

# **PROPOSED MIXED-USE DEVELOPMENT 141 FURSEN ROAD, CARINA**

## **TRAFFIC IMPACT ASSESSMENT**

**26 JUNE 2026**

PREPARED FOR  
ROYCORP

## DOCUMENT CONTROL RECORD

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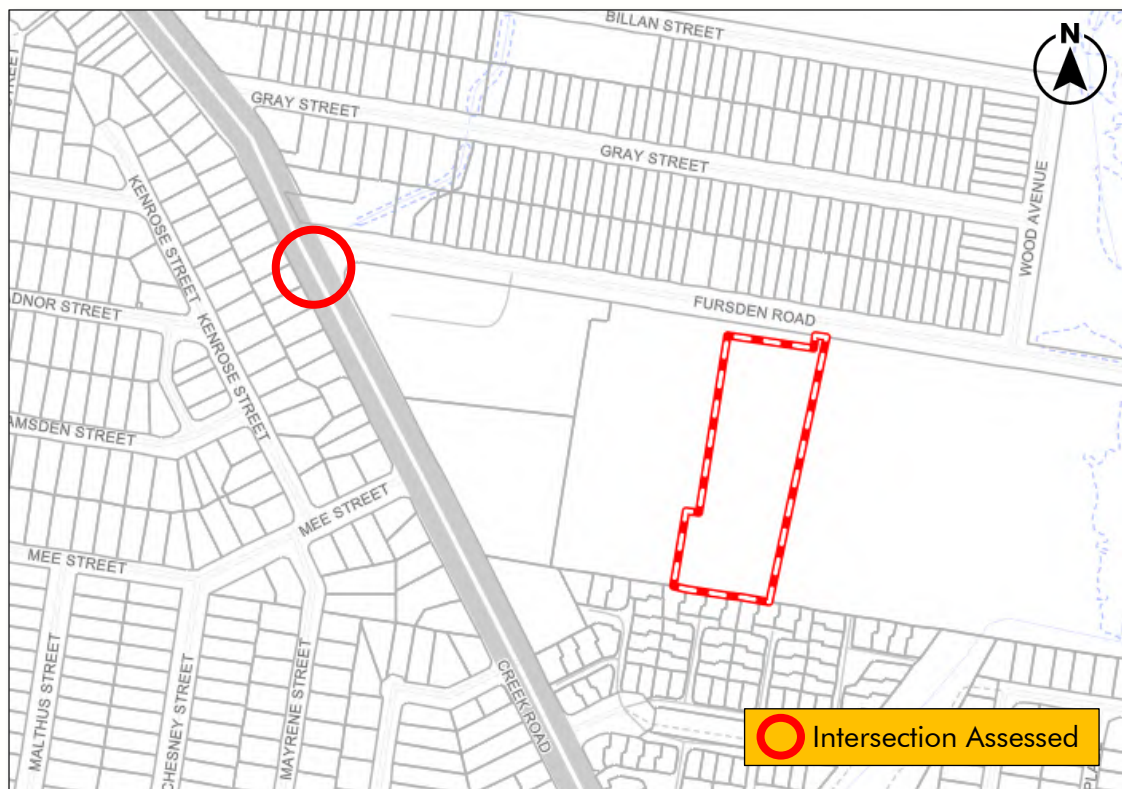
## APPENDIX G: TURNING MOVEMENT FORECASTS

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

In April 2026, PTT was commissioned by Roycorp, to undertake a traffic impact assessment for a proposed mixed-use development comprising a childcare centre and residential townhouses at 141 Fursden Road, Carina. The location of the subject site is shown in Figure 1.1.

**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 bicycle facilities and external traffic impact.

### 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, with development's impact on the adjacent road network quantified in terms of intersection delay and road safety (Chapter 4). The report concludes with a summary of key findings and recommendations (Chapter 5).

## 2.0 EXISTING CONDITIONS

### 2.1 SUBJECT SITE

The subject site is located at 141 Fursden Road, Carina and is formally described as Lot 2 on SP305062. The site is within a Community Facilities zone (Health Care Purposes), according to Brisbane City Council's 2014 City Plan. The site is currently vacant, as shown in Figure 2.1.

Figure 2.1: SUBJECT SITE



As shown in Figure 2.1 the site is bounded by:

- Fursden Road to the north
- a sports field to the east
- Community facilities (ie aged care facility) to the west
- Medium density residential uses to the south

The surrounding area comprises a mix of residential and community uses, as shown in Figure 2.1.

### 2.2 ACCESS

There is currently no formal access to the site on Fursden Road.

## 2.3 SURROUNDING ROAD NETWORK

The key attributes of the adjacent road network are summarised in Table 2.1. Fursden Road is classified as a neighbourhood road (ie minor road), according to Council's Road Hierarchy overlay. It currently provides an important access function and connects surrounding lower order residential streets to Creek Road, a major arterial road. While classified as a minor road, it is our view that Fursden Road does not operate as a minor residential street given the number and scale of non-residential uses it serves. Fursden Road intersects Creek Road at a priority-controlled T-intersection, approximately 300m west of the subject site.

**Table 2.1: ROAD NETWORK ATTRIBUTES**

| ATTRIBUTE            | FURSDEN ROAD                                            | CREEK ROAD                               |
|----------------------|---------------------------------------------------------|------------------------------------------|
| Road Hierarchy       | Neighbourhood Road                                      | Arterial Road                            |
| Cross Section        | Un-divided with a single traffic lane in each direction | Divided with two lanes in each direction |
| Speed Limit (km/h)   | 50                                                      | 70                                       |
| Jurisdiction         | Council                                                 | Council                                  |
| Predominant Land Use | Residential / Community                                 | Residential / Commercial                 |
| On-Street Parking    | Yes                                                     | Yes (within parking lane)                |
| Footpaths            | Yes (southern side of the road)                         | Yes (both sides)                         |
| Bicycle Lanes        | No                                                      | Yes (informal within parking lane)       |
| Bus Route            | No                                                      | Yes                                      |

## 2.4 TRAFFIC VOLUMES

To assist in the quantification of existing road network operations proximate to the site, peak period turning movement surveys were conducted at the nearby Creek Road / Fursden Road T-intersection on Thursday 23 April 2026.

The weekday morning and evening peak periods for the intersection are shown in Table 2.2, along with the key operational attributes of the intersections. The volumes shown represent all vehicle movements through the intersection in the peak hour periods. The traffic count data is provided in Appendix A.

**Table 2.2: CREEK ROAD / FURSDEN ROAD INTERSECTION ATTRIBUTES**

| ATTRIBUTE        | WEEKDAY MORNING PEAK | WEEKDAY EVENING PEAK |
|------------------|----------------------|----------------------|
| Peak Hour        | 7:45am – 8:45am      | 4:15pm – 5:15pm      |
| Volume (vph)     | 2,330                | 2,775                |
| % Heavy Vehicles | 4.0%                 | 1.4%                 |
| Peak Flow Factor | 97.0%                | 98.1%                |

## 2.5 INTERSECTION OPERATIONS

A series of SIDRA analyses were conducted to quantify existing traffic operations at the Creek Road / Fursden Road intersection. The analyses were based on traffic count data presented in Appendix A and the following assumptions:

- Peak Flow Factor (PFF) and proportion of heavy vehicles (%HV) for each movement as summarised in Table 2.2
- a 'level of reduction with opposing flow rate' factor of 'high'
- high Extra Bunching factors to calibrate the model to accurately reflect observed average delay to minor exit turn movements from Fursden Road
- SIDRA default values for other parameters

The "level of reduction with opposing flow rate" factor is used to reflect the tendency of some drivers to accept smaller gaps in circumstances where the opposing traffic volume is high. The adopted value of "high" is the highest of the available values in SIDRA. This factor is the preferred method for calibrating priority-controlled intersections according to the SIDRA Intersection User Manual and has been used to reflect local conditions. Further information regarding this calibration factor is provided in the PTT Gap Acceptance Practice Note included in Appendix B.

A total of 72 and 46 vehicles turned right from Fursden Road during the morning and evening peak hours, respectively. We have reviewed video footage (collected for the traffic count survey) to quantify the delay for each of these right turn movements, with these delays summarised in Appendix A. The video footage indicates significant platooning of through traffic on Creek Road, noting that signalised intersections are located to the north and south of the Fursden Road intersection. This platooning increases the availability of gaps in through traffic on Creek Road which reduces the delay for a large portion of right-turn movements from Fursden Road. The average delay for this right-turn movement is in the order of 39 seconds and 55 seconds during the morning and evening peak hours respectively. We have therefore calibrated the SIDRA model by adjusting the Extra Bunching factor on the Creek Road approaches to ensure the average delay for this right turn (reported by SIDRA) is generally equivalent to the observed average delay. A 40% and 37% Extra Bunching factor has been adopted during the morning and evening peak hours, respectively.

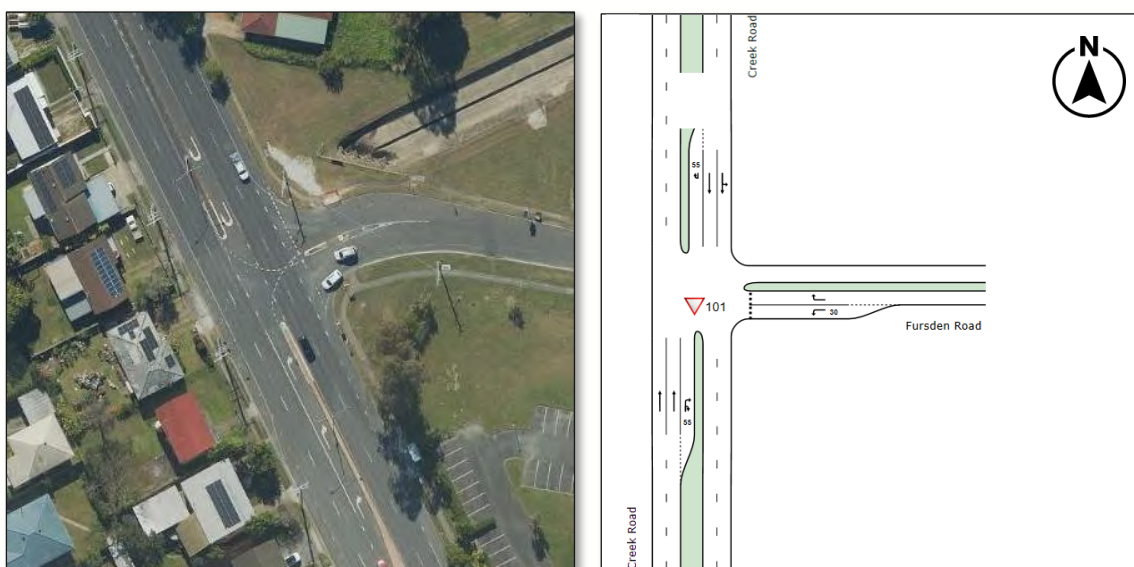
The degree of saturation for a movement is defined as the ratio of traffic demand to the capacity of the movement. The critical movement relates to the approach or movement with the highest degree of saturation. Table 2.3 is an extract from the SIDRA manual and defines the operational rating and level of service for all intersections.

