0.53	0.30	36.5
East: Marshall Avenue														
4	L2	1	0	1	0.0	0.064	4.1	LOS A	0.4	2.7	0.18	0.44	0.18	41.4
5	T1	71	1	75	1.4	0.064	3.9	LOS A	0.4	2.7	0.18	0.44	0.18	35.9
6	R2	2	0	2	0.0	0.064	11.3	LOS A	0.4	2.7	0.18	0.44	0.18	17.7
6u	U	2	0	2	0.0	0.064	8.4	LOS A	0.4	2.7	0.18	0.44	0.18	17.7
Approach		76	1	80	1.3	0.064	4.2	LOS A	0.4	2.7	0.18	0.44	0.18	34.3
North: Driveway														
7	L2	3	0	3	0.0	0.024	0.5	LOS A	0.1	0.9	0.26	0.10	0.26	15.6
8	T1	1	0	1	0.0	0.024	0.5	LOS A	0.1	0.9	0.26	0.10	0.26	26.3
9	R2	21	0	22	0.0	0.024	0.5	LOS A	0.1	0.9	0.26	0.10	0.26	10.0
9u	U	1	0	1	0.0	0.024	0.5	LOS A	0.1	0.9	0.26	0.10	0.26	9.9
Approach		26	0	27	0.0	0.024	0.5	LOS A	0.1	0.9	0.26	0.10	0.26	11.1
West: Marshall Avenue														
10	L2	4	0	4	0.0	0.054	6.6	LOS A	0.3	2.1	0.07	0.50	0.07	17.7
11	T1	54	2	57	3.7	0.054	3.7	LOS A	0.3	2.1	0.07	0.50	0.07	35.9
12	R2	10	0	11	0.0	0.054	6.7	LOS A	0.3	2.1	0.07	0.50	0.07	42.2
12u	U	4	0	4	0.0	0.054	8.1	LOS A	0.3	2.1	0.07	0.50	0.07	16.5
Approach		72	2	76	2.8	0.054	4.5	LOS A	0.3	2.1	0.07	0.50	0.07	33.9
All Vehicles		186	3	196	1.6	0.064	3.9	LOS A	0.4	2.7	0.16	0.42	0.16	27.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 303 [303 EX+DEV AM Marshall Ave, Holdsworth Ave (Site Folder: Existing + Development)]

Intersection: Marshall Avenue and Holdsworth Avenue
Scenario: Existing + Development AM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holdsworth Avenue														
1	L2	38	0	40	0.0	0.044	4.6	LOS A	0.3	1.8	0.31	0.52	0.31	40.3
2	T1	1	0	1	0.0	0.044	9.5	LOS A	0.3	1.8	0.31	0.52	0.31	28.0
3	R2	7	0	7	0.0	0.044	7.4	LOS A	0.3	1.8	0.31	0.52	0.31	28.0
3u	U	1	0	1	0.0	0.044	8.9	LOS A	0.3	1.8	0.31	0.52	0.31	44.6
Approach		47	0	49	0.0	0.044	5.2	LOS A	0.3	1.8	0.31	0.52	0.31	37.7
East: Marshall Avenue														
4	L2	6	0	6	0.0	0.072	4.3	LOS A	0.4	3.0	0.24	0.45	0.24	41.1
5	T1	71	1	75	1.4	0.072	4.1	LOS A	0.4	3.0	0.24	0.45	0.24	35.4
6	R2	2	0	2	0.0	0.072	11.5	LOS A	0.4	3.0	0.24	0.45	0.24	17.5
6u	U	2	0	2	0.0	0.072	8.6	LOS A	0.4	3.0	0.24	0.45	0.24	17.6
Approach		81	1	85	1.2	0.072	4.4	LOS A	0.4	3.0	0.24	0.45	0.24	34.7
North: Driveway														
7	L2	3	0	3	0.0	0.025	0.7	LOS A	0.1	0.9	0.30	0.13	0.30	15.5
8	T1	1	0	1	0.0	0.025	0.7	LOS A	0.1	0.9	0.30	0.13	0.30	26.2
9	R2	21	0	22	0.0	0.025	0.7	LOS A	0.1	0.9	0.30	0.13	0.30	10.0
9u	U	1	0	1	0.0	0.025	0.7	LOS A	0.1	0.9	0.30	0.13	0.30	9.8
Approach		26	0	27	0.0	0.025	0.7	LOS A	0.1	0.9	0.30	0.13	0.30	11.0
West: Marshall Avenue														
10	L2	4	0	4	0.0	0.071	6.6	LOS A	0.4	2.9	0.09	0.53	0.09	17.4
11	T1	54	2	57	3.7	0.071	3.7	LOS A	0.4	2.9	0.09	0.53	0.09	34.8
12	R2	32	0	34	0.0	0.071	6.8	LOS A	0.4	2.9	0.09	0.53	0.09	41.5
12u	U	4	0	4	0.0	0.071	8.2	LOS A	0.4	2.9	0.09	0.53	0.09	16.4
Approach		94	2	99	2.1	0.071	5.1	LOS A	0.4	2.9	0.09	0.53	0.09	35.7
All Vehicles		248	3	261	1.2	0.072	4.4	LOS A	0.4	3.0	0.21	0.46	0.21	31.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 302 [302 EX AM Marshall Ave, Holdsworth Ave (Site Folder: Existing)]

Intersection: Marshall Avenue and Holdsworth Avenue
Scenario: Existing PM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holdsworth Avenue														
1	L2	13	0	14	0.0	0.017	4.2	LOS A	0.1	0.7	0.23	0.53	0.23	40.2
2	T1	1	0	1	0.0	0.017	9.1	LOS A	0.1	0.7	0.23	0.53	0.23	28.0
3	R2	4	0	4	0.0	0.017	7.1	LOS A	0.1	0.7	0.23	0.53	0.23	28.0
3u	U	1	0	1	0.0	0.017	8.5	LOS A	0.1	0.7	0.23	0.53	0.23	44.5
Approach		19	0	20	0.0	0.017	5.3	LOS A	0.1	0.7	0.23	0.53	0.23	36.4
East: Marshall Avenue														
4	L2	2	1	2	50.0	0.037	4.3	LOS A	0.2	1.5	0.15	0.47	0.15	39.8
5	T1	36	0	38	0.0	0.037	3.8	LOS A	0.2	1.5	0.15	0.47	0.15	35.7
6	R2	1	0	1	0.0	0.037	11.2	LOS A	0.2	1.5	0.15	0.47	0.15	17.7
6u	U	5	0	5	0.0	0.037	8.3	LOS A	0.2	1.5	0.15	0.47	0.15	21.2
Approach		44	1	46	2.3	0.037	4.5	LOS A	0.2	1.5	0.15	0.47	0.15	33.0
North: Driveway														
7	L2	1	0	1	0.0	0.013	0.7	LOS A	0.1	0.5	0.30	0.12	0.30	15.4
8	T1	1	0	1	0.0	0.013	0.7	LOS A	0.1	0.5	0.30	0.12	0.30	26.1
9	R2	11	0	12	0.0	0.013	0.7	LOS A	0.1	0.5	0.30	0.12	0.30	10.0
9u	U	1	0	1	0.0	0.013	0.7	LOS A	0.1	0.5	0.30	0.12	0.30	9.8
Approach		14	0	15	0.0	0.013	0.7	LOS A	0.1	0.5	0.30	0.12	0.30	11.4
West: Marshall Avenue														
10	L2	6	0	6	0.0	0.072	6.6	LOS A	0.4	2.8	0.09	0.48	0.09	17.7
11	T1	79	0	83	0.0	0.072	3.7	LOS A	0.4	2.8	0.09	0.48	0.09	36.3
12	R2	3	0	3	0.0	0.072	6.8	LOS A	0.4	2.8	0.09	0.48	0.09	42.3
12u	U	9	0	9	0.0	0.072	8.2	LOS A	0.4	2.8	0.09	0.48	0.09	16.6
Approach		97	0	102	0.0	0.072	4.4	LOS A	0.4	2.8	0.09	0.48	0.09	31.5
All Vehicles		174	1	183	0.6	0.072	4.2	LOS A	0.4	2.8	0.14	0.45	0.14	29.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 304 [304 EX+DEV PM Marshall Ave, Holdsworth Ave (Site Folder: Existing + Development)]

