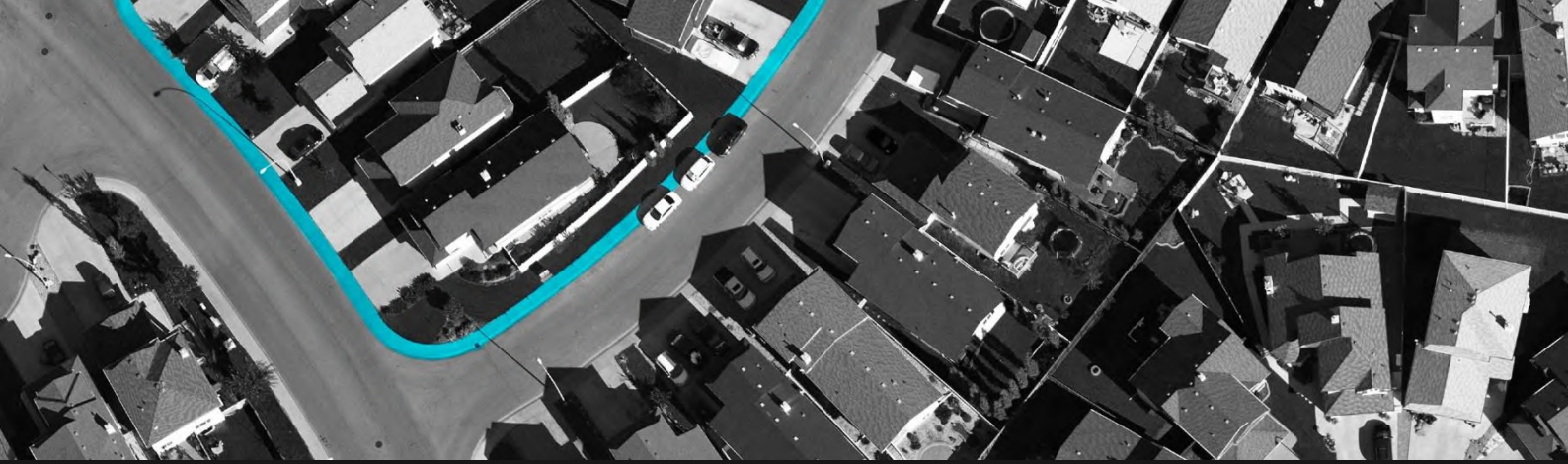




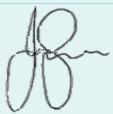
# **PROPOSED MIXED-USE DEVELOPMENT LOT 13 YARRABILBA DRIVE, YARRABILBA**

## **TRAFFIC ENGINEERING ASSESSMENT**

**20 OCTOBER 2022**

PREPARED FOR  
BROSS INVESTMENT UNIT TRUST

## DOCUMENT CONTROL RECORD

| DOCUMENT        |         |                                                                      |        |          |                      |                                                                                     |
|-----------------|---------|----------------------------------------------------------------------|--------|----------|----------------------|-------------------------------------------------------------------------------------|
| Report Title:   |         | Lot 13 Yarrabilba Drive, Yarrabilba – Traffic Engineering Assessment |        |          |                      |                                                                                     |
| Client:         |         | Bross Investment Unit Trust                                          |        |          |                      |                                                                                     |
| Project Number: |         | 21-653                                                               |        |          |                      |                                                                                     |
| REV             | PURPOSE | DATE                                                                 | AUTHOR | REVIEWER | APPROVED             | SIGNED                                                                              |
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| B               | FINAL   | OCT-22                                                               | NH     | CG       | JPG<br>(RPEQ: 22233) |  |

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## APPENDIX A: DEVELOPMENT PLANS

## APPENDIX B: PTT QUEUING PRACTICE NOTE

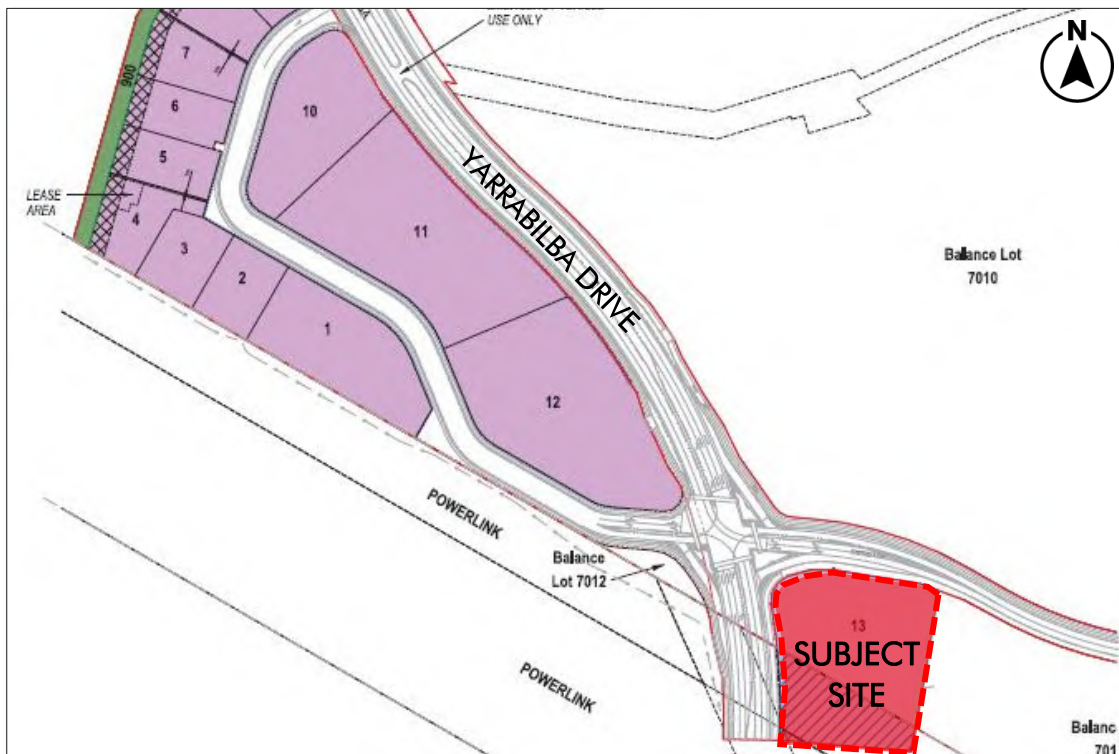
## APPENDIX C: SWEEPED PATHS

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

In January 2022, PTT was commissioned by Bross Investment Unit Trust to undertake a traffic engineering assessment for a proposed mixed-use development at Lot 13 Yarrabilba Drive, Yarrabilba. The location of the subject site, which is shown in Figure 1.1, falls within Precinct 3D of the Yarrabilba Priority Development Area, administered by Economic Development Queensland (EDQ).

**Figure 1.1: SITE LOCALITY**



### 1.2 AIM

The aim of this assessment is to review the proposed development in terms of its site access arrangements, parking provision and design, servicing arrangements, pedestrian and cyclist facilities, likely peak hour traffic generation and impact on the surrounding road network.