The existing layout of the Creek Road / Fursden Road intersection and equivalent SIDRA representation is shown in Figure 2.2.

**Table 2.3: SIDRA INTERSECTION RATINGS**

| LEVEL OF SERVICE | DEGREE OF SATURATION |                      |                      |
|------------------|----------------------|----------------------|----------------------|
|                  | SIGNALS              | ROUNDBABOUT          | PRIORITY             |
| LOS A            | $x \leq 0.60$        | $x \leq 0.60$        | $x \leq 0.60$        |
| LOS B            | $0.60 < x \leq 0.70$ | $0.60 < x \leq 0.70$ | $0.6 < x \leq 0.70$  |
| LOS C            | $0.70 < x \leq 0.90$ | $0.70 < x \leq 0.85$ | $0.70 < x \leq 0.80$ |
| LOS D            | $0.90 < x \leq 0.95$ | $0.85 < x \leq 0.95$ | $0.80 < x \leq 0.90$ |
| LOS E            | $0.95 < x \leq 1.00$ | $0.95 < x \leq 1.00$ | $0.90 < x \leq 1.00$ |
| LOS F            | $1.00 < x$           | $1.00 < x$           | $1.00 < x$           |

**Figure 2.2: CREEK ROAD / FURSDEN ROAD INTERSECTION LAYOUT**



The results of the analyses are outlined in Table 2.4 and included in Appendix C. This intersection currently experiences LOS A operations during both the weekday morning and evening peaks.

**Table 2.3: EXISTING INTERSECTION OPERATIONS**

| SCENARIO | DOS   | 95% QUEUE | AVERAGE DELAY | CRITICAL MOVEMENT         |
|----------|-------|-----------|---------------|---------------------------|
| Morning  | 49.7% | 1.8veh    | 1.9s          | French Street (E) – Right |
| Evening  | 46.0% | 1.5veh    | 2.1s          | French Street (E) – Right |

## 2.6 ACTIVE AND PUBLIC TRANSPORT

There is a pedestrian footpath on the southern side of Fursden Road adjacent to the site. There are no cycle lanes on the adjacent road network.

A bus stop pair (ID: 010234 and 010122) is located on Creek Road, just south of Fursden Road. These bus stops are located within 300m walking distance of the subject site and are served by TransLink bus routes 210 and 211. These routes provide frequent services (every 15 minute during the morning and evening weekday commuter peak periods) to Brisbane City, Cannon Hill

Shopping Centre, Woolloongabba, East Brisbane and Fortitude Valley. Thus, the site is accessible via public transport.

## 2.7 PREVIOUS DEVELOPMENT APPLICATION

A development application for a Material Change of Use comprising 90 multiple dwellings over the subject site (DA Reference: A006264225) was refused by Council in 2023. The decision was then appealed in the Planning and Environment Court (Appeal No 2574 of 2023). In May 2024 the Court endorsed a Minor Change to the application, resulting in reduction to 85 dwellings and an increase in total resident parking to 192 spaces. A Joint Expert Report (JER) was prepared as part of the appeal, signed 9 August 2024. It is understood that all traffic engineering issues in dispute were resolved.

### 3.0 PROPOSED DEVELOPMENT

#### 3.1 PROPOSAL

The proposal seeks approval for a Material Change of Use (MCU) for a mixed-use development over the subject site comprising an 88-place childcare centre and 72 residential townhouses (27 three-bedroom and 45 four-bedroom townhouses). The development would be supported by 206 parking spaces, including 18 spaces allocated to the childcare centre. The proposed ground floor layout is shown in Figure 3.1, with dimensioned plans attached in Appendix D.

**Figure 3.1: PROPOSED SITE LAYOUT**



#### 3.2 ACCESS

##### 3.2.1 Location and Design

Vehicular access to the site is proposed via a 6.35m wide crossover on Fursden Road. Given the very limited site frontage available on Fursden Road, a Type B1 crossover is proposed in accordance with Council Standard Drawing BSD-2021. The proposed driveway and associated tapers would be wholly contained within the available site frontage, as shown in Figure 3.2. The exit side taper would also achieve a 0.5m separation to a nearby stormwater gully pit, in accordance with Council Standard Drawing BSD-2022.

The width of the circulation aisle, in proximity to the proposed site access, reduces to 5.8m adjacent to the PMT. The proposed access and circulation aisle width would adequately cater for two-way vehicle movements and the access / egress of a Heavy Rigid Vehicle (ie the design vehicle), as demonstrated in drawing 26-520-001 and 26-520-002 included in Appendix F.

The proposed access location and design is also consistent with the access arrangement agreed by the traffic engineers in the recent appeal JER.

**Figure 3.2: ACCESS FUNCTIONAL LAYOUT**



### 3.2.2 Sight Distance

On a 50km/h road (ie Fursden Road), Council's Transport, Access, Parking and Servicing (TAPS) Planning Scheme Policy requires a desirable minimum sight distance of 90m. As observed on-site, the proposed access would achieve in excess of 100m sight distance in both directions on Fursden Road. Therefore, the available sight distance at the proposed access complies with the TAPS Policy and is considered adequate.

### 3.2.3 Queuing

Council's TAPS Policy requires sufficient on-site queuing be provided to allow a free influx of traffic which will not adversely affect traffic or pedestrian flows on the frontage road (ie Fursden Road).

The 95<sup>th</sup> percentile queue at the site access is considered to be an adequate measure of an acceptable queueing provision. The predicted 95<sup>th</sup> percentile queue at the proposed site access has been calculated based on 53 vehicles (ie the predicted peak hour arrivals) arriving in the critical peak hour, using the queuing theory outlined in the PTT Queuing Practice Note included in Appendix E.

The results of the analysis indicate a 95<sup>th</sup> percentile queue of 1.0 vehicle (ie 6.0m) at the site access. The proposed layout incorporates approximately 14.0m (ie in excess of two vehicles) of queue storage, measured between the site boundary and first parking space. Therefore, the proposed queuing provision is sufficient to accommodate the predicted 95<sup>th</sup> percentile queue.

## 3.3 CAR PARKING

### 3.3.1 Requirement

The minimum on-site parking requirement for the proposal has been determined based on parking rates outlined in Council's TAPS Policy. A minimum of 203 spaces are required to support the proposed scale of uses, as outlined in Table 3.1.

**Table 3.1: COUNCIL MINIMUM PARKING REQUIREMENT**

| LAND USE                          | SCALE       | RATE                                         | REQUIREMENT                           |
|-----------------------------------|-------------|----------------------------------------------|---------------------------------------|
| <b>Residential Townhouses</b>     |             |                                              |                                       |
| Three Bedroom                     | 27 units    | 2.0 space per unit                           | 54 spaces                             |
| Four Bedroom                      | 45 units    | 2.5 spaces per unit                          | 113 spaces                            |
| Visitors                          | 72 units    | 0.25 spaces per unit                         | 18 spaces                             |
| <b>Sub-Total Resident Parking</b> |             |                                              | <b>185 spaces</b>                     |
| <b>Childcare</b>                  | 88 children | 1 per five children (60% allocated to staff) | 18 spaces (including 11 staff spaces) |
| <b>Total Parking</b>              |             |                                              | <b>203 spaces</b>                     |

### 3.3.3 Provision

The proposed layout provides 206 on-site parking spaces on-site, including:

- 144 resident spaces, with double garages
- 26 additional resident spaces
- 18 resident visitor spaces, including one persons with disability (PWD) space
- 18 childcare spaces, including 11 staff spaces and one PWD space

The proposed parking provision and allocation complies with Council's TAPS Policy and is considered adequate to support the proposal.

### 3.3.4 Persons with Disability Parking

The TAPS Policy requires a minimum of one PWD bay be provided for residential developments comprising more than 10 dwellings. For non-residential developments, PWD parking is to be provided at a rate one space per 50 standard parking spaces. Accordingly, a minimum of two PWD spaces are required on-site.

The development layout includes two PWD bays (ie with one space allocated to the childcare centre and one space allocated to residential visitors). The proposed PWD parking provision complies with Council's TAPS Policy.