Intersection: Marshall Avenue and Holdsworth Avenue
Scenario: Existing + Development PM Peak
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holdsworth Avenue														
1	L2	32	0	34	0.0	0.038	4.3	LOS A	0.2	1.5	0.24	0.51	0.24	40.5
2	T1	1	0	1	0.0	0.038	9.2	LOS A	0.2	1.5	0.24	0.51	0.24	28.1
3	R2	8	0	8	0.0	0.038	7.1	LOS A	0.2	1.5	0.24	0.51	0.24	28.1
3u	U	1	0	1	0.0	0.038	8.6	LOS A	0.2	1.5	0.24	0.51	0.24	44.7
Approach		42	0	44	0.0	0.038	5.0	LOS A	0.2	1.5	0.24	0.51	0.24	37.2
East: Marshall Avenue														
4	L2	6	1	6	16.7	0.043	4.3	LOS A	0.2	1.7	0.21	0.47	0.21	40.4
5	T1	36	0	38	0.0	0.043	4.0	LOS A	0.2	1.7	0.21	0.47	0.21	35.3
6	R2	1	0	1	0.0	0.043	11.4	LOS A	0.2	1.7	0.21	0.47	0.21	17.5
6u	U	5	0	5	0.0	0.043	8.5	LOS A	0.2	1.7	0.21	0.47	0.21	21.0
Approach		48	1	51	2.1	0.043	4.7	LOS A	0.2	1.7	0.21	0.47	0.21	33.7
North: Driveway														
7	L2	1	0	1	0.0	0.014	0.9	LOS A	0.1	0.5	0.34	0.15	0.34	15.4
8	T1	1	0	1	0.0	0.014	0.9	LOS A	0.1	0.5	0.34	0.15	0.34	26.0
9	R2	11	0	12	0.0	0.014	0.9	LOS A	0.1	0.5	0.34	0.15	0.34	10.0
9u	U	1	0	1	0.0	0.014	0.9	LOS A	0.1	0.5	0.34	0.15	0.34	9.8
Approach		14	0	15	0.0	0.014	0.9	LOS A	0.1	0.5	0.34	0.15	0.34	11.3
West: Marshall Avenue														
10	L2	6	0	6	0.0	0.090	6.6	LOS A	0.5	3.6	0.10	0.51	0.10	17.5
11	T1	79	0	83	0.0	0.090	3.7	LOS A	0.5	3.6	0.10	0.51	0.10	35.3
12	R2	26	0	27	0.0	0.090	6.8	LOS A	0.5	3.6	0.10	0.51	0.10	41.7
12u	U	9	0	9	0.0	0.090	8.2	LOS A	0.5	3.6	0.10	0.51	0.10	16.4
Approach		120	0	126	0.0	0.090	4.9	LOS A	0.5	3.6	0.10	0.51	0.10	33.8
All Vehicles		224	1	236	0.4	0.090	4.6	LOS A	0.5	3.6	0.17	0.48	0.17	32.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

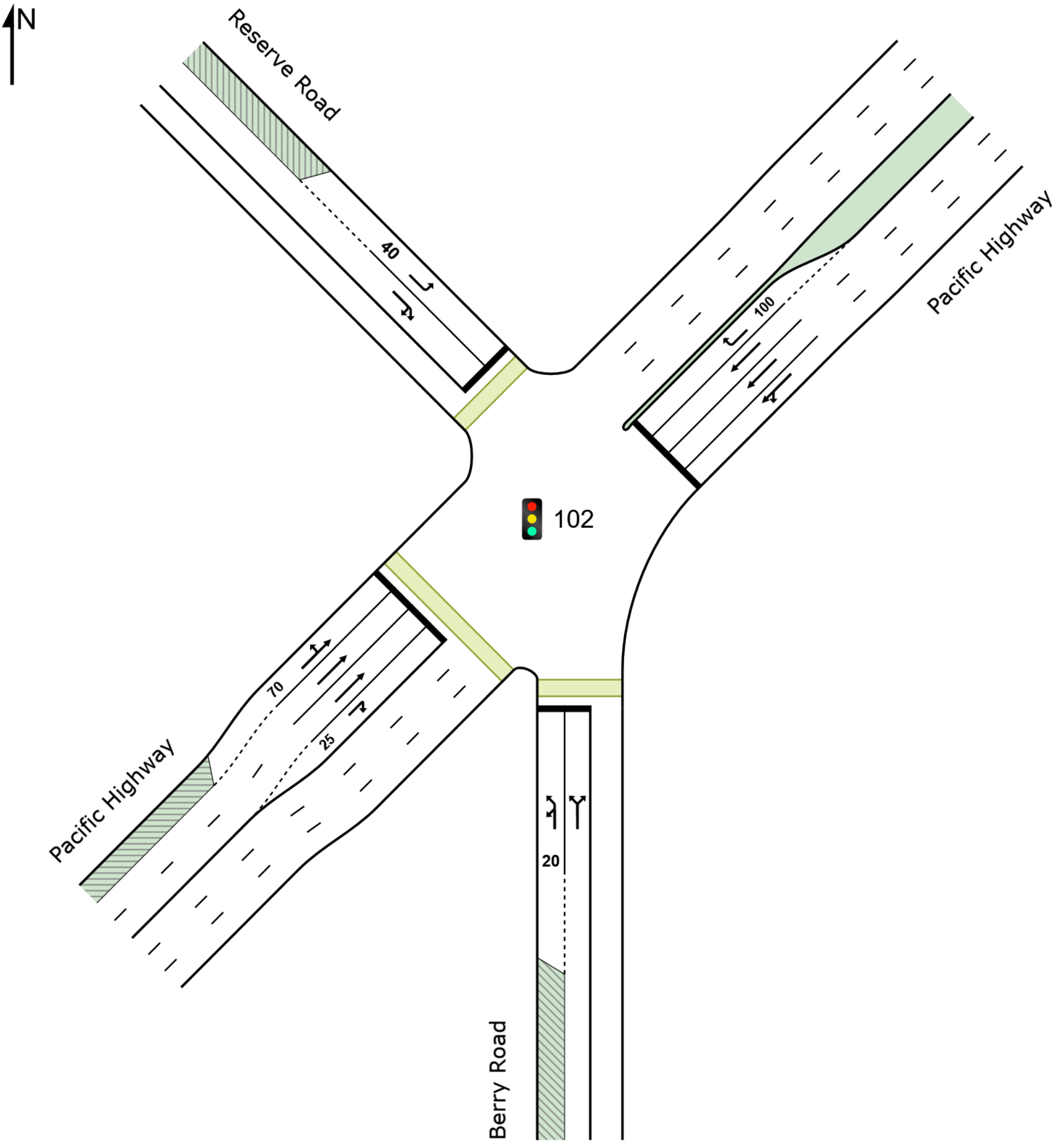
Site: 102 [102 EX PM Pacific Hwy, Berry Rd, Reserve Rd (Site Folder: Existing)]