### 1.3 SCOPE OF REPORT

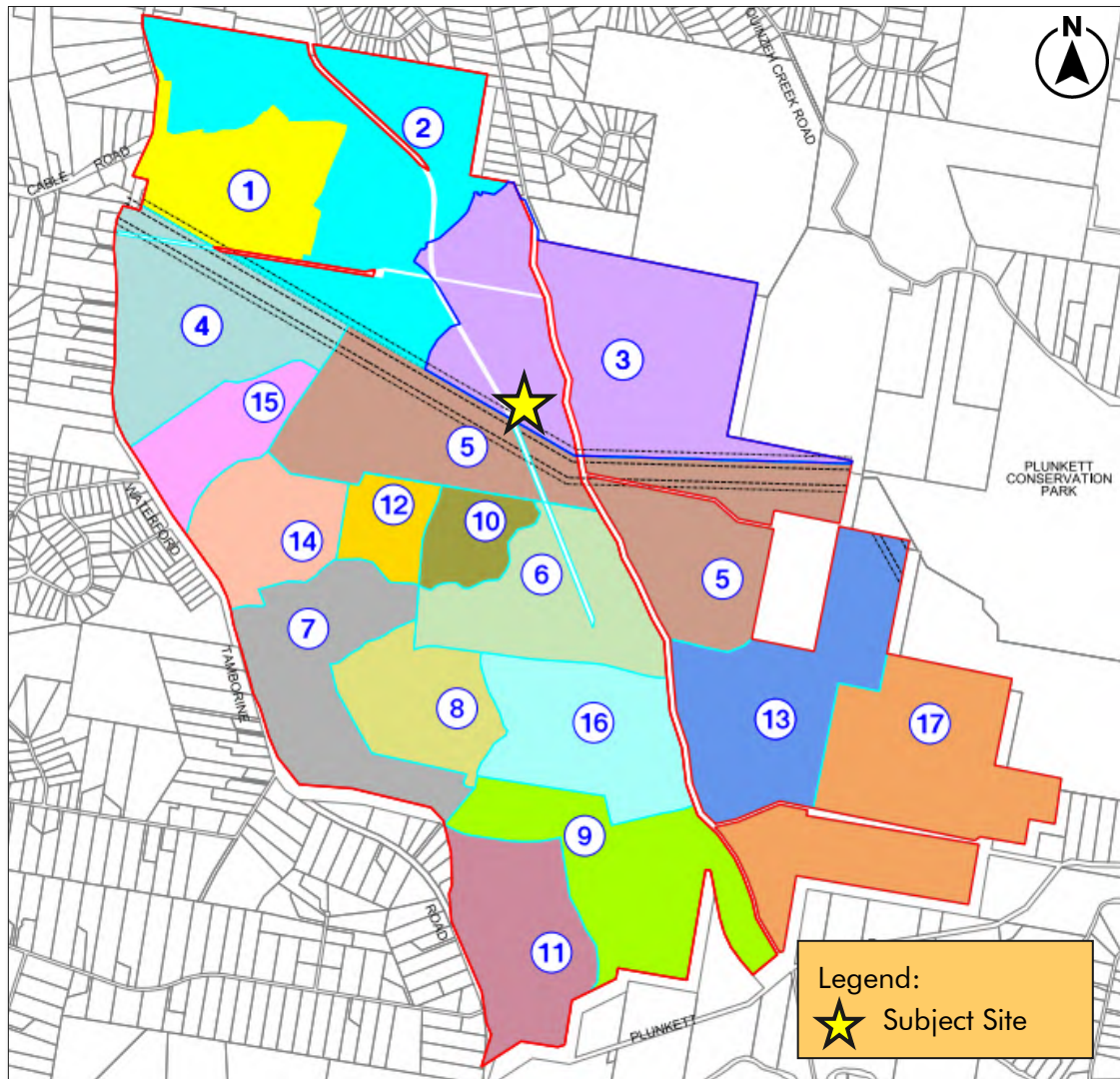
This report begins by summarising the characteristics of the existing road network (Chapter 2), followed by a description of the scope and scale of the proposed development, including access, parking and servicing arrangements (Chapter 3). The predicted peak hour traffic generation of the proposed development is estimated along with a consideration of its likely traffic impact on the surrounding road network (Chapter 4). The report concludes with a summary of key findings and recommendations (Chapter 5).

## 2.0 EXISTING CONDITIONS

### 2.1 YARRABILBA PRIORITY DEVELOPMENT AREA

The Yarrabilba Priority Development Area (PDA) was adopted by EDQ in 2011, with a purpose of providing housing for up to 50,000 people in 20,000 dwellings. The PDA is approximately 2,200 hectares in size and is located within the Logan City Council local government area. It is bounded by Plunkett Conservation Park to the east, Plunkett Road to the south and Waterford Tamborine Road to the west. The PDA is expected to be fully developed within 20 – 30 years and will comprise 17 precincts. The Yarrabilba precinct plan is shown in Figure 2.1, including the subject site within Precinct 3.

**Figure 2.1: YARRABILBA PDA PRECINCT PLAN**



## 2.2 SUBJECT SITE

The subject site is located at Lot 13 Yarrabilba Drive, Yarrabilba and is formally identified as Lot 907 on SP304357. The site is located in Precinct 3D of the PDA and according to the approved plan of development (approval reference: DEV2018/922), the site is zoned as mixed business / infrastructure. The site is currently vacant and is shown in Figure 2.2.

**Figure 2.2: SUBJECT SITE**



## 2.3 SURROUNDING AREA

As shown in Figure 2.2, the subject site is bounded by:

- Fauna Way to the north
- vacant land to the east and south
- Yarrabilba Drive to the west

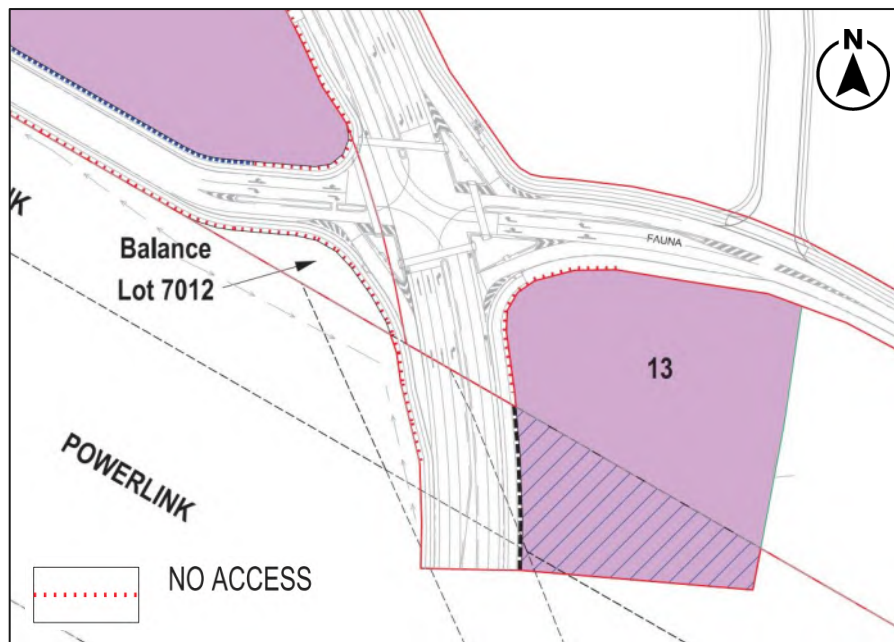
The surrounding area is currently undeveloped, although planning zones indicate the area will comprise predominantly commercial and residential uses.

## 2.4 ACCESS

No formal vehicular access is currently provided to the site.

Figure 2.3 shows the subject site within EDQ's approved plan of development (POD) for Village 3D. The plan shows locations along the site frontage where access is not preferred. Based on the plan, future access to the site could be provided via both Yarrabilba Drive and Fauna Way.

**Figure 2.3: VILLAGE 3D POD**



## 2.5 SURROUNDING ROAD NETWORK

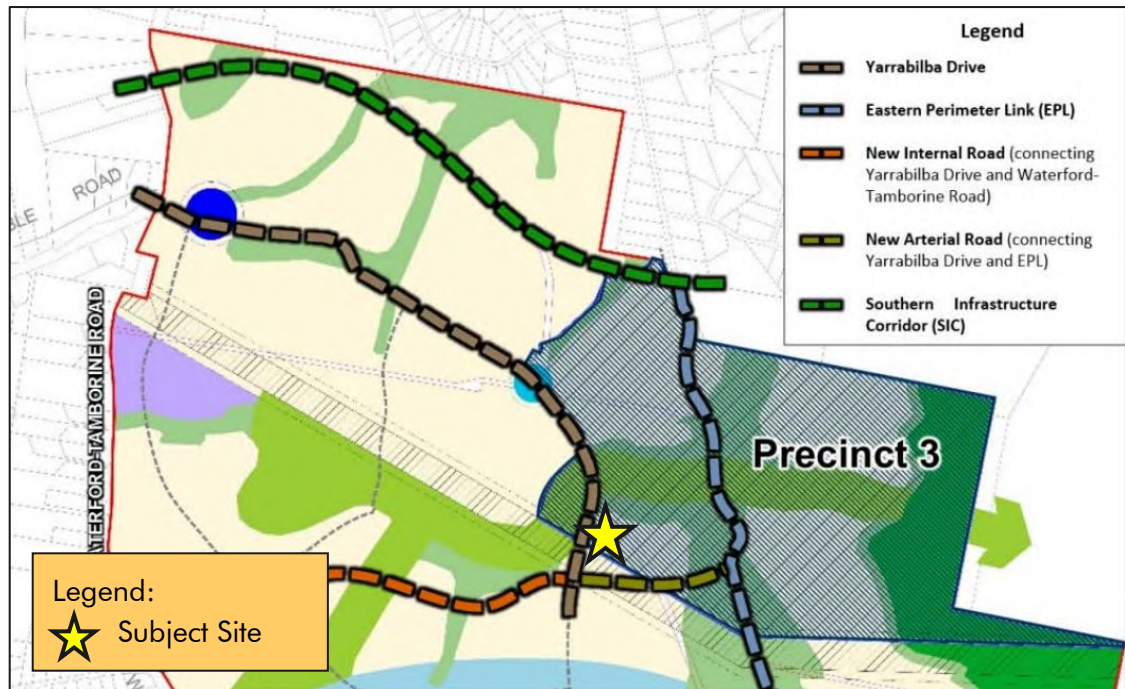
The key attributes of the surrounding road network in the vicinity of the subject site are summarised in Table 2.1.