### 3.3.5 Design

The proposed on-site parking has been designed generally in accordance with Council's TAPS Policy and Australian Standards AS2890.1 Parking Facilities Part 1: Off-Street Car Parking, in terms of parking bay dimensions, aisle widths, vehicle circulation and manoeuvring. This is typified by:

- double garages – dimensioned minimum 5.25m wide by 5.9m long, with a 4.8m wide door opening
- resident spaces (perpendicular) – dimensioned 2.4m wide by 5.4m long
- resident spaces (parallel) – dimensioned 2.1m wide by 6.3m long
- resident visitor spaces (perpendicular) – dimensioned 2.6m wide by 5.4m long
- resident visitor spaces (parallel) – dimensioned 2.1m wide by 6.3m long

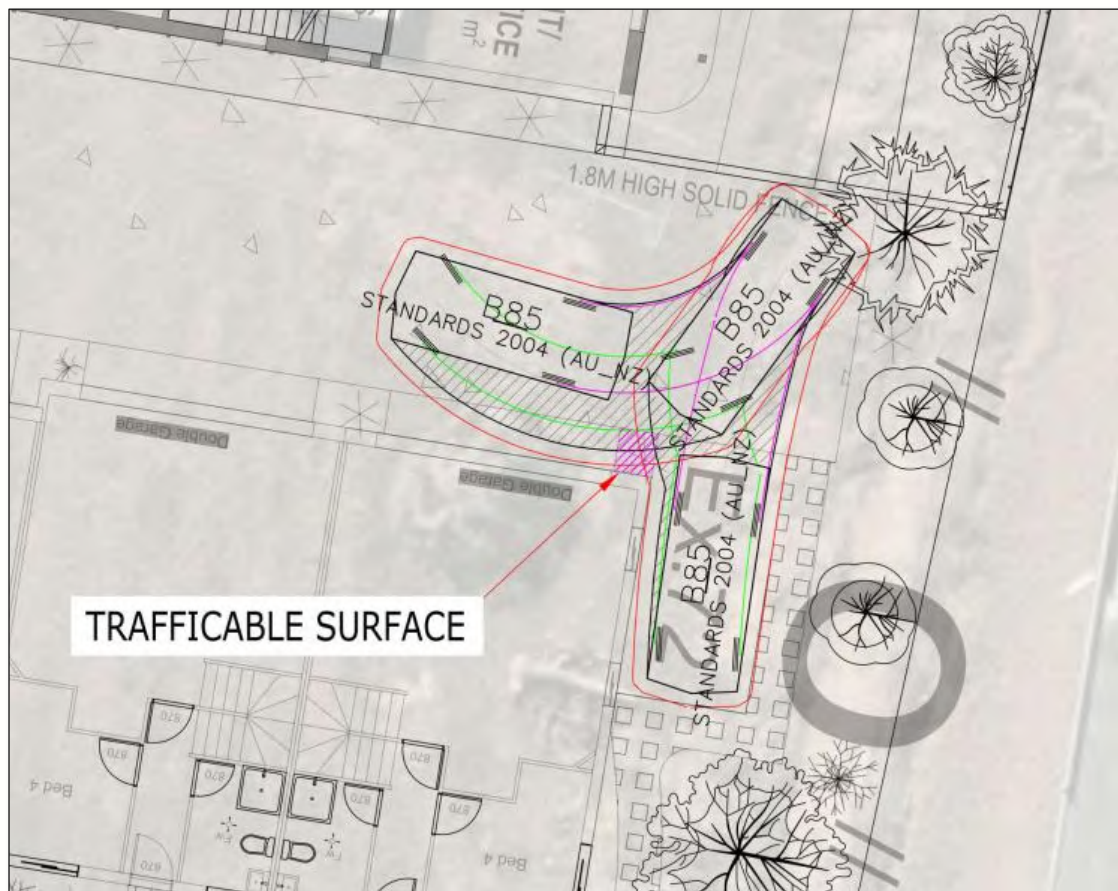
- parent parking bays – dimensioned 2.6m wide by 5.4m long
- staff parking bays – dimensioned 2.4m wide by 5.4m long
- PWD parking bays – dimensioned 2.4m wide by 5.4m long with an adjacent shared bay dimensioned 2.4m wide by 5.4m long
- additional parking clearance to walls/structures – dimensioned 0.3m wide
- trafficable parking aisle (adjacent to garages) – dimensioned 6.4m wide
- parking aisle (adjacent to standard perpendicular spaces) – dimensioned 6.2m wide
- end of aisle extension – dimensioned 1.0m wide
- wheel-stops located at the closed end of parking bays



Resident parking space 72 is accessed from a 5.5m wide parking aisle. It is recommended that a trafficable surface treatment be installed adjacent to the bay to ensure a B85 car can egress this bay, as shown in Figure 3.3.

Swept paths showing a B85 (medium) car accessing and egressing a typical double garage is included in Appendix F.

**Figure 3.3: RECOMMENDED CHANGES TO RESIDENTIAL BAY 72**



## 3.4 SERVICING

### 3.4.1 Refuse Collection

On-site refuse collection is proposed, with multiple bin stores (accommodating large bulk bins) proposed throughout the site. A swept path showing a front-lift Council refuse collection vehicle (RCV) accessing each bin store is included in Appendix F.

### 3.4.2 Residential Deliveries

Council's TAPS Policy nominates a Large Rigid Vehicle (ie a Heavy Rigid Vehicle) as the relevant design vehicle for residential uses. A swept path of a HRV accessing and egressing the site is included in Appendix F. As demonstrated, the proposed site layout can cater for on-site HRV servicing, in accordance with the TAPS Policy.

A dedicated service bay catering for a HRV is not considered necessary because:

- HRV servicing (ie furniture / bulky goods deliveries) is expected to be infrequent
- a HRV would only momentarily stand within the on-site parking / circulation aisles
- on-site HRV servicing would not impede queuing area in the vicinity of the site access
- the majority of townhouses are accessed via dead-end parking aisles and as such, a HRV standing within these dead end aisles would not impact access to visitor parking and through vehicle circulation to the majority of townhouses

### 3.4.2 Childcare Deliveries

The proposed childcare centre would be regularly serviced by a Van, as outlined in Table 1 of the TAPS Policy. It is expected that a Van would make use of vacant parking spaces (noting that deliveries are expected to occur outside of peak times when parent parking is lowest).

Alternatively, a Van could momentarily stand within the childcare parking aisle. Given that Van servicing is expected to occur outside of peak times, this arrangement is considered acceptable.

## 3.5 ACTIVE AND PUBLIC TRANSPORT

### 3.5.1 Pedestrians

A dedicated pedestrian access, separate to the vehicular driveway, is proposed on Fursden Road. This would adequately separate pedestrians at locations where vehicular traffic is most concentrated (ie at the site access). A 1.2m wide pedestrian path (separate to vehicular circulation aisles) is also proposed between Fursden Road and the main pedestrian access to the childcare centre. A pedestrian path is also proposed adjacent to the parent parking bays. These pedestrian paths would ensure vulnerable users (ie children) are separated from the vehicular traffic on the parking / circulation aisles.

The proposed parking aisles serving the townhouses are expected to operate similar to a shared zone. It is recommended that shared zone signage be installed adjacent to Visitor Bay 2 and Resident Bay 6, as shown in Figure 3.2, to inform drivers and pedestrians of this arrangement.

### 3.5.2 Cyclists

The TAPS Policy does not prescribe a minimum bicycle parking requirement for a childcare centre.

For residential uses, the following rates apply:

- one lockable resident space per dwelling, plus
- one visitor bicycle space per four dwellings

Based on the proposed number of townhouses, a minimum of 72 resident and 18 visitor bicycle parking spaces are required. It is understood that one resident bicycle parking space would be provided within each double garage (equating to a total of 72 resident spaces on-site). A total of 22 visitor bicycle parking spaces are proposed throughout the site. Thus, the proposed bicycle parking provision accords with Council's TAPS Policy.

### 3.5.3 Public Transport

The proposal would be expected to increase the viability of additional public transport services surrounding the site.

## 4.0 TRAFFIC OPERATIONS

### 4.1 DEVELOPMENT PROFILE

#### 4.1.1 Staging

For the purposes of this assessment, we have assumed all uses would be constructed in a single stage, with an anticipated year of opening in 2029. It is typical practice to adopt a 10-year design horizon when assessing impact to Council intersections. Therefore, the following development staging has been adopted:

|                             |      |
|-----------------------------|------|
| — Traffic Counts:           | 2026 |
| — Development Application:  | 2026 |
| — Construction and Opening: | 2029 |
| — 10-year design horizon:   | 2039 |

#### 4.1.2 Scenarios

The following assessment scenarios have been adopted:

- Opening Year (2029) pre-development
- Opening Year (2029) post-development
- Future Year (2039) pre-development
- Future Year (2039) post-development

#### 4.1.3 Background Traffic Growth

The scenarios modelled reflect the development staging with detailed analysis undertaken on the existing conditions, opening year (2029) and future year (2039). According to the Office of Economic and Statistical Research (OESR), Queensland Treasury and Trade (QTT), the population of Carina and surrounding area is expected to grow at a rate of 0.5% per annum. We have also reviewed historical growth trends in Average Annual Daily Traffic (AADT) on the nearby State-Controlled network. AADT on Old Cleveland Road (Counter Site: 135769) grew at an average annual rate of 0.4% between 2014 and 2024. We have therefore adopted a background traffic growth rate of 0.5% per annum. The application of this rate equates to a 6.5% increase in background traffic volumes over the next 13 years (ie 2026 – 2039).

### 4.2 TRAFFIC GENERATION

#### 4.2.1 Childcare Centre

The peak hour traffic generation for the childcare centre has been estimated based on the Queensland Government traffic generation data available via the Open Data Portal. This traffic generation data is based on surveys of sites throughout Queensland undertaken between 2006 and 2018. There are 17 childcare centres in the data. The rate has been derived by taking the 85<sup>th</sup> percentile traffic generation rates for all of the childcare site) during the weekday morning and evening peak periods. The following rates have been adopted:

- weekday morning: 0.76 trips per child
- weekday evening: 0.51 trips per child

#### 4.2.2 Residential

The peak hour traffic generation for the proposed residential townhouses has been estimated based on published rates in Transport for New South Wales (TfNSW) Guide to Transport Impact Assessment. A total of 72 dwellings are proposed over a total site area of 13,570m<sup>2</sup>. This equates to total residential yield of 53 dwellings per hectare. The TfNSW guide defines medium density residential uses as having between 30 and 60 dwellings per hectare. We have conservatively adopted the regional rates included in Table 5.6 of the TfNSW guide, which are as follows:

- weekday morning: 0.41 trips per dwelling
- weekday evening: 0.6 trips per dwelling

#### 4.2.3 Summary

The total peak hour traffic generation is summarised in Table 4.1. The proposed development is expected to generate up to 94 two-way trips during the commuter peak hours. A 50:50 in:out split in development traffic has been adopted for the childcare use. A 30:70 in:out split has been adopted for the residential use during the morning peak hour, with the reverse split adopted during the evening peak hour.