Intersection: Pacific Highway, Berry Road and Reserve Road
Scenario: Exisiting PM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS Layout
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, E1*, E2*
Output Phase Sequence: A, D, E
(* Variable Phase)

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Site: 102 [102 EX PM Pacific Hwy, Berry Rd, Reserve Rd (Site Folder: Existing)]

Intersection: Pacific Highway, Berry Road and Reserve Road
Scenario: Exisiting PM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS Layout
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, E1*, E2*
Output Phase Sequence: A, D, E
(* Variable Phase)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1b	L3	56	0	59	0.0	0.132	40.6	LOS C	2.6	18.1	0.79	0.73	0.79	24.4
1a	L1	1	0	1	0.0	* 0.568	60.1	LOS E	5.2	36.2	0.99	0.79	1.00	12.6
3a	R1	83	0	87	0.0	0.568	60.3	LOS E	5.2	36.2	0.99	0.79	1.00	9.5
Approach		140	0	147	0.0	0.568	52.4	LOS D	5.2	36.2	0.91	0.77	0.92	15.4
NorthEast: Pacific Highway														
24a	L1	97	1	102	1.0	0.179	15.8	LOS B	5.0	35.9	0.47	0.55	0.47	25.1
8	T1	1362	48	1434	3.5	* 0.597	15.0	LOS B	23.7	170.6	0.65	0.60	0.65	40.6
9	R2	101	7	106	6.9	* 0.260	12.7	LOS A	1.9	14.0	0.49	0.69	0.49	31.8
Approach		1560	56	1642	3.6	0.597	14.9	LOS B	23.7	170.6	0.63	0.60	0.63	39.5
NorthWest: Reserve Road														
10	L2	148	7	156	4.7	0.294	41.0	LOS C	7.1	51.4	0.82	0.78	0.82	19.2
29a	R1	3	0	3	0.0	0.296	53.9	LOS D	3.5	24.3	0.94	0.76	0.94	14.5
12	R2	58	0	61	0.0	0.296	56.7	LOS E	3.5	24.3	0.94	0.76	0.94	21.5
Approach		209	7	220	3.3	0.296	45.5	LOS D	7.1	51.4	0.85	0.77	0.85	20.0
SouthWest: Pacific Highway														
1	L2	45	0	47	0.0	0.340	17.8	LOS B	10.9	78.5	0.53	0.50	0.53	39.9
2	T1	992	42	1044	4.2	0.340	12.1	LOS A	11.0	79.5	0.52	0.47	0.52	43.2
32b	R3	58	1	61	1.7	0.216	17.2	LOS B	1.2	8.4	0.62	0.73	0.62	35.6
Approach		1095	43	1153	3.9	0.340	12.6	LOS A	11.0	79.5	0.53	0.48	0.53	42.6
All Vehicles		3004	106	3162	3.5	0.597	17.9	LOS B	23.7	170.6	0.62	0.58	0.62	36.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Site: 104 [104 EX+DEV PM Pacific Hwy, Berry Rd, Reserve Rd (Site Folder: Existing + Development)]

Intersection: Pacific Highway, Berry Road and Reserve Road
Scenario: Exisiting + Development PM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: TCS Layout
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, E1*, E2*
Output Phase Sequence: A, D, E
(* Variable Phase)

Vehicle Movement Performance

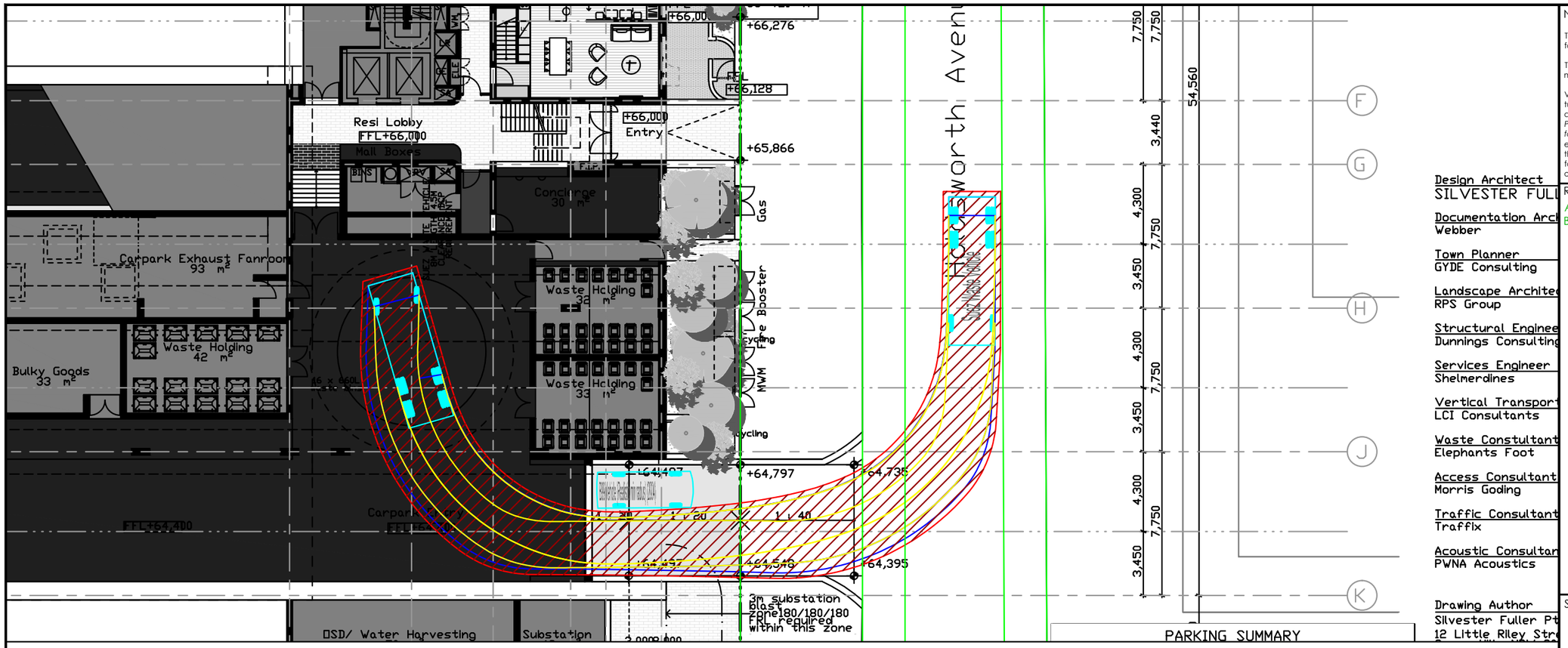
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Berry Road														
1b	L3	65	0	68	0.0	0.144	39.1	LOS C	3.0	20.7	0.78	0.74	0.78	24.9
1a	L1	1	0	1	0.0	*0.595	58.3	LOS E	5.7	39.9	0.98	0.80	1.01	12.9
3a	R1	93	0	98	0.0	0.595	58.5	LOS E	5.7	39.9	0.98	0.80	1.01	9.7
Approach		159	0	167	0.0	0.595	50.6	LOS D	5.7	39.9	0.90	0.78	0.91	15.9
NorthEast: Pacific Highway														
24a	L1	110	1	116	0.9	0.188	16.8	LOS B	5.4	38.2	0.49	0.58	0.49	24.0
8	T1	1362	48	1434	3.5	*0.625	16.4	LOS B	25.4	183.4	0.68	0.63	0.68	39.4
9	R2	101	7	106	6.9	*0.267	13.4	LOS A	2.0	14.9	0.51	0.69	0.51	31.3
Approach		1573	56	1656	3.6	0.625	16.2	LOS B	25.4	183.4	0.66	0.63	0.66	38.3
NorthWest: Reserve Road														
10	L2	148	7	156	4.7	0.278	39.3	LOS C	6.9	50.1	0.80	0.77	0.80	19.7
29a	R1	3	0	3	0.0	0.269	51.8	LOS D	3.4	23.7	0.92	0.76	0.92	14.9
12	R2	58	0	61	0.0	0.269	54.6	LOS D	3.4	23.7	0.92	0.76	0.92	21.9
Approach		209	7	220	3.3	0.278	43.7	LOS D	6.9	50.1	0.83	0.77	0.83	20.5
SouthWest: Pacific Highway														
1	L2	45	0	47	0.0	0.354	18.9	LOS B	11.5	83.1	0.55	0.52	0.55	39.1
2	T1	992	42	1044	4.2	0.354	13.2	LOS A	11.6	84.2	0.55	0.49	0.55	42.2
32b	R3	71	1	75	1.4	0.274	18.9	LOS B	1.6	11.3	0.67	0.75	0.67	34.4
Approach		1108	43	1166	3.9	0.354	13.8	LOS A	11.6	84.2	0.55	0.51	0.55	41.5
All Vehicles		3049	106	3209	3.5	0.625	19.0	LOS B	25.4	183.4	0.65	0.60	0.65	35.8