**Table 2.1: ROAD NETWORK ATTRIBUTES**

| ATTRIBUTE            | YARRABILBA DRIVE                                     | FAUNA WAY                                           |
|----------------------|------------------------------------------------------|-----------------------------------------------------|
| Road Hierarchy       | Arterial                                             | Collector                                           |
| Alignment            | North-South                                          | East-West                                           |
| Cross Section        | Divided, with two lanes of traffic in each direction | Divided, with one lane of traffic in each direction |
| Speed Limit (km/h)   | 60                                                   | 60                                                  |
| Jurisdiction         | Logan City Council (Council)                         | Council                                             |
| Predominant Land Use | Commercial / Residential                             | Commercial / Residential                            |

Traffic modelling for Precinct 3D and the Yarrabilba Masterplan area was undertaken in 2015, with the results documented in the Yarrabilba Master Plan Micro-Simulation Modelling – Revised Land Use and Road Network Report, published by Cardno. A Traffic Assessment Report for Precinct 3D was also published by SLR on 27 February 2018. The reports considered the expected traffic generated by the subject site and surrounding developments to inform the design of the surrounding road network. Figure 2.4 shows the indicative road network for the Yarrabilba Masterplan.

**Figure 2.4: YARRABILBA INDICATIVE ROAD NETWORK**



Yarrabilba Drive, south of the site, is currently under construction. However, it is understood that the southern section of Yarrabilba Drive, as well as the New Arterial Road connecting Yarrabilba Drive to the Eastern Perimeter Link Road will be completed by the end of 2022. Both Yarrabilba Drive and the New Arterial Road will connect surrounding residential areas of the new Yarrabilba State School, located south-east of the site. This new school is scheduled to open in January 2023.

## 2.6 ACTIVE AND PUBLIC TRANSPORT

### 2.6.1 Pedestrians and Cyclists

Pedestrian footpaths are provided on both sides of Yarrabilba Drive and on the northern side of Fauna Way in the vicinity of the site. Pedestrian crossings are installed on all four approaches at the Yarrabilba Drive / Fauna Way signalised intersection adjacent to the subject site.

According to the Active Transport Network Map for Precinct 3D, Yarrabilba Drive and Fauna Way are classified as a principal cycle routes. Currently, on-street bicycle lanes are provided on both sides of Yarrabilba Drive in the vicinity of the site. No formal on-street bicycle facilities are currently provided on Fauna Way.

### 2.6.2 Public Transport

There are two bus stops located on Yarrabilba Drive in the vicinity of the site, as indicated in Figure 2.2. The stops are serviced by Translink Route 587, which provides frequent connections to surrounding areas in Yarrabilba, as well as Logan Village, Waterford West and Loganlea to the north. This route currently operates approximately once an hour in both directions between 5:00am and 7:00pm on weekdays and once every two hours in both directions between 9:00am and 3:00pm on weekends. Thus, the site is accessible via public transport.

### 3.0 PROPOSED DEVELOPMENT

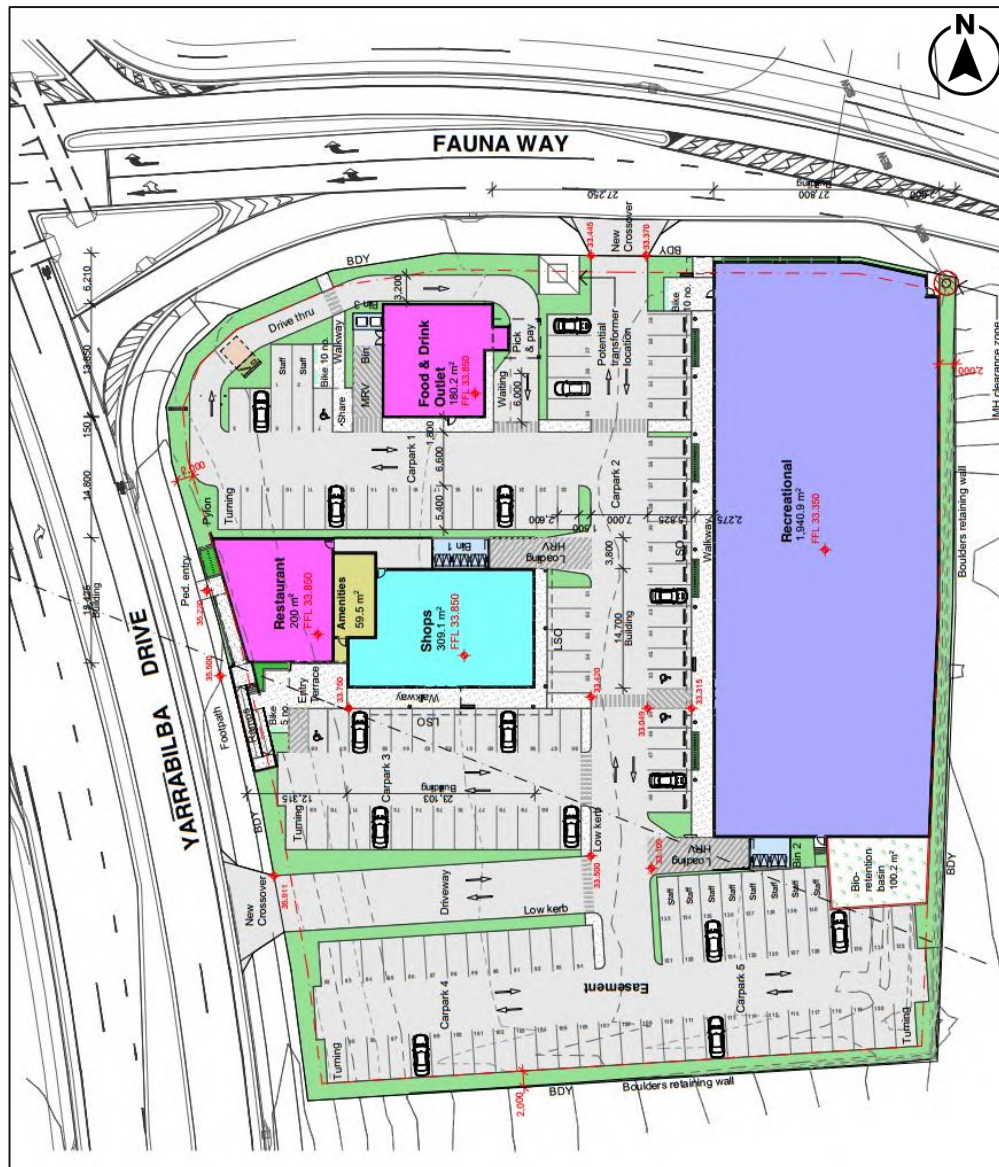
#### 3.1 PROPOSAL

The application seeks approval for a mixed-use development. The proposed development includes the following uses:

- 1,930m<sup>2</sup> GFA indoor sport and recreational facility (ie gym)
- 310m<sup>2</sup> GFA shop
- 200m<sup>2</sup> GFA restaurant
- 180m<sup>2</sup> fast-food outlet with drive-through

The proposed mixed-use development would be supported by a total of 140 on-site car parking spaces. The proposal is shown in Figure 3.1 with dimensioned plans included in Appendix A.