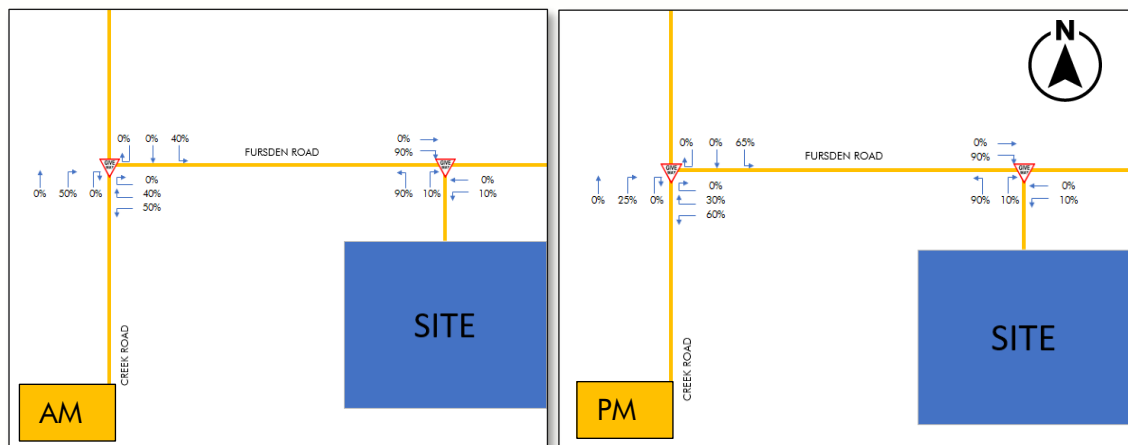
**Table 4.1: PROPOSED DEVELOPMENT PEAK HOUR TRAFFIC GENERATION**

| USE                    | SCALE        | RATE                    | SOURCE | TRIPS / HR | TRIPS (IN : OUT) |
|------------------------|--------------|-------------------------|--------|------------|------------------|
| <b>Weekday Morning</b> |              |                         |        |            |                  |
| Childcare              | 88 Children  | 0.76 trips per child    | TMR    | 67         | 34 : 34          |
| Residential            | 72 dwellings | 0.41 trips per dwelling | TfNSW  | 30         | 9 : 21           |
| <b>Total</b>           |              |                         |        | <b>97</b>  | <b>43 : 55</b>   |
| <b>Weekday PM</b>      |              |                         |        |            |                  |
| Childcare              | 88 Children  | 0.51 trips per child    | TMR    | 50         | 25 : 25          |
| Residential            | 72 dwellings | 0.6 trips per dwelling  | TfNSW  | 43         | 30 : 13          |
| <b>Total</b>           |              |                         |        | <b>93</b>  | <b>55 : 38</b>   |

### 4.3 DIRECTIONAL DISTRIBUTION

The distribution of development related traffic on the existing road network has been estimated based on the directional split inherent in the traffic surveys and the surrounding residential catchment. The resulting distribution of development traffic is shown in Figure 4.1

**Figure 4.1: DIRECTIONAL DISTRIBUTION**



#### 4.4 INTERSECTION PERFORMANCE

The likely impact of the proposed development on the opening year (2029) and future year (2039) peak hour operations of the surrounding road network has been assessed based on the peak hour turning movement forecasts presented in Appendix G.

The SIDRA analyses of the Creek Road / Fursden Road intersection were undertaken using the intersection layout shown in Figure 2.2. The results of these analyses are shown in Appendix C and are summarised in Table 4.2.

Council's Infrastructure Planning Scheme Policy does not nominate a maximum acceptable operational capacity for priority-controlled intersections. It is typical practice to adopt a maximum degree of saturation of 80% at priority-controlled intersections. As demonstrated, the intersection is expected to operate within typical acceptable limits (ie degree of saturation less than 80%) in all pre and post-development scenarios. The existing channelised right and U-turn lanes on Creek Road would cater for all post-development 95<sup>th</sup> percentile queue lengths. Accordingly, the intersection is expected to adequately cater for additional traffic generated by the proposal and no upgrades to the intersection considered necessary.

**Table 4.2: CREEK ROAD / FURSDEN ROAD OPERATIONS**

| SCENARIO                 | DOS   | 95% QUEUE | AV DELAY | CRITICAL MOVEMENT      |
|--------------------------|-------|-----------|----------|------------------------|
| <b>Opening Year</b>      |       |           |          |                        |
| Morning Pre-Development  | 51.9% | 1.9veh    | 2.0s     | Fursden Rd (E) – Right |
| Morning Post-Development | 68.7% | 2.9veh    | 2.9s     | Fursden Rd (E) – Right |
| Evening Pre-Development  | 48.6% | 1.6veh    | 2.2s     | Fursden Rd (E) – Right |
| Evening Post-Development | 61.4% | 2.2veh    | 2.8s     | Fursden Rd (E) – Right |
| <b>Future Year</b>       |       |           |          |                        |
| Morning Pre-Development  | 58.8% | 2.2veh    | 2.2s     | Fursden Rd (E) – Right |
| Morning Post-Development | 76.0% | 3.4veh    | 3.2s     | Fursden Rd (E) – Right |
| Evening Pre-Development  | 54.5% | 1.9veh    | 2.4s     | Fursden Rd (E) – Right |
| Evening Post-Development | 68.3% | 2.5veh    | 3.0s     | Fursden Rd (E) – Right |

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 CONCLUSIONS

The proposed mixed-use development at 141 Fursden Road, Carina has been evaluated in terms of its site access arrangements, parking provision, internal layout and impact on the surrounding road network. The main points to note are:

- the development application seeks approval for a 88-place childcare centre and 72 townhouses over the subject site
- vehicular access is proposed via a 6.35m wide driveway on Fursden Road
- the proposed access is consistent with Council's TAPS Policy and AS2890.1 in terms of sight distance, design and location
- the proposed access has been designed to cater for the expected 95<sup>th</sup> percentile queue in accordance with Council's TAPS Policy
- a total of 206 car parking spaces are proposed on-site, including two PWD bays, which accords with Council's minimum parking requirement
- the on-site parking layout has been designed generally in accordance with Council's TAPS Policy and AS2890.1
- the proposal can accommodate on-site servicing for an RCV and HRV which is considered adequate for the proposed scale of development
- a dedicated pedestrian access, separate to the vehicular access, would be provided
- 72 resident and 22 visitor bicycle spaces are proposed on-site, which exceeds Council's minimum requirement
- the proposal is expected to generate up to 97 trips during the weekday peak periods
- the nearby Creek Road / Fursden Road intersection is expected to operate within acceptable limits during all post-development scenarios
- no upgrades to the surrounding road network are considered necessary to support the proposed scale of uses

### 5.2 RECOMMENDATIONS

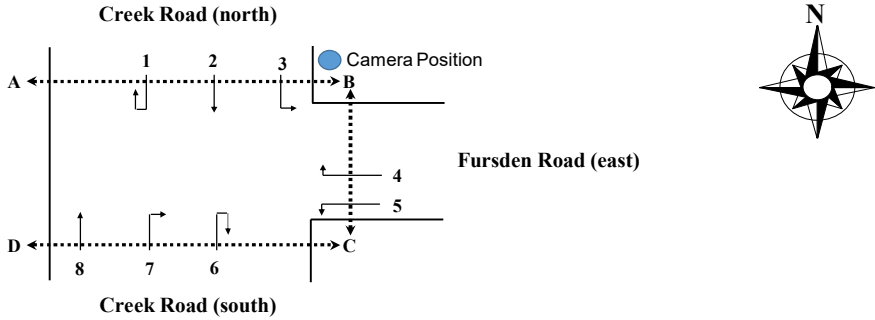
Based on the above, it is recommended that:

- a trafficable surface be provided adjacent resident bay 72, as shown in Figure 3.3
- shared zone signage be installed throughout the site, as shown in Figure 3.2

## **APPENDIX A: TRAFFIC COUNT DATA**

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 1      Weather: Fine  
Location: Creek Road/Fursden Road, Carina Heights  
Day/Date: Thursday, 23 April 2026  
AM Peak:    Hour ending -    8:45 AM  
PM Peak:    Hour ending -    5:15 PM