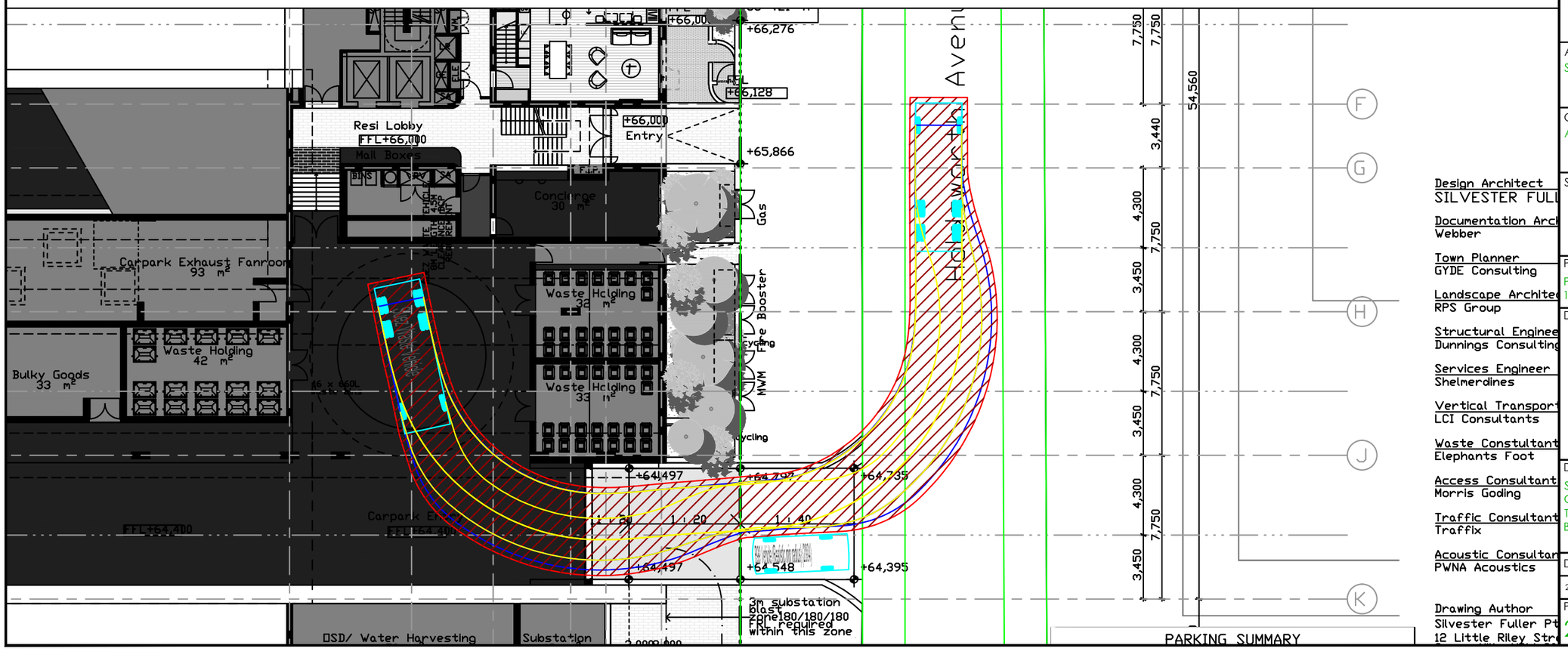
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

APPENDIX C

Swept Path Analysis





Design Architect
SILVESTER FULL

Documentation Arch
Webber

Town Planner
GYDE Consulting

Landscape Architec
RPS Group

Structural Enginee
Dunnings Consulting

Services Engineer
Shelmerdines

Vertical Transport
LCI Consultants

Waste Constultant
Elephants Foot

Access Consultant
Morris Goding

Traffic Consultant
Traffix

Acoustic Consultan
PWNA Acoustics

Drawing Author
Silvester Fuller Pt
12 Little Riley Str

Notes:

This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date
A	Swept Path Analysis	HD	06-05-22
B	Updated Plans	HD	10-06-22

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
Silvester Fuller

Client
Aqualand

Scale / Plan Orientation

0 2.5 5 7.5 10m

1:250 @ A3

Project Description
Proposed Mixed Use Development
10-20 Berry Rd and 11-19 Holdsworth Ave St Leonards