Figure 3.1: PROPOSED SITE LAYOUT



## 3.2 ACCESS

### 3.2.1 Location

Vehicular access to the development is proposed via two left-in / left-out driveways on Fauna Way and Yarrabilba Drive.

The proposed access driveways would be located outside of the restricted access locations included in the Village 3D POD. Thus, the proposed access locations are consistent with the Village 3D POD.

### 3.2.2 Design

The Logan Planning Scheme requires commercial driveway crossovers be designed in accordance with the Institute of Public Works Engineering Australasia's (IPWEA) Standard Drawing RS-051. It is therefore recommended that each driveway be of a General Wide Flared design in accordance with IPWEA Standard Drawing RS-051.

### 3.2.3 Sight Distance

On a 60km/h road (ie Yarrabilba Drive and Fauna Way), Australian Standards AS2890.1 Parking Facilities Part 1: Off-Street Car Parking requires an absolute minimum sight distance of 65m, with a desirable sight distance of 83m. There is well in excess of 83m sight distance available to the north of the Yarrabilba Drive access (to the Yarrabilba Drive / Fauna Way intersection) and to the east of the Fauna Way access. Accordingly, the available sight distances at each access are consistent with AS2890.1.

### 3.2.4 Queuing

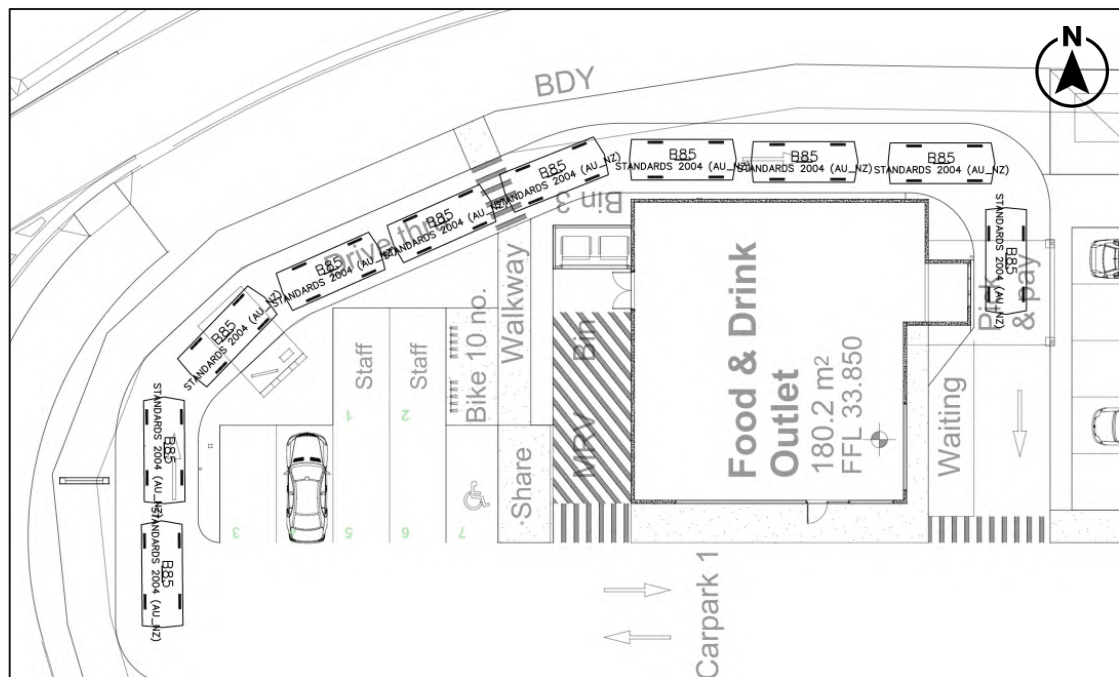
AS2890.1 recommends that sufficient on-site queuing be provided to allow a free influx of traffic that will not adversely affect traffic or pedestrian flows on the frontage roads (ie Yarrabilba Drive and Fauna Way). The 95<sup>th</sup> percentile queue across the site accesses is considered to be an adequate measure of an acceptable queuing provision.

The predicted 95<sup>th</sup> percentile queue at the proposed accesses has been calculated based on 159 vehicles arriving during the peak hours, using queuing theory outlined in the PTT Queuing Practice Note, included in Appendix B.

The results of the analysis indicate a 95<sup>th</sup> percentile queue of 6.3 vehicles (ie 37.7m) across the site accesses. The proposed layout provides 37.0m (ie six vehicles) and 6.0m (ie one vehicle) of clear queuing space at the Yarrabilba Drive and Fauna Way accesses, respectively. Therefore, the proposed queuing provision is sufficient to cater for the predicted 95<sup>th</sup> percentile queue.

The Logan Planning Scheme requires sufficient queue storage be provided at drive-through facilities to cater for 10 queued vehicles (so as to not block circulation roads, parking and site access driveways). As demonstrated in Figure 3.2, we estimate that the proposed drive-through would have capacity to store up to 10 queued cars (measured from the order pick-up point) without extending into the adjoining parking aisle.

**Figure 3.2: DRIVE-THROUGH QUEUING PLAN**



### 3.3 CAR PARKING

#### 3.3.1 Requirement

The parking requirement for the site has been determined based on the car parking provision rates outlined in EDQ's POD. Of the proposed uses, the indoor sport and recreational facility (gym) is expected to generate the highest parking demand. It is understood that the gym would comprise approximately 400m<sup>2</sup> of ancillary facilities (ie sauna, creche, staff offices etc.). Given that these ancillary facilities would only be available by gym members / staff, these areas are unlikely to generate additional parking demand. Accordingly, no additional parking (beyond that required for the gym use) is likely to be required to accommodate these ancillary facilities. The 'effective' GFA of the gym is based on the total GFA, less the GFA of the ancillary facilities.

A parking provision of 156 spaces is required based on EDQ's rates, as shown in Table 3.1.

**Table 3.1: PARKING REQUIREMENT**

| LAND USE                          | SCALE                             | PARKING RATE                                                                                                  | REQUIRED |
|-----------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------|----------|
| Indoor Sport and Recreation (Gym) | 1,530m <sup>2</sup> effective GFA | 1 space per 15m <sup>2</sup> GFA                                                                              | 102      |
| Shop                              | 310m <sup>2</sup> GFA             | 1 space per 20m <sup>2</sup> GFA                                                                              | 16       |
| Food and Drink (Fast Food)        | 180m <sup>2</sup> GFA             | 1 space per 10m <sup>2</sup> GFA for first 200m <sup>2</sup> plus 1 space per 20m <sup>2</sup> GFA thereafter | 18       |
| Food and Drink (Restaurant)       | 200m <sup>2</sup> GFA             | 1 space per 10m <sup>2</sup> GFA for first 200m <sup>2</sup> plus 1 space per 20m <sup>2</sup> GFA thereafter | 20       |
| Total                             |                                   |                                                                                                               | 156      |

### 3.3.2 Alternative Gym Parking Demand Data

To calculate an appropriate parking demand for the proposed gym use (and confirm the adequacy of EDQ's parking requirement), we have analysed recent visitation data from a number of existing gyms (of a similar scale) throughout South East Queensland. Table 3.2 summarises the gym visitation data, as well as the characteristics of each gym. Consistent with the methodology adopted for the proposed development, ancillary areas have been excluded from the GFA of these existing gyms for the purpose of this calculation. The

**Table 3.2: SUMMARY OF EXISTING GYM ATTRIBUTES**

| ATTRIBUTE                                | GYM 1                                    | GYM 2                          | GYM 3                          |
|------------------------------------------|------------------------------------------|--------------------------------|--------------------------------|
| Location                                 | Ashmore                                  | Coomera                        | Burpengary                     |
| Effective GFA                            | 908m <sup>2</sup>                        | 2,070m <sup>2</sup>            | 2,216m <sup>2</sup>            |
| Data Period                              | 29 March 2021 – 11 April 2021            | 29 March 2021 – 11 April 2021  | 1 August 2018 – 31 August 2018 |
| Days of Data                             | 11                                       | 11                             | 31                             |
| 85 <sup>th</sup> Percentile Parking Rate | 1 space per 19.6m <sup>2</sup>           | 1 space per 23.9m <sup>2</sup> | 1 space per 25.6m <sup>2</sup> |
|                                          | Average = 1 space per 22.8m <sup>2</sup> |                                |                                |

As the data is based on visitor arrivals rather than vehicles parking on-site, data pertaining to mode share, vehicle occupancy and duration of stay of gymnasium users has been sourced from TMR's Household Travel Survey (HTS) data to determine an equivalent parking rate. According to TMR's HTS data, approximately 95% of trips to and from gym facilities in South East Queensland are by personal vehicle, with an average private vehicle occupancy of 1.26 persons per vehicle. The HTS data also indicates the average duration of stay at gym facilities is 76 minutes (ie 1.26 hours).