| TIME<br>(1/4 hr end) | Movement 1     |                |       |          | Movement 2     |                |       |          | Movement 3     |                |       |          | Movement 4     |                |       |          | Movement 5     |                |       |          | Movement 6     |                |       |          | Movement 7     |                |       |          | Movement 8  |          |             |          | Pedestrian Movements |          |             |          |             |          |             |          |             |          |   |   |
|----------------------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|-------------|----------|-------------|----------|----------------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|---|---|
|                      | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | A - B       |          | B - A       |          | B - C                |          | C - B       |          | C - D       |          | D - C       |          |             |          |   |   |
|                      |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          | Pedestrians | Cyclists | Pedestrians | Cyclists | Pedestrians          | Cyclists | Pedestrians | Cyclists | Pedestrians | Cyclists | Pedestrians | Cyclists | Pedestrians | Cyclists |   |   |
| 7:15 AM              | 0              | 0              | 0     | 0        | 133            | 6              | 139   | 1        | 4              | 0              | 4     | 0        | 19             | 0              | 19    | 0        | 23             | 0              | 23    | 0        | 3              | 0              | 3     | 0        | 12             | 0              | 12    | 0        | 235         | 12       | 247         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0 |   |
| 7:30 AM              | 0              | 0              | 0     | 0        | 150            | 6              | 156   | 0        | 8              | 0              | 8     | 0        | 13             | 0              | 13    | 0        | 21             | 0              | 21    | 0        | 5              | 0              | 5     | 0        | 14             | 0              | 14    | 0        | 265         | 8        | 273         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |   |
| 7:45 AM              | 0              | 0              | 0     | 0        | 157            | 12             | 169   | 1        | 9              | 0              | 9     | 0        | 24             | 0              | 24    | 0        | 20             | 1              | 21    | 0        | 4              | 0              | 4     | 0        | 8              | 0              | 8     | 0        | 286         | 14       | 300         | 0        | 0                    | 0        | 0           | 0        | 0           | 2        | 0           | 0        | 0           | 0        | 0 |   |
| 8:00 AM              | 0              | 0              | 0     | 0        | 172            | 16             | 188   | 1        | 8              | 1              | 9     | 0        | 17             | 0              | 17    | 0        | 19             | 0              | 19    | 0        | 0              | 2              | 2     | 0        | 10             | 0              | 10    | 0        | 300         | 14       | 314         | 0        | 0                    | 0        | 0           | 0        | 1           | 0        | 0           | 0        | 0           | 0        | 0 |   |
| 8:15 AM              | 0              | 0              | 0     | 0        | 206            | 11             | 217   | 0        | 1              | 0              | 1     | 0        | 15             | 0              | 15    | 0        | 28             | 1              | 29    | 0        | 3              | 0              | 3     | 0        | 8              | 0              | 8     | 0        | 302         | 8        | 310         | 1        | 0                    | 0        | 0           | 3        | 0           | 1        | 1           | 0        | 0           | 0        | 0 |   |
| 8:30 AM              | 0              | 0              | 0     | 0        | 238            | 10             | 248   | 0        | 5              | 1              | 6     | 0        | 24             | 0              | 24    | 0        | 34             | 0              | 34    | 0        | 1              | 0              | 1     | 0        | 11             | 0              | 11    | 0        | 284         | 11       | 295         | 0        | 0                    | 0        | 0           | 0        | 0           | 1        | 0           | 0        | 0           | 0        | 0 |   |
| 8:45 AM              | 1              | 0              | 1     | 0        | 225            | 8              | 233   | 1        | 16             | 1              | 17    | 0        | 16             | 0              | 16    | 0        | 16             | 0              | 16    | 0        | 5              | 0              | 5     | 0        | 11             | 0              | 11    | 0        | 262         | 10       | 272         | 0        | 0                    | 0        | 0           | 0        | 0           | 1        | 1           | 0        | 0           | 0        | 0 |   |
| 9:00 AM              | 1              | 0              | 1     | 0        | 218            | 12             | 230   | 1        | 8              | 1              | 9     | 0        | 15             | 1              | 16    | 0        | 17             | 0              | 17    | 0        | 1              | 0              | 1     | 0        | 17             | 0              | 17    | 0        | 249         | 8        | 257         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0 |   |
| 9:15 AM              | 1              | 0              | 1     | 0        | 170            | 7              | 177   | 0        | 5              | 0              | 5     | 0        | 7              | 0              | 7     | 1        | 15             | 0              | 15    | 0        | 5              | 0              | 5     | 0        | 25             | 0              | 25    | 0        | 187         | 6        | 193         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0 |   |
| 9:30 AM              | 0              | 0              | 0     | 0        | 187            | 9              | 196   | 0        | 4              | 0              | 4     | 0        | 2              | 0              | 2     | 0        | 13             | 1              | 14    | 0        | 3              | 0              | 3     | 0        | 14             | 0              | 14    | 0        | 186         | 11       | 197         | 0        | 0                    | 0        | 0           | 0        | 1           | 0        | 0           | 0        | 0           | 0        | 0 |   |
| 9:45 AM              | 0              | 0              | 0     | 0        | 150            | 9              | 159   | 0        | 11             | 0              | 11    | 0        | 6              | 0              | 6     | 0        | 15             | 0              | 15    | 0        | 2              | 0              | 2     | 0        | 15             | 0              | 15    | 0        | 172         | 7        | 179         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0 |   |
| 10:00 AM             | 0              | 0              | 0     | 0        | 170            | 5              | 175   | 0        | 13             | 0              | 13    | 0        | 8              | 1              | 9     | 0        | 10             | 0              | 10    | 0        | 2              | 0              | 2     | 0        | 12             | 1              | 13    | 0        | 193         | 4        | 197         | 0        | 0                    | 0        | 0           | 0        | 0           | 1        | 0           | 0        | 0           | 0        | 0 |   |
| 3 hr Total           | 3              | 0              | 3     | 0        | 2176           | 111            | 2287  | 5        | 92             | 4              | 96    | 0        | 166            | 2              | 168   | 1        | 231            | 3              | 234   | 0        | 34             | 2              | 36    | 0        | 157            | 1              | 158   | 0        | 2921        | 113      | 3034        | 1        | 0                    | 0        | 0           | 0        | 5           | 0        | 6           | 2        | 0           | 0        | 0 | 0 |
| AM Peak              | 1              | 0              | 1     | 0        | 841            | 45             | 886   | 2        | 30             | 3              | 33    | 0        | 72             | 0              | 72    | 0        | 97             | 1              | 98    | 0        | 9              | 2              | 11    | 0        | 40             | 0              | 40    | 0        | 1148        | 43       | 1191        | 1        | 0                    | 0        | 0           | 0        | 4           | 0        | 3           | 2        | 0           | 0        | 0 | 0 |

| TIME<br>(1/4 hr end) | Movement 1     |                |       |          | Movement 2     |                |       |          | Movement 3     |                |       |          | Movement 4     |                |       |          | Movement 5     |                |       |          | Movement 6     |                |       |          | Movement 7     |                |       |          | Movement 8  |          |             |          | Pedestrian Movements |          |             |          |             |          |             |          |             |          |   |  |
|----------------------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|----------------|----------------|-------|----------|-------------|----------|-------------|----------|----------------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|---|--|
|                      | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | Light Vehicles | Heavy Vehicles | Total | Cyclists | A - B       |          | B - A       |          | B - C                |          | C - B       |          | C - D       |          | D - C       |          |             |          |   |  |
|                      |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          |                |                |       |          | Pedestrians | Cyclists | Pedestrians | Cyclists | Pedestrians          | Cyclists | Pedestrians | Cyclists | Pedestrians | Cyclists | Pedestrians | Cyclists | Pedestrians | Cyclists |   |  |
| 2:45 PM              | 0              | 0              | 0     | 0        | 294            | 9              | 303   | 0        | 26             | 2              | 28    | 0        | 20             | 1              | 21    | 0        | 19             | 2              | 21    | 0        | 2              | 0              | 2     | 0        | 11             | 1              | 12    | 0        | 213         | 12       | 225         | 0        | 0                    | 0        | 0           | 0        | 1           | 0        | 0           | 0        | 0           | 0        |   |  |
| 3:00 PM              | 0              | 0              | 0     | 0        | 309            | 10             | 319   | 1        | 19             | 0              | 19    | 0        | 13             | 0              | 13    | 0        | 24             | 0              | 24    | 0        | 1              | 0              | 1     | 0        | 16             | 0              | 16    | 0        | 205         | 14       | 219         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |  |
| 3:15 PM              | 0              | 0              | 0     | 0        | 290            | 8              | 298   | 0        | 26             | 0              | 26    | 0        | 9              | 0              | 9     | 0        | 25             | 0              | 25    | 0        | 2              | 0              | 2     | 0        | 12             | 0              | 12    | 0        | 244         | 6        | 250         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |  |
| 3:30 PM              | 0              | 0              | 0     | 0        | 363            | 7              | 370   | 1        | 37             | 0              | 37    | 0        | 2              | 0              | 2     | 0        | 11             | 0              | 11    | 0        | 1              | 0              | 1     | 0        | 24             | 0              | 24    | 0        | 230         | 7        | 237         | 0        | 0                    | 0        | 0           | 0        | 1           | 0        | 0           | 0        | 0           | 0        |   |  |
| 3:45 PM              | 0              | 0              | 0     | 0        | 413            | 9              | 422   | 0        | 45             | 0              | 45    | 0        | 7              | 0              | 7     | 0        | 16             | 0              | 16    | 0        | 2              | 0              | 2     | 0        | 15             | 0              | 15    | 0        | 212         | 10       | 222         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |  |
| 4:00 PM              | 0              | 0              | 0     | 0        | 320            | 9              | 329   | 1        | 41             | 0              | 41    | 0        | 10             | 1              | 11    | 0        | 18             | 0              | 18    | 0        | 1              | 0              | 1     | 0        | 5              | 1              | 6     | 0        | 201         | 2        | 203         | 0        | 0                    | 0        | 0           | 0        | 1           | 1        | 0           | 0        | 0           | 0        |   |  |
| 4:15 PM              | 1              | 0              | 1     | 0        | 347            | 9              | 356   | 0        | 39             | 0              | 39    | 0        | 6              | 0              | 6     | 0        | 19             | 2              | 21    | 0        | 3              | 0              | 3     | 0        | 15             | 0              | 15    | 0        | 179         | 8        | 187         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 4           | 0        | 0           | 0        |   |  |
| 4:30 PM              | 5              | 0              | 5     | 0        | 386            | 7              | 393   | 0        | 60             | 0              | 60    | 0        | 12             | 0              | 12    | 0        | 19             | 1              | 20    | 0        | 1              | 0              | 1     | 0        | 19             | 0              | 19    | 0        | 216         | 2        | 218         | 0        | 0                    | 0        | 0           | 0        | 0           | 1        | 0           | 0        | 0           | 0        | 0 |  |
| 4:45 PM              | 7              | 0              | 7     | 0        | 376            | 6              | 382   | 0        | 52             | 1              | 53    | 0        | 11             | 0              | 11    | 0        | 12             | 0              | 12    | 0        | 2              | 0              | 2     | 0        | 22             | 0              | 22    | 0        | 190         | 7        | 197         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |  |
| 5:00 PM              | 0              | 0              | 0     | 0        | 358            | 5              | 363   | 0        | 34             | 0              | 34    | 0        | 7              | 0              | 7     | 0        | 15             | 0              | 15    | 0        | 0              | 0              | 0     | 0        | 11             | 0              | 11    | 0        | 205         | 4        | 209         | 0        | 0                    | 0        | 0           | 0        | 0           | 2        | 0           | 0        | 0           | 0        | 0 |  |
| 5:15 PM              | 2              | 0              | 2     | 0        | 381            | 0              | 381   | 0        | 41             | 0              | 41    | 0        | 16             | 0              | 16    | 0        | 37             | 0              | 37    | 0        | 2              | 0              | 2     | 0        | 15             | 0              | 15    | 1        | 219         | 7        | 226         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |  |
| 5:30 PM              | 3              | 0              | 3     | 0        | 374            | 3              | 377   | 1        | 47             | 0              | 47    | 0        | 13             | 0              | 13    | 0        | 13             | 2              | 15    | 0        | 2              | 0              | 2     | 0        | 13             | 0              | 13    | 0        | 185         | 5        | 190         | 0        | 0                    | 0        | 0           | 0        | 0           | 0        | 0           | 0        | 0           | 0        |   |  |
| 3 hr Total           | 18             | 0              | 18    | 0        | 4211           | 82             | 4293  | 4        | 467            | 3              | 470   | 0        | 126            | 2              | 128   | 0        | 228            | 7              | 235   | 0        | 19             | 0              | 19    | 0        | 178            | 2              | 180   | 1        | 2499        | 84       | 2583        | 0        | 0                    | 0        | 0           | 3        | 3           | 1        | 4           | 0        | 0           | 0        |   |  |
| PM Peak              | 14             | 0              | 14    | 0        | 1501           | 18             | 1519  | 0        | 187            | 1              | 188   | 0        | 46             | 0              | 46    | 0        | 83             | 1              | 84    | 0        | 5              | 0              | 5     | 0        | 67             | 0              | 67    | 1        | 830         | 20       | 850         | 0        | 0                    | 0        | 0           | 0        | 2           | 1        | 0           | 0        | 0           | 0        |   |  |