Drawing Prepared By

TRAFFIX
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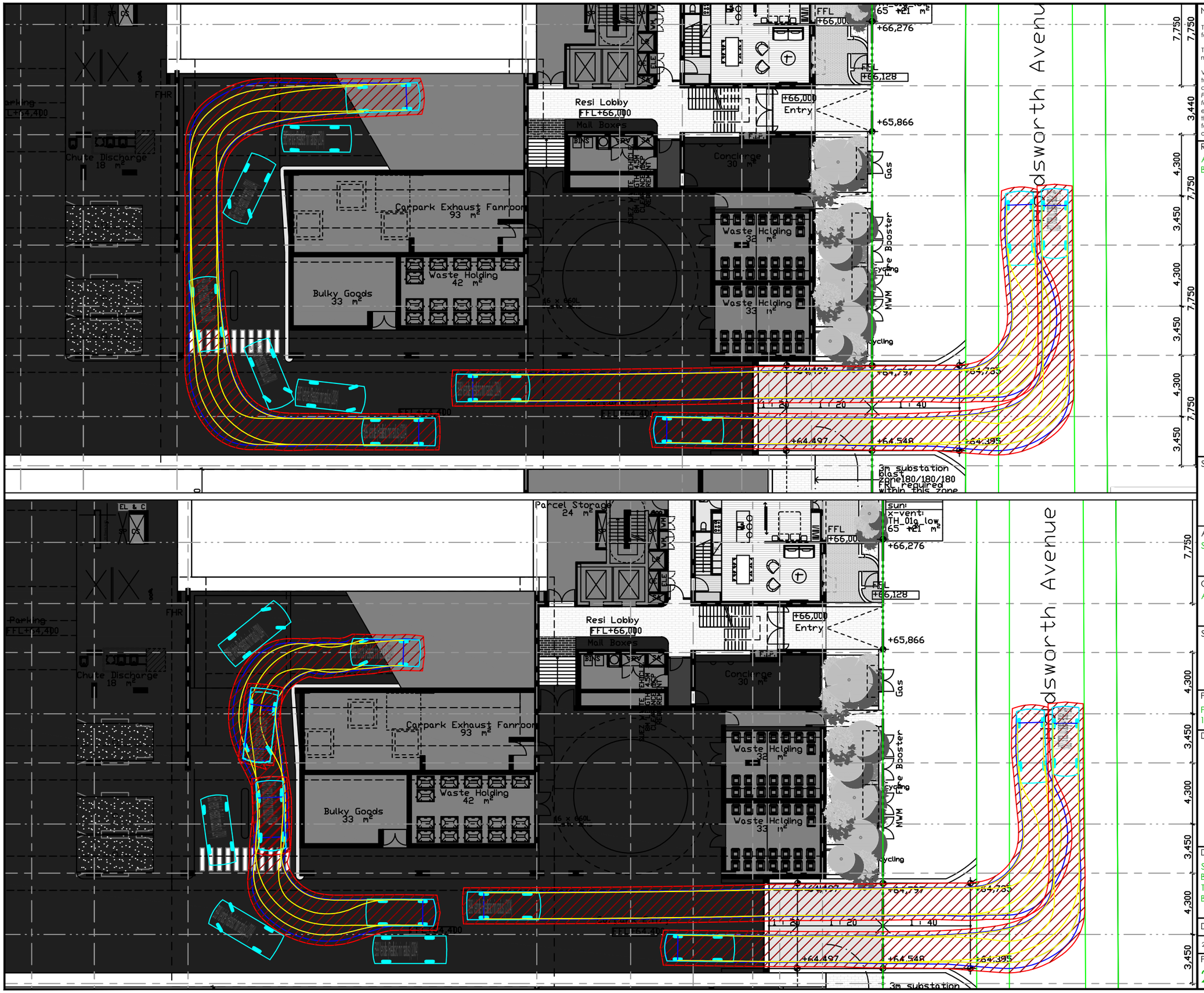
Drawing Title
Swept Path Analysis
Council Waste Vehicle and B99 Vehicle
Top: Entry Manoeuvre
Bottom: Exit Manoeuvre

Drawn:	Checked:	Date:
HD	-	06-05-22

21.519d05v01 TRAFFIX [220608 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
21.519	DA	TX.01	B



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Rev.	Revision Note	By.	Date
A	Swept Path Analysis	HD	06-05-22
B	Updated Plans	HD	10-06-22

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
Silvester Fuller

Client
Aqualand

Scale / Plan Orientation

0 2.5 5 7.5 10m
1:250 @ A3

Project Description
Proposed Mixed Use Development
10-20 Berry Rd and 11-19 Holdsworth Ave St Leonards