The visitation data has been adapted based on the HTS data to calculate an equivalent parking demand. The calculated peak parking demand on each day of the data series has been converted into an equivalent parking demand rate (ie spaces per 100m<sup>2</sup> GFA).

The 85<sup>th</sup> percentile peak parking demand rate (ie the parking rate which exceeds the peak parking demand on 85% of days) is considered an adequate measure of an acceptable parking provision rate at the proposed development. The calculated 85<sup>th</sup> percentile peak parking demand rate for each existing gym is summarised in Table 2. The 85<sup>th</sup> percentile peak parking demand rate across all three gyms is one space per 22.8m<sup>2</sup> 'effective' GFA.

As shown in Table 3.3, the application of this parking rate indicates that the proposed development is expected to generate a demand of 125 spaces.

**Table 3.3: PREDICTED PARKING DEMAND**

| LAND USE                          | SCALE                             | PARKING RATE                                                                                                  | REQUIRED   |
|-----------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------|------------|
| Indoor Sport and Recreation (Gym) | 1,530m <sup>2</sup> effective GFA | 1 space per 22.8m <sup>2</sup> GFA                                                                            | 67         |
| Shop                              | 310m <sup>2</sup> GFA             | 1 space per 20m <sup>2</sup> GFA                                                                              | 16         |
| Food and Drink (Fast Food)        | 180m <sup>2</sup> GFA             | 1 space per 10m <sup>2</sup> GFA for first 200m <sup>2</sup> plus 1 space per 20m <sup>2</sup> GFA thereafter | 18         |
| Food and Drink (Restaurant)       | 200m <sup>2</sup> GFA             | 1 space per 10m <sup>2</sup> GFA for first 200m <sup>2</sup> plus 1 space per 20m <sup>2</sup> GFA thereafter | 20         |
| <b>Total</b>                      |                                   |                                                                                                               | <b>121</b> |

### 3.3.3 RTA Parking Rates for Gyms

Section 5.9.2 of the NSW Roads and Traffic Authority (RTA) Guide to Traffic Generating Developments (2002) recommends gym parking in sub-regional areas be provided at a minimum rate of 4.5 spaces per 100m<sup>2</sup> GFA. This equates to around 1 space per 22.2m<sup>2</sup> GFA, which is consistent with recommended parking rate extracted from the gym visitation data. Therefore, the adopted gym parking requirement in Table 3.3 is consistent with the RTA as is expected to be adequate for the proposed scale of development.

### 3.3.4 Non-coincidence of Peak Parking Demand

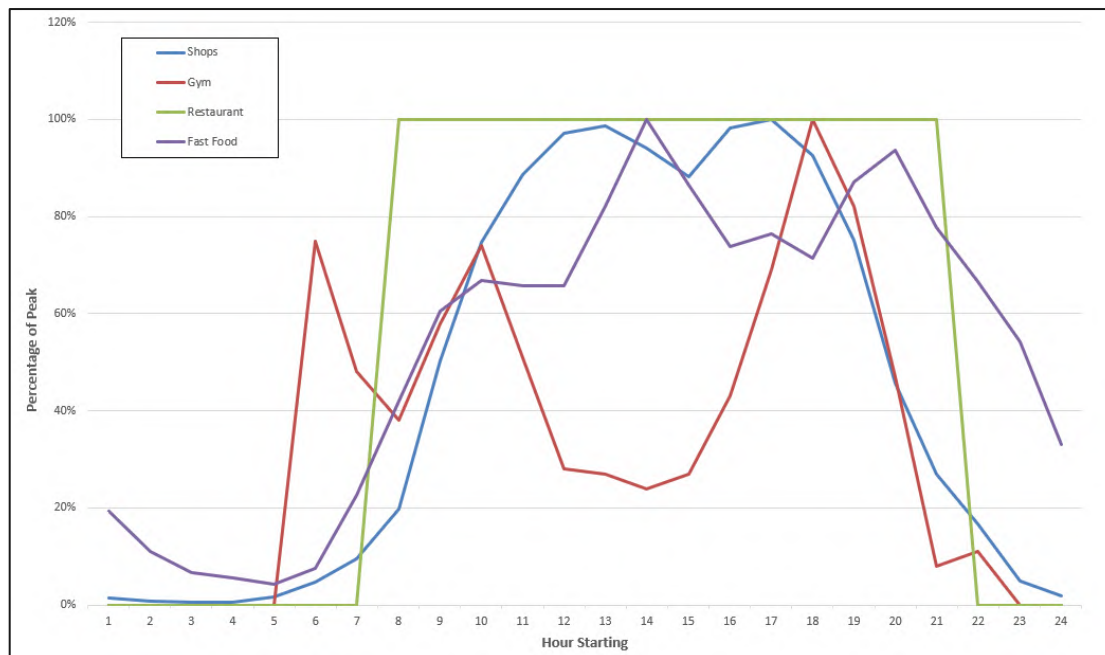
The parking demand of the proposed development has been assessed to determine the demand profile for each of the proposed land uses during a typical weekday. These profiles have been determined based on the Department of Transport and Main Roads' (TMR) Traffic Generation surveys and additional surveys conducted by PTT, as follows:

- Gym – PTT Survey Data
- Shop – TMR Survey Data
- Fast Food – TMR Survey Data

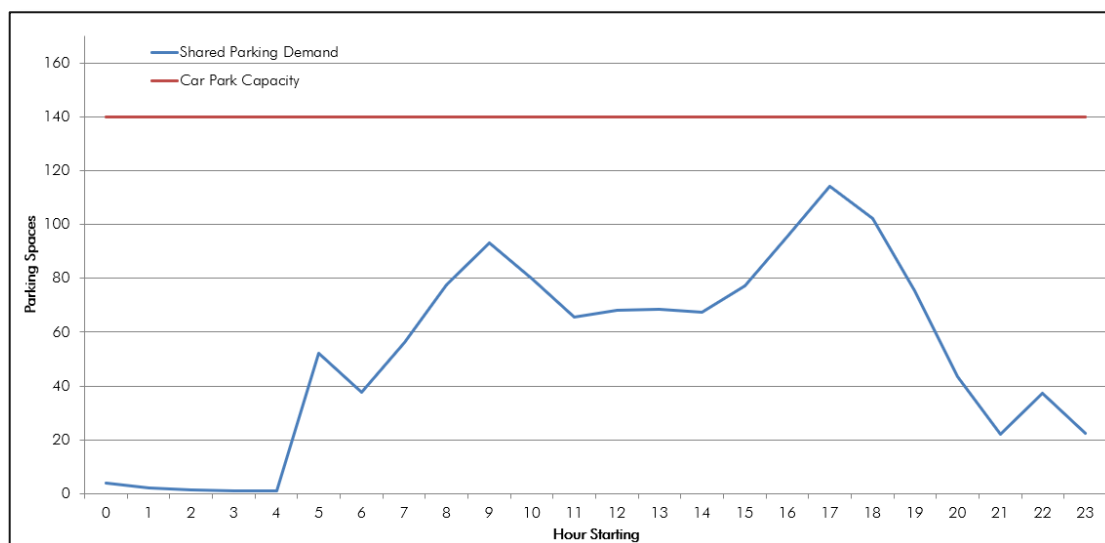
The TMR surveys only include data for fast-food food and drink outlets and do not include data for restaurants. The peak parking demand for restaurants is generally dependant on the specific circumstances. For the purposes of this analysis we have conservatively assumed that the proposed restaurant would serve breakfast, lunch and dinner and would therefore be trading for the majority of the day. We have assumed that the restaurant would experience a peak parking demand between 7am – 8pm on a typical weekday.