| Vehicle Number | Delay Start | Time Clear Intersection | Delay   |
|----------------|-------------|-------------------------|---------|
| 1              |             |                         | 0:00:00 |
| 2              |             |                         | 0:00:00 |
| 3              | 7:45:37     | 7:46:11                 | 0:00:34 |
| 4              | 7:46:14     | 7:46:52                 | 0:00:38 |
| 5              | 7:48:23     | 7:48:32                 | 0:00:09 |
| 6              | 7:49:05     | 7:49:51                 | 0:00:46 |
| 7              | 7:49:51     | 7:50:07                 | 0:00:16 |
| 8              | 7:50:15     | 7:50:33                 | 0:00:18 |
| 9              | 7:50:16     | 7:51:36                 | 0:01:20 |
| 10             | 7:50:27     | 7:51:42                 | 0:01:15 |
| 11             | 7:52:19     | 7:53:09                 | 0:00:50 |
| 12             |             |                         | 0:00:00 |
| 13             | 7:55:24     | 7:55:49                 | 0:00:25 |
| 14             | 7:55:39     | 7:55:52                 | 0:00:13 |
| 15             |             |                         | 0:00:00 |
| 16             |             |                         | 0:00:00 |
| 17             | 7:56:10     | 7:56:15                 | 0:00:05 |
| 18             | 7:58:43     | 7:59:20                 | 0:00:37 |
| 19             | 8:00:52     | 8:01:34                 | 0:00:42 |
| 20             | 8:03:06     | 8:03:27                 | 0:00:21 |
| 21             | 8:03:51     | 8:03:58                 | 0:00:07 |
| 22             | 8:04:27     | 8:04:52                 | 0:00:25 |
| 23             | 8:05:04     | 8:05:30                 | 0:00:26 |
| 24             | 8:06:03     | 8:06:33                 | 0:00:30 |
| 25             | 8:06:10     | 8:06:36                 | 0:00:26 |
| 26             |             |                         | 0:00:00 |
| 27             | 8:07:05     | 8:07:15                 | 0:00:10 |
| 28             | 8:07:54     | 8:08:14                 | 0:00:20 |
| 29             | 8:07:59     | 8:08:20                 | 0:00:21 |
| 30             | 8:09:48     | 8:10:02                 | 0:00:14 |
| 31             | 8:10:54     | 8:11:05                 | 0:00:11 |
| 32             | 8:11:50     | 8:12:30                 | 0:00:40 |
| 33             | 8:13:53     | 8:14:08                 | 0:00:15 |
| 34             | 8:13:54     | 8:15:39                 | 0:01:45 |
| 35             | 8:14:36     | 8:15:45                 | 0:01:09 |
| 36             | 8:14:37     | 8:15:56                 | 0:01:19 |
| 37             | 8:14:52     | 8:15:58                 | 0:01:06 |
| 38             | 8:14:55     | 8:16:10                 | 0:01:15 |
| 39             | 8:17:18     | 8:17:56                 | 0:00:38 |
| 40             | 8:18:27     | 8:19:21                 | 0:00:54 |
| 41             | 8:19:50     | 8:20:37                 | 0:00:47 |
| 42             | 8:20:07     | 8:20:57                 | 0:00:50 |
| 43             | 8:20:17     | 8:20:59                 | 0:00:42 |
| 44             | 8:20:23     | 8:21:02                 | 0:00:39 |
| 45             | 8:21:21     | 8:21:33                 | 0:00:12 |
| 46             | 8:21:24     | 8:22:34                 | 0:01:10 |
| 47             | 8:22:34     | 8:22:45                 | 0:00:11 |
| 48             | 8:22:52     | 8:24:07                 | 0:01:15 |
| 49             | 8:23:18     | 8:24:29                 | 0:01:11 |
| 50             | 8:23:31     | 8:24:31                 | 0:01:00 |
| 51             | 8:23:36     | 8:24:38                 | 0:01:02 |
| 52             | 8:23:53     | 8:24:47                 | 0:00:54 |
| 53             | 8:24:26     | 8:24:56                 | 0:00:30 |
| 54             | 8:24:42     | 8:26:07                 | 0:01:25 |
| 55             | 8:25:06     | 8:26:09                 | 0:01:03 |
| 56             | 8:25:54     | 8:26:12                 | 0:00:18 |
| 57             | 8:27:04     | 8:28:20                 | 0:01:16 |
| 58             |             |                         | 0:00:00 |
| 59             | 8:30:04     | 8:30:27                 | 0:00:23 |
| 60             | 8:32:30     | 8:33:18                 | 0:00:48 |
| 61             | 8:33:08     | 8:34:00                 | 0:00:52 |
| 62             | 8:33:16     | 8:34:02                 | 0:00:46 |
| 63             | 8:34:57     | 8:35:29                 | 0:00:32 |
| 64             | 8:37:35     | 8:39:00                 | 0:01:25 |
| 65             | 8:38:44     | 8:39:13                 | 0:00:29 |
| 66             | 8:39:05     | 8:40:38                 | 0:01:33 |
| 67             | 8:39:23     | 8:40:46                 | 0:01:23 |
| 68             | 8:41:01     | 8:41:55                 | 0:00:54 |
| 69             | 8:41:20     | 8:41:58                 | 0:00:38 |
| 70             | 8:43:39     | 8:43:59                 | 0:00:20 |
| 71             | 8:43:42     | 8:44:02                 | 0:00:20 |
| 72             | 8:44:21     | 8:45:50                 | 0:01:29 |

Average intersection delay  
0:00:39  
Max Delay  
0:01:45

| Vehicle Number | Delay Start | Time Clear Intersection | Delay   |
|----------------|-------------|-------------------------|---------|
| 1              | 16:15:01    | 16:15:45                | 0:00:44 |
| 2              | 16:15:11    | 16:15:51                | 0:00:40 |
| 3              | 16:17:14    | 16:17:43                | 0:00:29 |
| 4              | 16:17:27    | 16:17:46                | 0:00:19 |
| 5              | 16:18:17    | 16:19:32                | 0:01:15 |
| 6              | 16:18:30    | 16:20:37                | 0:02:07 |
| 7              | 16:19:57    | 16:20:42                | 0:00:45 |
| 8              | 16:20:48    | 16:21:52                | 0:01:04 |
| 9              | 16:20:51    | 16:21:53                | 0:01:02 |
| 10             | 16:22:49    | 16:22:55                | 0:00:06 |
| 11             | 16:23:27    | 16:23:53                | 0:00:26 |
| 12             | 16:23:29    | 16:23:55                | 0:00:26 |
| 13             | 16:25:22    | 16:25:37                | 0:00:15 |
| 14             | 16:30:55    | 16:31:05                | 0:00:10 |
| 15             | 16:32:19    | 16:33:46                | 0:01:27 |
| 16             |             |                         | 0:00:00 |
| 17             | 16:34:50    | 16:35:52                | 0:01:02 |
| 18             | 16:35:22    | 16:35:56                | 0:00:34 |
| 19             | 16:36:45    | 16:37:34                | 0:00:49 |
| 20             | 16:37:45    | 16:38:16                | 0:00:31 |
| 21             | 16:37:54    | 16:38:20                | 0:00:26 |
| 22             | 16:38:54    | 16:39:18                | 0:00:24 |
| 23             |             |                         | 0:00:00 |
| 24             | 16:42:38    | 16:43:38                | 0:01:00 |
| 25             | 16:45:43    | 16:45:51                | 0:00:08 |
| 26             | 16:47:42    | 16:47:52                | 0:00:10 |
| 27             | 16:52:13    | 16:52:31                | 0:00:18 |
| 28             |             |                         | 0:00:00 |
| 29             | 16:52:45    | 16:53:50                | 0:01:05 |
| 30             | 16:53:44    | 16:53:53                | 0:00:09 |
| 31             | 16:56:37    | 16:57:37                | 0:01:00 |
| 32             | 16:59:29    | 17:00:26                | 0:00:57 |
| 33             | 16:59:30    | 17:00:45                | 0:01:15 |
| 34             | 17:00:03    | 17:00:57                | 0:00:54 |
| 35             | 17:03:02    | 17:05:10                | 0:02:08 |
| 36             | 17:03:55    | 17:05:45                | 0:01:50 |
| 37             | 17:03:58    | 17:06:20                | 0:02:22 |
| 38             | 17:04:25    | 17:07:36                | 0:03:11 |
| 39             | 17:06:24    | 17:07:44                | 0:01:20 |
| 40             | 17:06:58    | 17:07:54                | 0:00:56 |
| 41             | 17:07:33    | 17:09:20                | 0:01:47 |
| 42             | 17:08:30    | 17:09:22                | 0:00:52 |
| 43             | 17:11:12    | 17:11:18                | 0:00:06 |
| 44             | 17:11:52    | 17:14:09                | 0:02:17 |
| 45             | 17:12:04    | 17:14:22                | 0:02:18 |
| 46             | 17:13:40    | 17:14:53                | 0:01:13 |
| 47             | 17:14:18    | 17:14:55                | 0:00:37 |

Average intersection delay

0:00:55

Max Delay

0:03:11

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

# PRACTICE NOTE

## GAP ACCEPTANCE AT UNSIGNALISED INTERSECTIONS



### BACKGROUND

At unsignalised intersections, drivers on minor (ie opposed) movements must wait for a suitable gap in the opposing traffic flow before entering the intersection. There are several sources of guidance for the selection of gap acceptance parameters, with Austroads' Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2023) being a prominent example.