Drawing Prepared By

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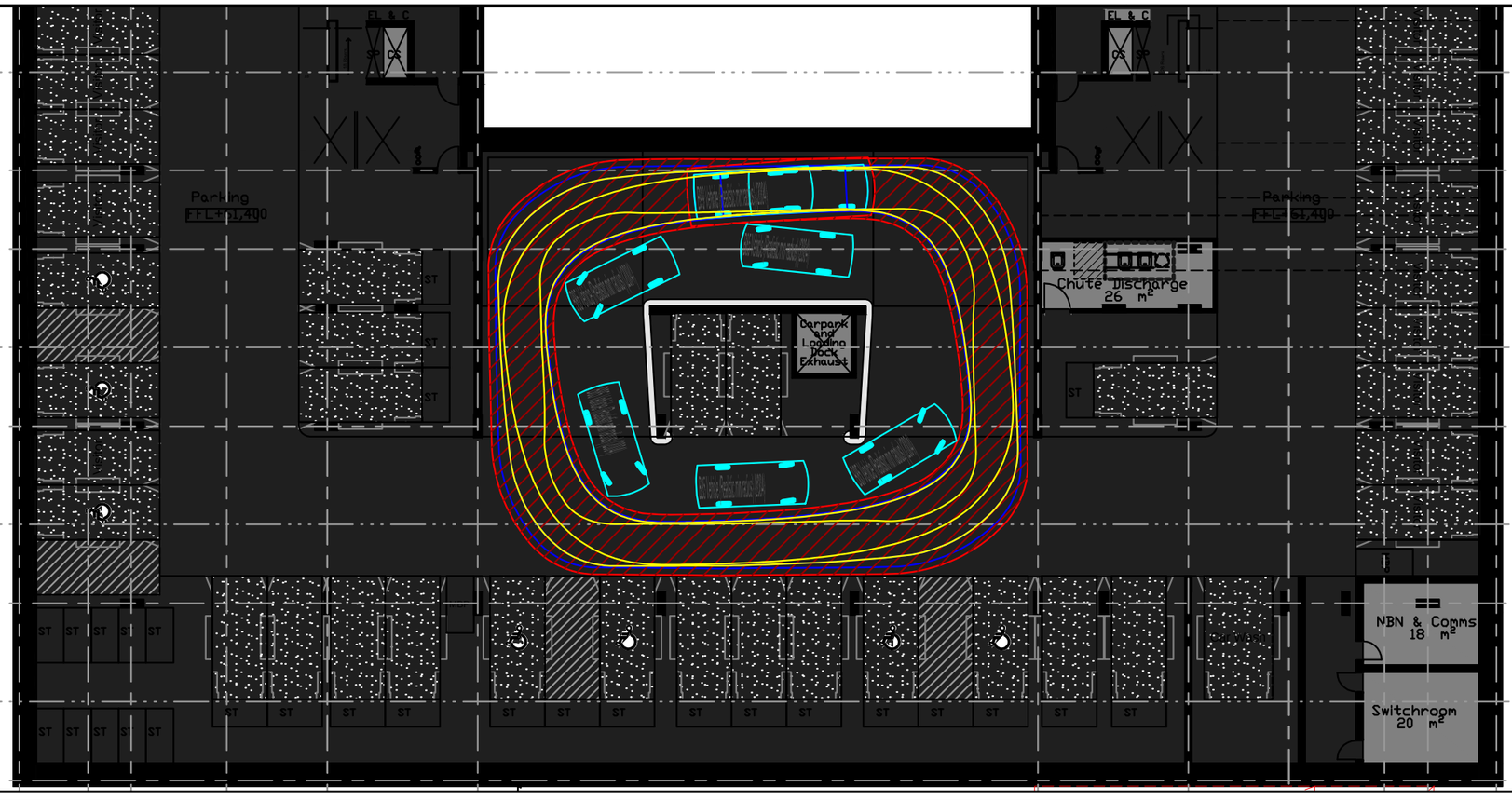
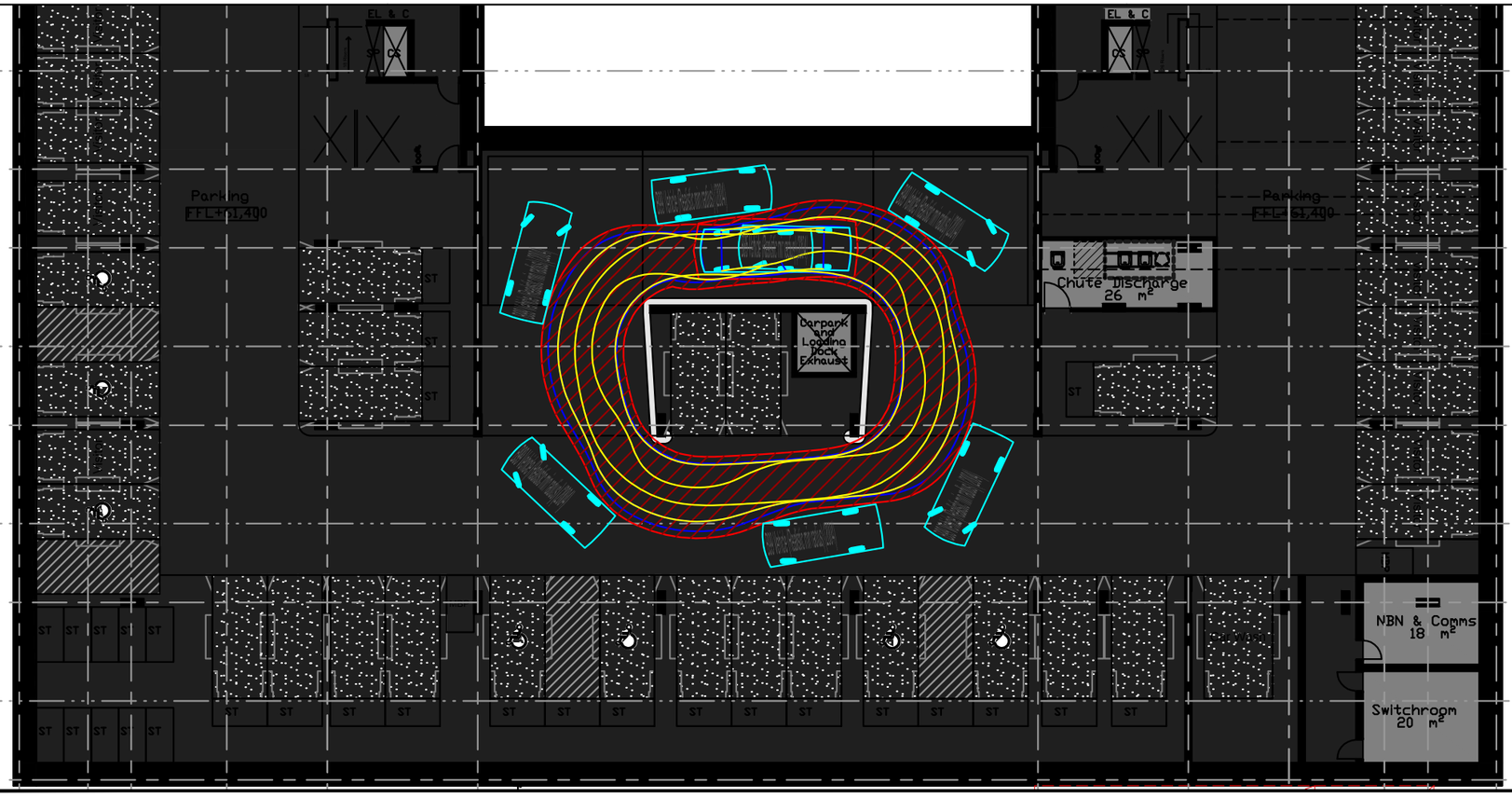
Drawing Title
Swept Path Analysis
B99 and B85 Vehicles
Top: Entry and Circulation
Bottom: Exit and Circulation

Drawn:	Checked:	Date:
HD	-	06-05-22

21.519d05v01 TRAFFIX [220608 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
21.519	DA	TX.02	B





Notes:

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Rev.	Revision Note	By.	Date
A	Swept Path Analysis	HD	06-05-22
B	Updated Plans	HD	10-06-22

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
Silvester Fuller

Client
Aqualand

Scale / Plan Orientation

0 2.5 5 7.5 10m
1:250 @ A3

Project Description
Proposed Mixed Use Development
10-20 Berry Rd and 11-19 Holdsworth Ave St Leonards