The parking demand profiles for each use is shown in Figure 3.3, with the parking demand (when considering the non-coincidence of peaks) relative to the on-site parking capacity (ie 142 spaces) shown in Figure 3.4. The survey data indicates that the busiest time of day is around 5pm. At this time, a total of 114 spaces are required to accommodate the expected parking demands for each use.

**Figure 3.3: PARKING DEMAND PROFILES**



**Figure 3.4: SHARED PARKING DEMAND**



### 3.3.5 Provision

The proposal provides a total of 140 on-site parking bays, which represents a shortfall of 16 spaces compared to EDQ's requirement. However, the proposed provision represents a surplus of 19 spaces compared to adopted reduced parking requirement outlined in Table 3.3. Furthermore, the proposed parking provision would be more than adequate to cater for the expected shared on-site parking demand, as shown in Figure 3.4. Therefore, it our view that the proposed parking provision is adequate to support the proposed scale of uses.

### 3.3.6 Persons with Disability Spaces

The Building Code of Australia (BCA) specifies that Persons with Disability (PWD) parking spaces be provided at a rate of one space per 50, or part thereof, for a Class 6 building with less than 1,000 car parking spaces. Four PWD bays are proposed on-site, which is consistent with the requirements of the BCA.

### 3.3.7 Design

The layout of on-site parking has been designed generally in accordance with AS2890.1 in terms of bay dimensions, aisle widths, vehicle circulation and manoeuvring. This is typified by:

- standard parking bays – dimensioned 2.6m wide by 5.4m long
- tandem parking bays – dimensioned 2.6m wide by 10.8m long
- PWD parking bays – dimensioned 2.4m wide by 5.4m long with an adjacent shared bay dimensioned 2.4m wide by 5.4m long
- parking aisles – dimensioned 6.0m wide or greater
- end of aisle treatment – dimensioned 1.0m wide
- turnaround bays (at blind aisles) – dimensioned 2.6m wide by 5.4m long

It is recommended that the tandem bays (south of the gym) be designated at staff parking only. Each tandem bay will need to be designated to the same tenancy.

## 3.4 SERVICING

### 3.4.1 Gym Use

The Logan Planning Scheme requires the proposed development accommodate access for a 12.5m long Heavy Rigid Vehicle (HRV), for the gym. A dedicated loading bay, dimensioned 3.8m wide by 12.5m long, is proposed adjacent to the gym. A swept path of a HRV accessing and egressing the loading bay is included in Appendix C. The proposed development is expected to open in 2024 and as discussed, Yarrabilba Drive (south of the site) would be fully constructed and operational prior to expected opening year. Accordingly, we have shown the HRV exiting the development site via Yarrabilba Drive.

### 3.4.2 Food and Drink / Shop Uses

Additional loading bays are located adjacent to the food and drink and shop tenancies. Given the small scale of each of the tenancies, the largest vehicle expected to regularly service these uses is a Refuse Collection Vehicle (RCV). Swept paths of a 10.2m long RCV accessing and egressing each loading bay is included in Appendix C. These loading bays would also be sufficiently sized to cater for smaller rigid vehicles (which are likely to be used for deliveries).

## 3.5 ACTIVE & PUBLIC TRANSPORT

### 3.5.1 Pedestrians

The proposal provides dedicated pedestrian accesses (separate to the vehicular driveways) to the site from Yarrabilba Drive and Fauna Way frontages. A network of internal pedestrian pathways

and crossings provide safe and direct connections between the pedestrian accesses and each use on-site.

### 3.5.2 Cyclists

The bicycle parking requirement for the proposed development has been determined based on bicycle provision rates included in Austroads Guide to Traffic Management Part 11: Parking Facilities. The minimum Austroads bicycle requirement is summarised in Table 3.4.

**Table 3.4: AUSTROADS BICYCLE PARKING REQUIREMENT**

| LAND USE                          | SCALE                             | STAFF RATE                  | VISITOR RATE                                             | REQUIREMENT            |
|-----------------------------------|-----------------------------------|-----------------------------|----------------------------------------------------------|------------------------|
| Indoor Sport and Recreation (Gym) | 1,530m <sup>2</sup> effective GFA | 1 per 300m <sup>2</sup> GFA | 1 per 200m <sup>2</sup> GFA                              | 5 staff + 8 visitors   |
| Shop                              | 350m <sup>2</sup> GFA             | 1 per 300m <sup>2</sup> GFA | 1 per 500m <sup>2</sup> GFA over 1,000m <sup>2</sup> GFA | 2 staff                |
| Food and Drink (Fast Food)        | 180m <sup>2</sup> GFA             | 1 per 100m <sup>2</sup> GFA | 1 per 50m <sup>2</sup> GFA                               | 2 staff + 4 visitors   |
| Food and Drink (Restaurant)       | 210m <sup>2</sup> GFA             | 1 per 100m <sup>2</sup> GFA | 2 spaces                                                 | 2 staff + 2 visitors   |
| <b>Total</b>                      |                                   |                             |                                                          | 11 staff + 14 visitors |

A total of 25 bicycle spaces are proposed on-site, in accordance with Austroads. It is recommended that the bicycle parking be designed in accordance with the Logan Planning Scheme and Australian Standards AS2890.3:2015 Parking Facilities Part 3: Bicycle Parking. Staff bicycle should be secured and covered and visitor bicycle parking should be provided in the form of racks in public areas.

### 3.5.3 Public Transport

The proposed development is expected to increase the viability of existing and future public transport services and facilities in Precinct 3D.

## 4.0 TRAFFIC OPERATIONS

### 4.1 TRAFFIC GENERATION

The peak hour traffic generation for the proposed development has been estimated based on trip generation rates published by the NSW Road and Transport Authority (RTA) and TMRs' traffic generation survey data, as summarised in Table 4.1. The predicted traffic generation attributable to the proposal is estimated to be 286 vehicles per hour (143 in and 143 out) for the morning peak and the reverse in the evening peak.

**Table 4.1: PEAK HOUR TRAFFIC GENERATION**

| LAND USE                          | SCALE                                | TRIP RATE                       | TRIPS<br>(VEH/HR) | IN:OUT<br>SPLIT | IN:OUT<br>(VEH/HR) |
|-----------------------------------|--------------------------------------|---------------------------------|-------------------|-----------------|--------------------|
| Indoor Sport and Recreation (Gym) | 1,530m <sup>2</sup><br>effective GFA | 9 per 100m <sup>2</sup><br>GFA  | 138               | 50 : 50         | 69 : 69            |
| Shop                              | 310m <sup>2</sup> GFA                | 12 per 100m <sup>2</sup><br>GFA | 37                | 50 : 50         | 19 : 19            |
| Food and Drink<br>(Fast Food)     | 180m <sup>2</sup> GFA                | 55 per 100m <sup>2</sup><br>GFA | 99                | 50 : 50         | 50 : 50            |
| Food and Drink<br>(Restaurant)    | 200m <sup>2</sup> GFA                | 5 per 100m <sup>2</sup><br>GFA  | 10                | 50 : 50         | 5 : 5              |
| Total                             |                                      |                                 | 286               | 50 : 50         | 143 : 143          |

### 4.2 TRAFFIC IMPACT

Traffic reporting and modelling undertaken by Cardno and SLR in 2015 and 2018 considered the expected traffic generated by Village 3D, including the subject site. The impact of the development site on the external network has been included in the planning of Precinct 3.