However, what drivers consider to be a suitable gap can vary significantly based on a range of different factors, including intersection geometry, posted speed, weather, time of day, vehicle type and occupancy, to name a few. It is also widely recognised that most drivers are prepared to accept smaller gaps in situations where opposing traffic volumes are high (with fewer large gaps available).

This behaviour is well supported by in-field gap acceptance studies and other relevant publications. For example, a 2000 study (Tian et al., 2000) found that *"with the increase of major stream volume or minor stream vehicle delay, drivers tend to seek smaller gaps."*

This was corroborated by a 2022 study (Li et al., 2022), which concluded that *"increased AADT on major roads correlated with increased probability of accepting a given gap. In [other] words, increased AADT correlated with shorter gaps overall."*

### MODELLING OF GAP ACCEPTANCE

The default gap acceptance parameters (ie critical gap and follow-up headway) adopted by SIDRA Intersection modelling software for priority-controlled intersections are consistent with those outlined in Austroads' Guide to Traffic Management Part 3: Transport Study and Analysis Methods (2020). However, recognising that the default gap acceptance parameters may not accurately reflect driver behaviour at priority-controlled intersections

with high opposing flow rates, SIDRA Intersection software allows these parameters to be calibrated by changing the "level of reduction with opposing flow rate" factor. For roundabouts, this calibration is performed automatically by SIDRA Intersection.

There are four possible values for "level of reduction with opposing flow rate" factor: "none", "low", "medium" and "high". The effect of this factor on the critical gap and follow-up headway parameters is shown in Figures 1 and 2, respectively.

FIGURE 1: EFFECT ON CRITICAL GAP

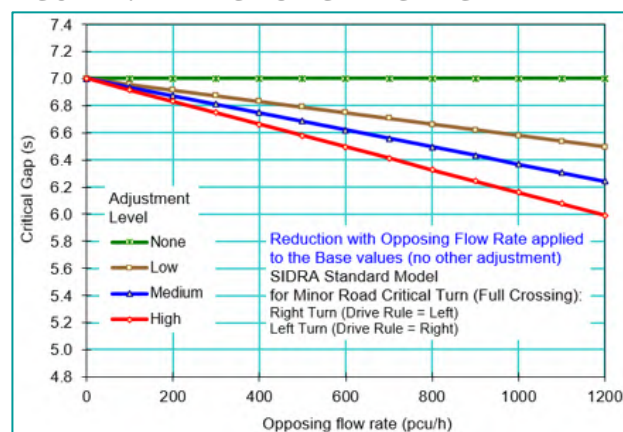
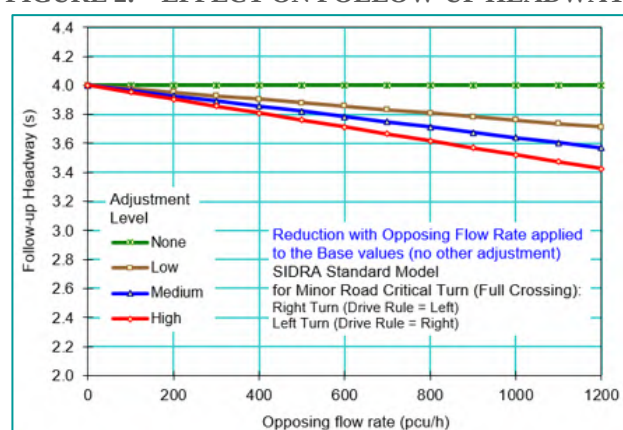


FIGURE 2: EFFECT ON FOLLOW-UP HEADWAY



# PRACTICE NOTE

## GAP ACCEPTANCE AT UNSIGNALISED INTERSECTIONS



As shown in Figures 1 and 2, for an opposing flow rate of 1,200 passenger car units per hour (pch/h), application of the calibration factor results in a 7-14% reduction in the critical gap and follow-up headway. The calibration factor has a smaller effect at lower opposing flow rates and a larger effect at higher opposing flow rates.

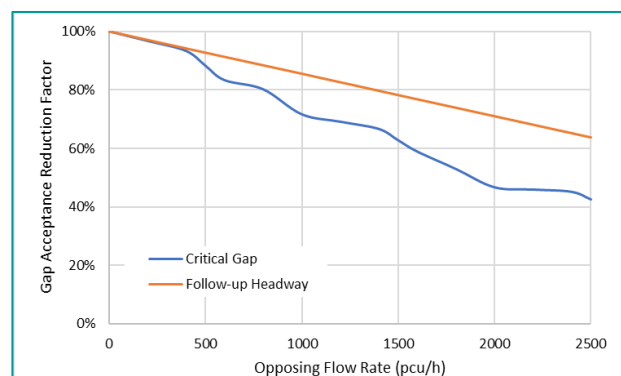
The SIDRA Intersection User Manual recommends that calibration of priority-controlled intersections be undertaken by adjusting gap acceptance parameters. This is Therefore, the use of the “*level of reduction with opposing flow rate*” factor to calibrate priority-controlled intersections is consistent with the SIDRA Intersection User Manual. However, SIDRA Intersection does not provide guidance on which of the four possible values of the factor (ie “none”, “low”, “medium” and “high”) should be used.

### AUSTROADS GUIDANCE

To inform the selection of an appropriate value for this calibration factor, guidance has been sourced from Austroads’ Guide to Traffic Engineering Practice Part 6: Roundabouts (1993). This document specifies various critical gap and follow-up headway values for vehicles entering roundabouts, based on a range of opposing circulating flow rates. Although these gap acceptance parameters cannot be directly applied to priority-controlled intersections, the relationship between opposing flow rate and gap acceptance is expected to be comparable at both types of intersections. Figure 3 summarises this relationship at roundabouts, as specified in the Austroads guide.

More recent Austroads guidelines continue to recognise the tendency for drivers to accept reduced gaps where opposing flow rates are high, but no longer provide guidance on specific gap acceptance reduction factors.

**FIGURE 3: AUSTROADS EFFECT OF OPPOSING FLOW RATE ON GAP ACCEPTANCE**



A comparison of Figure 3 with Figures 1 and 2 indicates that, even when adopting the highest possible value for the “*level of reduction with opposing flow rate*” factor (ie “high”), the SIDRA Intersection modelling software does not calibrate (ie reduce) critical gap and follow-up headway to the same extent as Austroads. Broadly speaking, the three possible values of this factor (ie “low”, “medium” and “high”, excluding “none”) are in the order of 35%, 55%, and 75% as impactful as the Austroads calibration values, respectively.

Therefore, SIDRA Intersection’s method of calibrating gap acceptance at priority-controlled intersections is likely to be inherently conservative.

### RECOMMENDED METHODOLOGY

To ensure a consistent and unbiased approach to assessing traffic operations at priority-controlled intersection, Table 1 can be used to guide the application of the “*level of reduction with opposing flow rate*” calibration factor. This table evenly distributes the range of opposing flow rates specified in the Austroads guidance (ie 0-2,500pcu/h) across the four possible values of the calibration factor, reflecting observations that higher opposing flow rates typically correspond to drivers accepting smaller gaps.

# PRACTICE NOTE

## GAP ACCEPTANCE AT UNSIGNALISED INTERSECTIONS



As outlined above, Austroads guidance suggests that even the highest value of this calibration factor (ie “high”) is likely to be conservative. Therefore, the recommended approach is likely to be highly conservative.

**TABLE 1: CALIBRATION FACTOR SELECTION**

| OPPOSING FLOW RATE  | CALIBRATION FACTOR VALUE |
|---------------------|--------------------------|
| 0 – 625 pcu/h       | None                     |
| 626 – 1,250 pcu/h   | Low                      |
| 1,251 – 1,875 pcu/h | Medium                   |
| 1,876+ pcu/h        | High                     |

### REFERENCES

Austroads (1993). *Guide to Traffic Engineering Practice Part 6: Roundabouts*, Sydney.

Austroads (2020). *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*, Sydney.

Austroads (2023). *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*, Sydney.

Austroads (2023). *Guide to Road Design Part 4B: Roundabouts*, Sydney.

Li, Y., Hao, H., Gibbons, R., & Medina, A. (2022). Analyzing Intersection Gap Acceptance Behavior with Naturalistic Driving Data. *National Surface Transportation Safety Centre for Excellence*, Virginia.

Tian, Z., et al. (2000). A Further Investigation on Critical Gap and Follow-Up Time. In *Fourth International Symposium on Highway Capacity* (pp. 397-408), 27 June to 1 July 2000, Hawaii.