Drawing Prepared By

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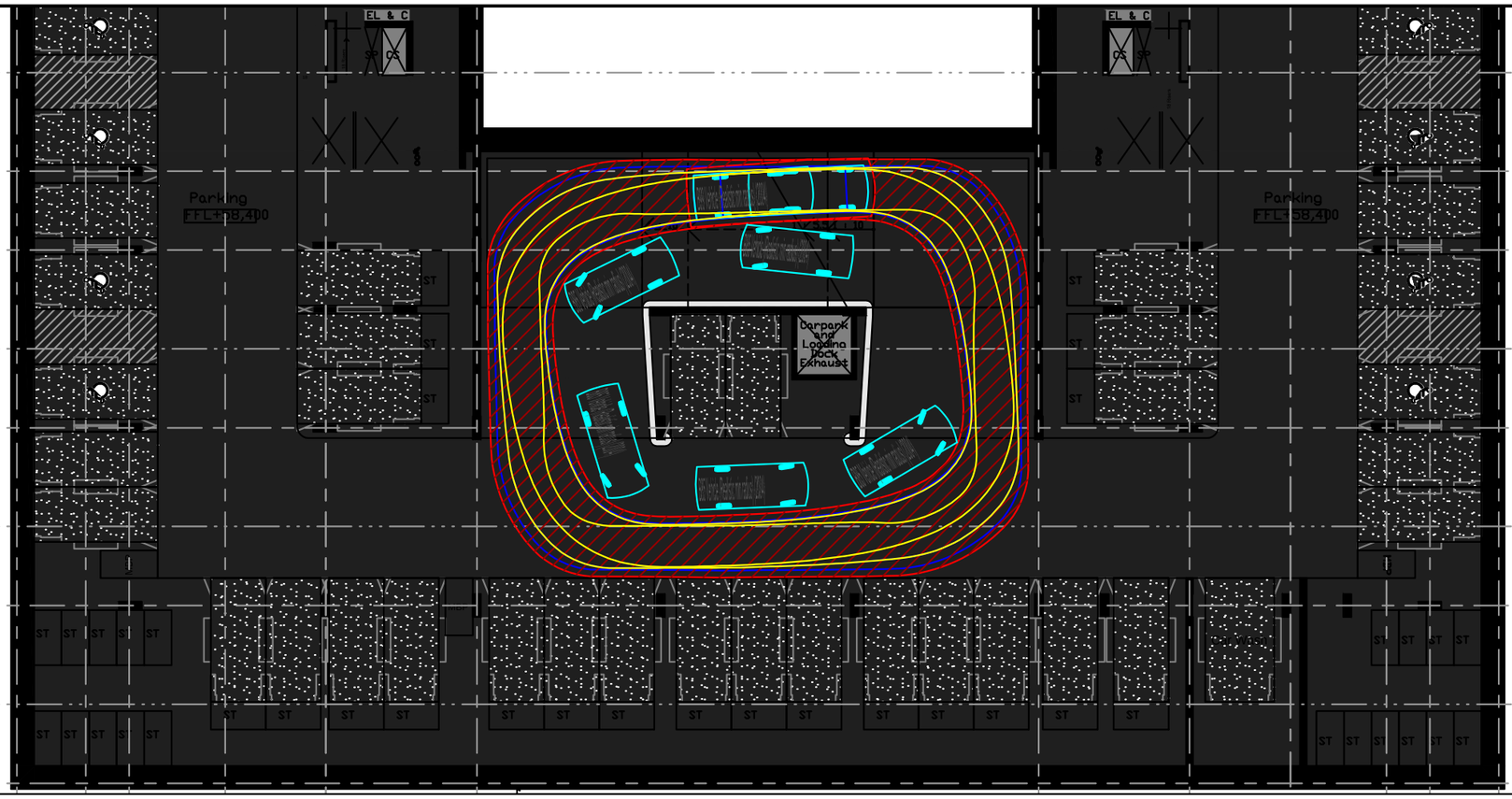
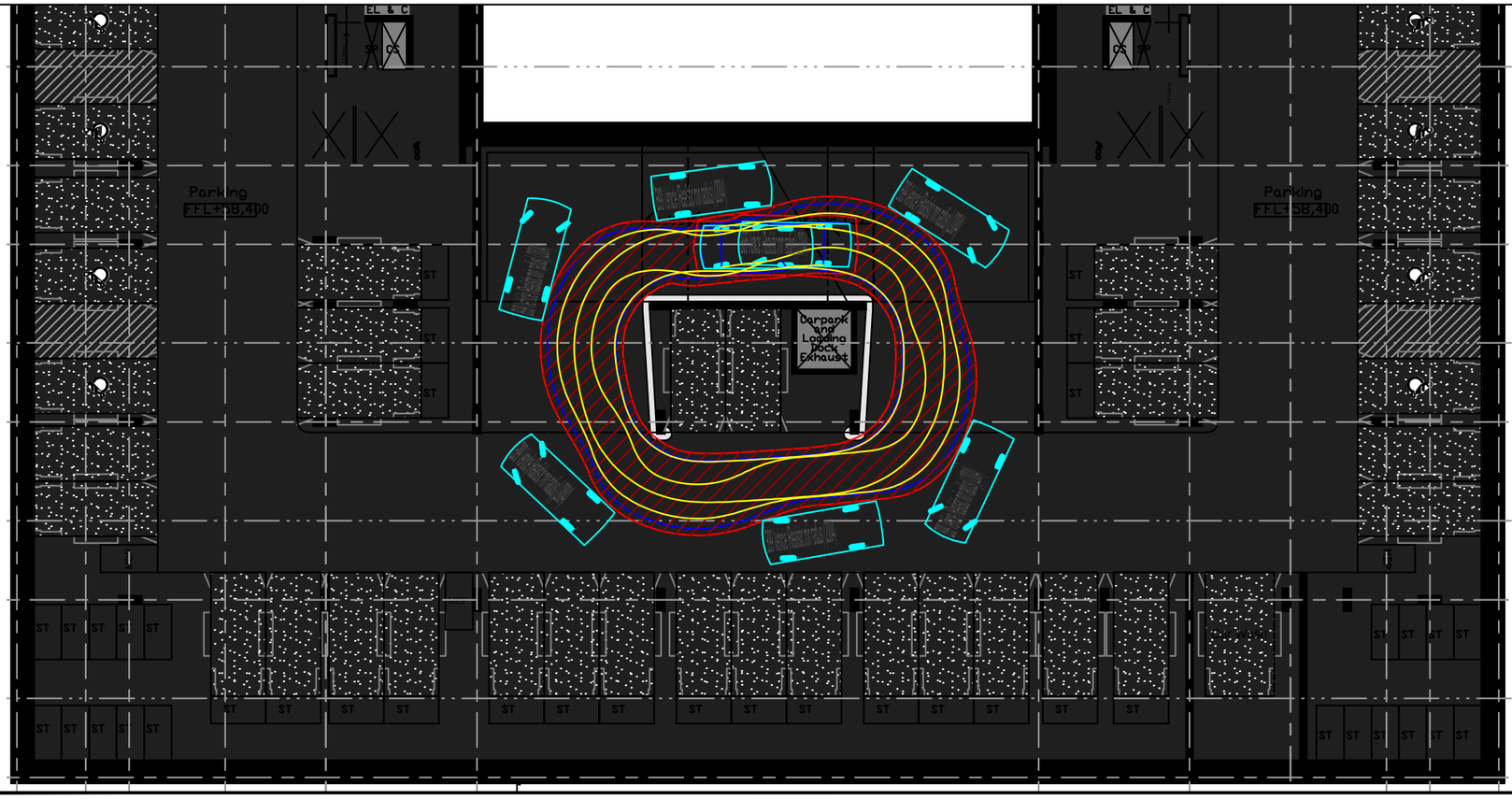
Drawing Title
Swept Path Analysis
Basement 1
B99 and B85 Vehicles
Top: Entry and Circulation
Bottom: Exit and Circulation

Drawn:	Checked:	Date:
HD	-	06-05-22

21.519d05v01 TRAFFIX [220608 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
21.519	DA	TX.03	B





Notes:

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Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date
A	Swept Path Analysis	HD	06-05-22
B	Updated Plans	HD	10-06-22

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
Silvester Fuller

Client
Aqualand

Scale / Plan Orientation

0 2.5 5 7.5 10m
1:250 @ A3

Project Description
Proposed Mixed Use Development
10-20 Berry Rd and 11-19 Holdsworth Ave St Leonards