Traffic modelling undertaken by SLR had assumed the subject site would comprise a fast-food outlet (ie McDonalds) and a service station and had assigned a peak traffic generation of 246vph to the subject site. Accordingly, the majority of the impact of the development site has already been considered as part of previous traffic modelling. It is our view that the additional 43vph (generated by the subject development) is not expected to significantly impact surrounding traffic operations and thus additional traffic analyses is not considered necessary.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 CONCLUSIONS

The proposed mixed-use development has been evaluated in terms of its site access arrangements, internal layout and impact on the surrounding road network. The main points to note are:

- the application seeks approval for a mixed-use development
- access to the development is proposed via left-in / left-out driveways on Yarrabilba Drive and Fauna Way
- the proposed access locations are consistent with the Village 3D POD
- the proposed queuing provision is expected to be adequate to cater for the development
- a total of 140 parking spaces are proposed on-site, which is inconsistent with EDQ's minimum parking requirement
- a reduction in on-site parking can be applied when considered existing gym parking demand data and non-coincidence of peak parking demands for each use
- four PWD bays are proposed on-site which is consistent with the Building Code of Australia
- the development layout can accommodate the access and egress of a HRV and RCV
- dedicated pedestrian accesses are proposed on both site frontages
- the proposed layout generally encourages low vehicle speeds and priorities pedestrian movements around the site
- the impact of the development site has been considered as part of the previous traffic modelling undertaken for Village 3D and a further traffic impact assessment is not considered necessary

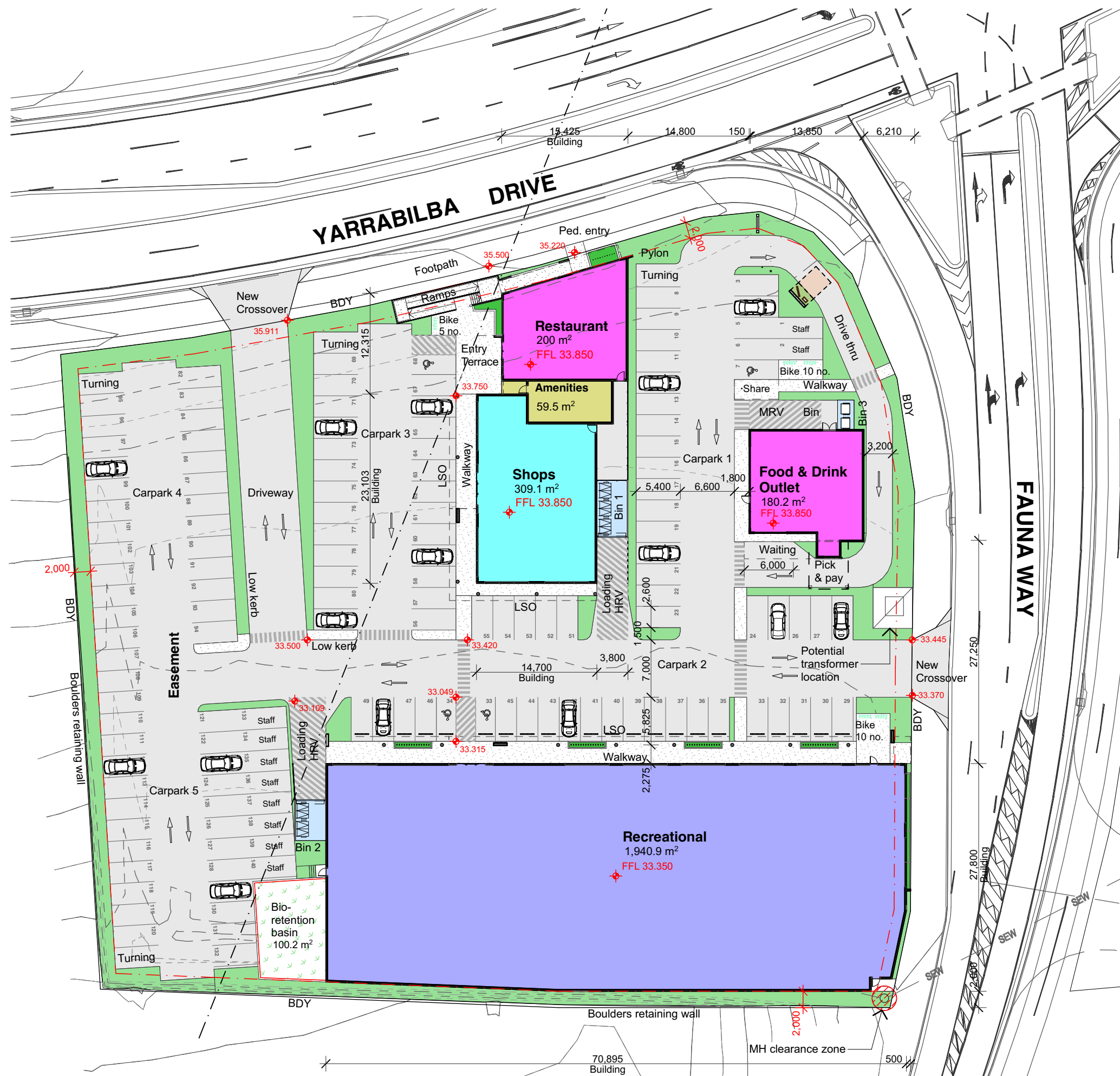
### 5.2 RECOMMENDATIONS

Based on the above, it is recommended that:

- each driveway be of a General Wide Flared design in accordance with IPWEA Standard Drawing RS-051
- tandem bays (south of the gym) be designated at staff parking only
- bicycle parking is designed in accordance with AS2890.3

## **APPENDIX A: DEVELOPMENT PLANS**

|                     |                        |
|---------------------|------------------------|
| Landscaping         | 951.0 m <sup>2</sup>   |
| Roof Planters       | 344.1 m <sup>2</sup>   |
| Bio-retention basin | 100.1 m <sup>2</sup>   |
| Impervious          | 8,077.9 m <sup>2</sup> |



## **APPENDIX B: PTT PRACTICE NOTE**

# PRACTICE NOTE

## QUEUING CHARACTERISTICS AT SITE ACCESSSES



### BACKGROUND

On-site queuing areas are required at site access locations to ensure that vehicles do not queue across pedestrian paths or back onto the frontage road.

However, with queuing requirements in planning scheme policies becoming increasingly onerous, the usage of these figures can result in excessive queuing areas which can unnecessarily have an adverse effect construction costs and development yields.

This practice note demonstrates how conventional queuing theory can be used in traffic engineering to determine the anticipated queue length at access locations as a function of local conditions.

### QUEUING THEORY

To calculate the amount of queuing space required, we must estimate the probability of a number of vehicles in a queue ( $n$ ) exceeding a specified number of vehicles ( $N$ ) at any instant. This is calculated using the following formula:

$$\Pr(n > N) = \rho^{N+1} \leq \alpha$$

Where:

- $\rho$  is the queue utilisation factor
- $\alpha$  is the probability of a queue of  $N$  vehicles being exceeded

Rearranging this formula enables the calculation of the design queue length in terms of the number of vehicles as follows:

$$N = \frac{\log(\alpha)}{\log(\rho)} - 1$$

The **minimum** design queue would be calculated as  $N$  vehicles, which may include a fraction of a vehicle (eg 1.2 vehicles). This

design queue could be applied subject to engineering judgment.

The **desirable** design queue would be the smallest integer which contains the value,  $N$  (ie rounded up to the nearest integer).

Application of a standard vehicle length of 6m per vehicle results in a design queue length in metres.

### QUEUE UTILISATION FACTOR

The utilisation factor,  $\rho$ , is the ratio of the mean arrival rate ( $r$ ) and the mean service rate ( $s$ ), ie:

$$\rho = \frac{r}{s}$$

The mean arrival rate (veh/hr) varies for each situation. It is calculated using the peak hour trip generation for the facility. This is expressed in vehicles per hour.

The mean service rate (veh/hr) is determined by observing the operations of similar facilities.

PTT has calculated the mean service rate for a non-controlled (ie no boom gate) parking facility by surveying the average time taken for cars to enter and leave from visitor parks in a residential development.

This survey was undertaken at a recently approved and constructed mixed use commercial/residential development at Nundah on a Wednesday in July 2014 between 4:30-6:00pm. A minimum of 30 observations were made for both "parking" and "unparking" manoeuvres. The results of this analysis are shown in Table 1.

# PRACTICE NOTE

## QUEUING CHARACTERISTICS AT SITE ACCESSSES



**Table 1: MEAN VEHICLE MANOEUVRING TIME (seconds/vehicle)**

| MANOEUVRE | MEAN TIME | STD DEV | MIN | MAX  |
|-----------|-----------|---------|-----|------|
| Parking   | 12.2      | 13.8    | 1.1 | 69.5 |
| Unparking | 14.7      | 7.1     | 2.1 | 37.2 |

The application of the mean “unparking” value from Table 1 assumes that each vehicle which enters the access will be waiting for a car to “unpark” from the space nearest to the access. This is an extremely conservative assumption, which will result in an over-estimate of queue lengths.