Drawing Prepared By

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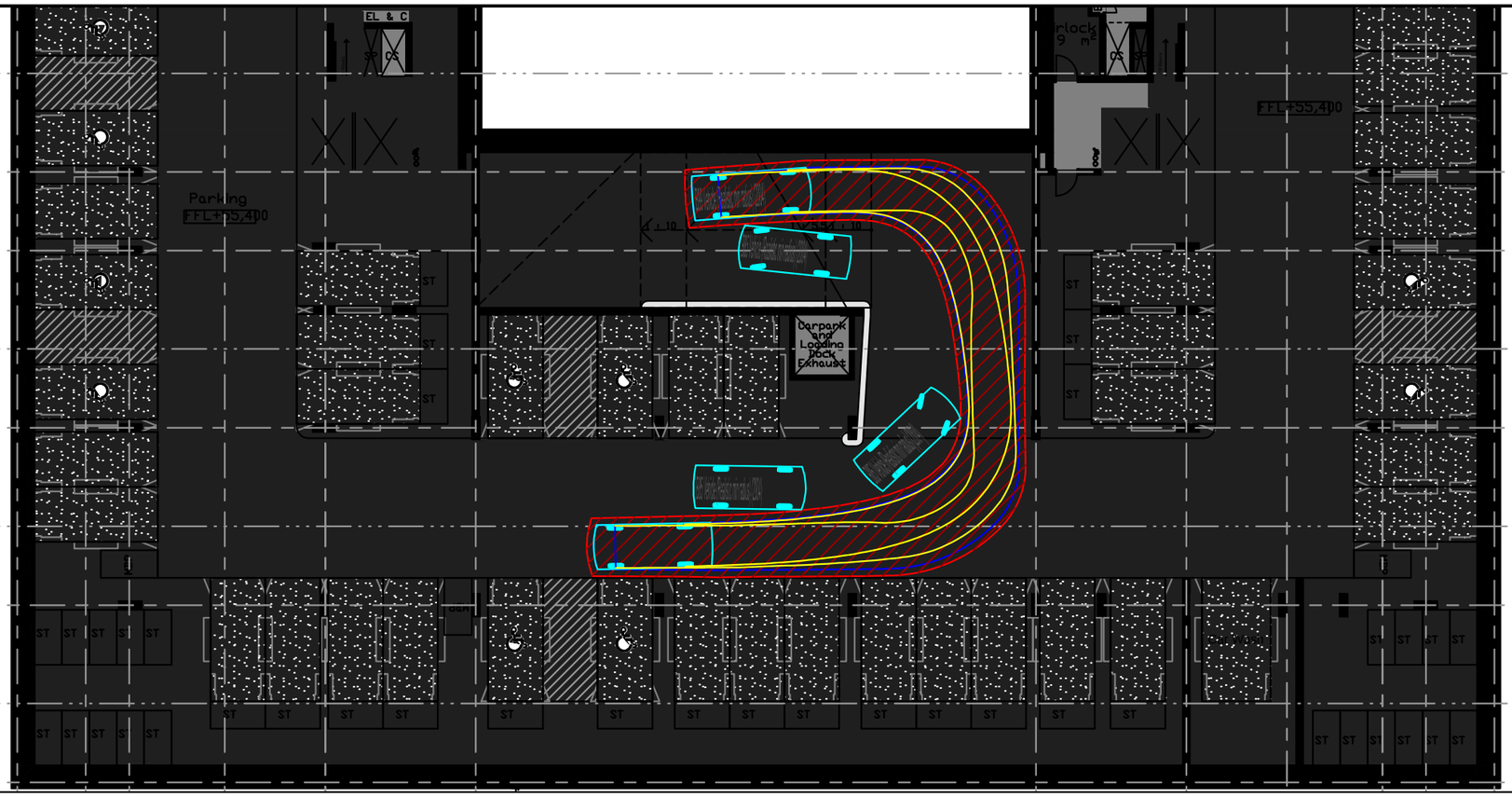
w: www.traffix.com.au

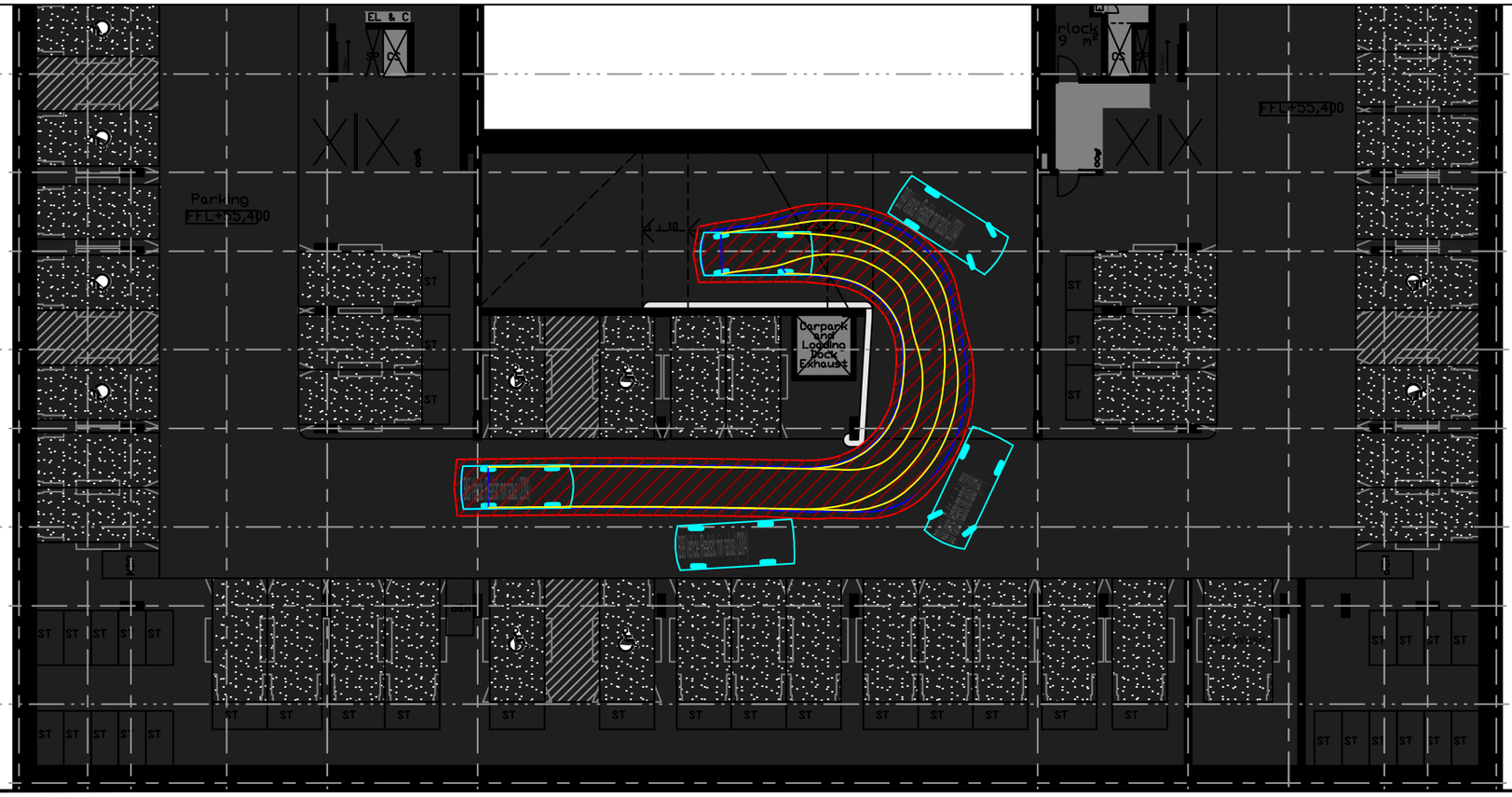
Drawing Title
Swept Path Analysis
Basement 2
B99 and B85 Vehicles
Top: Entry and Circulation
Bottom: Exit and Circulation

Drawn:	Checked:	Date:
HD	-	06-05-22

21.519d05v01 TRAFFIX [220608 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
21.519	DA	TX.04	B





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This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1:2004 Parking facilities - Off-street car parking*, and/or *AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date
A	Swept Path Analysis	HD	06-05-22
B	Updated Plans	HD	10-06-22

Swept Path Legend

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

Architect
Silvester Fuller

Client
Aqualand

Scale / Plan Orientation

0 2.5 5 7.5 10m
1:250 @ A3

Project Description
Proposed Mixed Use Development
10-20 Berry Rd and 11-19 Holdsworth Ave St Leonards

Drawing Prepared By

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Drawing Title
Swept Path Analysis
Basement 2
B99 and B85 Vehicles
Top: Entry and Circulation
Bottom: Exit and Circulation

Drawn:	Checked:	Date:
HD	-	06-05-22

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Project No.	Drawing Phase	Drawing No.	Rev.
21.519	DA	TX.05	B