The mean service time for car parks with entrance controls such as boom gates, ticket dispensing machines, car stackers and mechanical parking installations can usually be provided by the supplier of the product.

### PROBABILITY OF EXCEEDANCE

The queuing formula is used to calculate the queue length given a specified probability ( $\alpha$ ).

Generally, the 95<sup>th</sup> percentile queue is considered an adequate measure of an acceptable queue at access driveways. This infers that there is a 5% probability that the queue length will be exceeded (ie  $\alpha=0.05$ ).

Australian Standards, AS2890.1, outlines the requirement to provide a 98<sup>th</sup> percentile queue for situations where mechanical parking installations such as car stackers are used (ie  $\alpha=0.02$ ).

### EXAMPLE

A development with a mean peak hour trip generation of 100 veh/hr and a 80:20 in:out split results in a vehicle arrival rate of 80 veh/hr.

The service rates from Table 1 can be applied to calculate the queue utilisation factor. However common units are required to find a ratio.

Therefore, the service rate,  $s$ , is:

$$\frac{\text{vehicle}}{\text{hour}} = 3,600 \left( \frac{\text{seconds}}{\text{vehicle}} \right)^{-1}$$
$$s = \frac{3,600}{14.7} = 244.9 \text{ vehicles per hour}$$

The queue utilisation factor is:

$$\rho = \frac{r}{s} = \frac{80}{244.9} = 0.327$$

The 95<sup>th</sup> percentile design queue:

$$N = \frac{\log(\alpha)}{\log(\rho)} - 1$$
$$N = \frac{\log(0.05)}{\log(0.327)} - 1$$
$$N = 1.68 \text{ vehicles}$$

Therefore, desirably, the development should be designed to allow for an entrance queue of two vehicles (ie 12m). However, an available queuing distance of 1.68 vehicles (ie 10.1m) would be considered acceptable to cater for the 95<sup>th</sup> percentile queue, subject to engineering judgment.

# PRACTICE NOTE

## QUEUING CHARACTERISTICS AT SITE ACCESSSES



### CONCLUSION

Conventional traffic engineering queuing theory can be used to determine the anticipated queue length at access locations. This ensures that queuing does not adversely impact on nearby traffic or pedestrian flows whilst ensuring that the queuing area is not excessive.

### REFERENCES

Bennett, DW and Rose, G (1988), *Unsignalised Intersection Analysis*, University of Melbourne

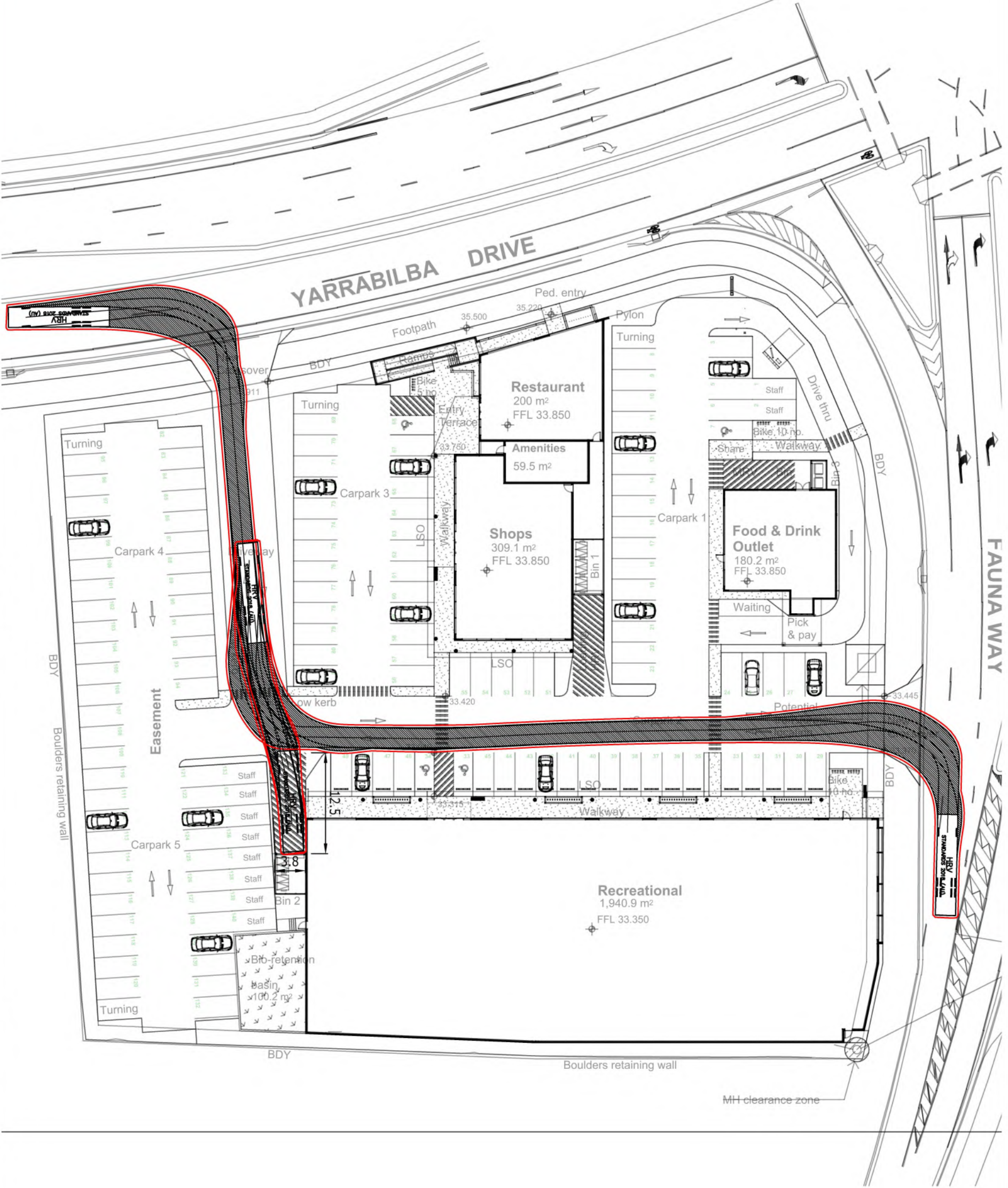
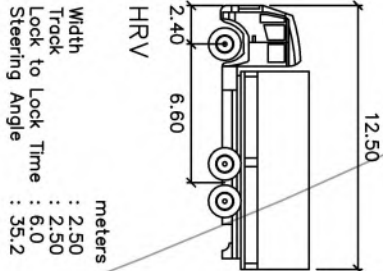
Institute of Transport Studies Monash University (2003), *Traffic Engineering and Management*, Volume 2, Caulfield East

Standards Australia (2004), *AS2890.1:2004 Parking facilities Part 1: Off-street car parking*, Sydney

### DISCLAIMER

*The material contained in this practice note is of a general nature, for information only. Pekol Traffic and Transport accepts no liability for any damage caused by any error or omission contained herein.*

## **APPENDIX B: PTT PRACTICE NOTE**





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| REV. | AMENDMENTS | DRN | DATE |
|------|------------|-----|------|
|      |            |     |      |
|      |            |     |      |
|      |            |     |      |

PROJECT TITLE:

**LOT 13 YARRABILBA DRIVE, YARRABILBA**

DRAWING TITLE:

**HRV SERVICING**

CLIENT:

**BROSS INVESTMENT UNIT TRUST**

DATE: 20/10/2022  
SCALE: 1:500@A3  
DRAWING NO. 21-653-001

DRAWN: CG  
APPROVED: JPG

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| REV. | AMENDMENTS | <div>DRN</div> <div>DATE</div> |

PROJECT TITLE:  
LOT 13 YARRABILBA DRIVE, YARRABILBA

DRAWING TITLE:  
RCV SERVICING

|                             |          |         |           |
|-----------------------------|----------|---------|-----------|
| CLIENT:                     |          |         |           |
| BROSS INVESTMENT UNIT TRUST |          |         |           |
| DATE:                       | SCALE:   | DRAWN:  | APPROVED: |
| 20/10/2022                  | 1:250@A3 | CG      | JPG       |
| DRAWING NO.                 | REV      | JOB NO. |           |
| 21-653-002                  | -        | 21-653  |           |