### DISCLAIMER

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

## **APPENDIX C: SIDRA ANALYSES**

# USER REPORT FOR SITE

 **Project: Creek\_Fursden**

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

**Template: Default Site User Report**

## **Site: 101 [2026AM (Site Folder: Pre-Development)]**

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   |           |             |                  | [ Veh. veh        | Dist ] m |           |                |                     |             |
|                              |      |           | veh/h        |     | veh/h         |     | v/c       | sec         |                  |                   |          |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 2                            | T1   | All MCs   | 1228         | 4.0 | 1228          | 4.0 | 0.323     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.8        |
| 3                            | R2   | All MCs   | 41           | 4.0 | 41            | 4.0 | 0.075     | 9.1         | LOS A            | 0.3               | 1.9      | 0.54      | 0.73           | 0.54                | 49.8        |
| 3u                           | U    | All MCs   | 11           | 4.0 | 11            | 4.0 | 0.075     | 13.1        | LOS B            | 0.3               | 1.9      | 0.54      | 0.73           | 0.54                | 49.3        |
| Approach                     |      |           | 1280         | 4.0 | 1280          | 4.0 | 0.323     | 0.5         | NA               | 0.3               | 1.9      | 0.02      | 0.03           | 0.02                | 59.3        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 101          | 4.0 | 101           | 4.0 | 0.105     | 7.7         | LOS A            | 0.5               | 3.8      | 0.47      | 0.63           | 0.47                | 51.1        |
| 6                            | R2   | All MCs   | 74           | 4.0 | 74            | 4.0 | 0.497     | 39.6        | LOS E            | 1.8               | 13.2     | 0.92      | 1.05           | 1.26                | 35.5        |
| Approach                     |      |           | 175          | 4.0 | 175           | 4.0 | 0.497     | 21.2        | LOS C            | 1.8               | 13.2     | 0.66      | 0.81           | 0.80                | 43.1        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 34           | 4.0 | 34            | 4.0 | 0.250     | 5.6         | LOS A            | 0.0               | 0.0      | 0.00      | 0.04           | 0.00                | 56.8        |
| 8                            | T1   | All MCs   | 913          | 4.0 | 913           | 4.0 | 0.250     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.02           | 0.00                | 59.7        |
| 9u                           | U    | All MCs   | 1            | 4.0 | 1             | 4.0 | 0.003     | 15.4        | LOS C            | 0.0               | 0.1      | 0.69      | 0.71           | 0.69                | 46.0        |
| Approach                     |      |           | 948          | 4.0 | 948           | 4.0 | 0.250     | 0.3         | NA               | 0.0               | 0.1      | 0.00      | 0.02           | 0.00                | 59.5        |
| All Vehicles                 |      |           | 2404         | 4.0 | 2404          | 4.0 | 0.497     | 1.9         | NA               | 1.8               | 13.2     | 0.06      | 0.08           | 0.07                | 57.8        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2029AM (Site Folder: Pre-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |             |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of | Queue    | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   |           |             |                  | [ Veh. veh  | Dist ] m |           |                |                     |             |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |             |          |           |                |                     |             |
| 2                            | T1   | All MCs   | 1253         | 4.0 | 1253          | 4.0 | 0.330     | 0.1         | LOS A            | 0.0         | 0.0      | 0.00      | 0.00           | 0.00                | 59.8        |
| 3                            | R2   | All MCs   | 42           | 4.0 | 42            | 4.0 | 0.077     | 9.2         | LOS A            | 0.3         | 1.9      | 0.54      | 0.74           | 0.54                | 49.7        |
| 3u                           | U    | All MCs   | 11           | 4.0 | 11            | 4.0 | 0.077     | 13.3        | LOS B            | 0.3         | 1.9      | 0.54      | 0.74           | 0.54                | 49.3        |
| Approach                     |      |           | 1306         | 4.0 | 1306          | 4.0 | 0.330     | 0.5         | NA               | 0.3         | 1.9      | 0.02      | 0.03           | 0.02                | 59.3        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |             |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 103          | 4.0 | 103           | 4.0 | 0.108     | 7.8         | LOS A            | 0.5         | 3.9      | 0.47      | 0.63           | 0.47                | 51.1        |
| 6                            | R2   | All MCs   | 75           | 4.0 | 75            | 4.0 | 0.519     | 41.5        | LOS E            | 1.9         | 13.8     | 0.93      | 1.06           | 1.29                | 34.9        |
| Approach                     |      |           | 178          | 4.0 | 178           | 4.0 | 0.519     | 22.0        | LOS C            | 1.9         | 13.8     | 0.67      | 0.81           | 0.82                | 42.7        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |             |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 35           | 4.0 | 35            | 4.0 | 0.255     | 5.6         | LOS A            | 0.0         | 0.0      | 0.00      | 0.04           | 0.00                | 56.8        |
| 8                            | T1   | All MCs   | 932          | 4.0 | 932           | 4.0 | 0.255     | 0.1         | LOS A            | 0.0         | 0.0      | 0.00      | 0.02           | 0.00                | 59.7        |
| 9u                           | U    | All MCs   | 1            | 4.0 | 1             | 4.0 | 0.003     | 15.7        | LOS C            | 0.0         | 0.1      | 0.70      | 0.71           | 0.70                | 45.8        |
| Approach                     |      |           | 968          | 4.0 | 968           | 4.0 | 0.255     | 0.3         | NA               | 0.0         | 0.1      | 0.00      | 0.02           | 0.00                | 59.5        |
| All Vehicles                 |      |           | 2453         | 4.0 | 2453          | 4.0 | 0.519     | 2.0         | NA               | 1.9         | 13.8     | 0.06      | 0.08           | 0.07                | 57.8        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2039AM (Site Folder: Pre-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | Dist ] m |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 2                            | T1   | All MCs   | 1313         | 4.0 | 1313          | 4.0 | 0.346     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.8        |
| 3                            | R2   | All MCs   | 44           | 4.0 | 44            | 4.0 | 0.085     | 9.4         | LOS A            | 0.3               | 2.1      | 0.57      | 0.76           | 0.57                | 49.5        |
| 3u                           | U    | All MCs   | 12           | 4.0 | 12            | 4.0 | 0.085     | 13.7        | LOS B            | 0.3               | 2.1      | 0.57      | 0.76           | 0.57                | 49.1        |
| Approach                     |      |           | 1370         | 4.0 | 1370          | 4.0 | 0.346     | 0.5         | NA               | 0.3               | 2.1      | 0.02      | 0.03           | 0.02                | 59.3        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 110          | 4.0 | 110           | 4.0 | 0.118     | 8.0         | LOS A            | 0.6               | 4.2      | 0.49      | 0.64           | 0.49                | 51.0        |
| 6                            | R2   | All MCs   | 79           | 4.0 | 79            | 4.0 | 0.588     | 47.4        | LOS E            | 2.2               | 16.0     | 0.94      | 1.09           | 1.39                | 33.0        |
| Approach                     |      |           | 190          | 4.0 | 190           | 4.0 | 0.588     | 24.4        | LOS C            | 2.2               | 16.0     | 0.68      | 0.83           | 0.87                | 41.5        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 36           | 4.0 | 36            | 4.0 | 0.267     | 5.7         | LOS A            | 0.0               | 0.0      | 0.00      | 0.04           | 0.00                | 56.8        |
| 8                            | T1   | All MCs   | 977          | 4.0 | 977           | 4.0 | 0.267     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.02           | 0.00                | 59.7        |
| 9u                           | U    | All MCs   | 1            | 4.0 | 1             | 4.0 | 0.003     | 16.4        | LOS C            | 0.0               | 0.1      | 0.72      | 0.72           | 0.72                | 45.4        |
| Approach                     |      |           | 1014         | 4.0 | 1014          | 4.0 | 0.267     | 0.3         | NA               | 0.0               | 0.1      | 0.00      | 0.02           | 0.00                | 59.5        |
| All Vehicles                 |      |           | 2574         | 4.0 | 2574          | 4.0 | 0.588     | 2.2         | NA               | 2.2               | 16.0     | 0.06      | 0.09           | 0.08                | 57.6        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2026PM (Site Folder: Pre-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |            |                |                     |             |      |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|------------|----------------|---------------------|-------------|------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue | Prop. Que  | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |      |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh ]      | [ Dist ] m |                |                     |             | km/h |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |            |                |                     |             |      |
| 2                            | T1   | All MCs   | 866          | 1.4 | 866           | 1.4 | 0.224     | 0.1         | LOS A            | 0.0               | 0.0        | 0.00           | 0.00                | 0.00        | 59.9 |
| 3                            | R2   | All MCs   | 68           | 1.4 | 68            | 1.4 | 0.171     | 14.0        | LOS B            | 0.5               | 3.8        | 0.79           | 0.91                | 0.79        | 46.9 |
| 3u                           | U    | All MCs   | 5            | 1.4 | 5             | 1.4 | 0.171     | 22.2        | LOS C            | 0.5               | 3.8        | 0.79           | 0.91                | 0.79        | 46.5 |
| Approach                     |      |           | 940          | 1.4 | 940           | 1.4 | 0.224     | 1.2         | NA               | 0.5               | 3.8        | 0.06           | 0.07                | 0.06        | 58.6 |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |            |                |                     |             |      |
| 4                            | L2   | All MCs   | 86           | 1.4 | 86            | 1.4 | 0.107     | 9.1         | LOS A            | 0.5               | 3.5        | 0.57           | 0.71                | 0.57        | 50.3 |
| 6                            | R2   | All MCs   | 47           | 1.4 | 47            | 1.4 | 0.460     | 54.2        | LOS F            | 1.5               | 10.9       | 0.95           | 1.04                | 1.19        | 31.2 |
| Approach                     |      |           | 133          | 1.4 | 133           | 1.4 | 0.460     | 25.0        | LOS D            | 1.5               | 10.9       | 0.70           | 0.83                | 0.79        | 41.3 |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |            |                |                     |             |      |
| 7                            | L2   | All MCs   | 192          | 1.4 | 192           | 1.4 | 0.453     | 5.7         | LOS A            | 0.0               | 0.0        | 0.00           | 0.13                | 0.00        | 56.1 |
| 8                            | T1   | All MCs   | 1548         | 1.4 | 1548          | 1.4 | 0.453     | 0.2         | LOS A            | 0.0               | 0.0        | 0.00           | 0.06                | 0.00        | 59.2 |
| 9u                           | U    | All MCs   | 14           | 1.4 | 14            | 1.4 | 0.027     | 12.2        | LOS B            | 0.1               | 0.6        | 0.56           | 0.75                | 0.56        | 48.0 |
| Approach                     |      |           | 1754         | 1.4 | 1754          | 1.4 | 0.453     | 0.9         | NA               | 0.1               | 0.6        | 0.00           | 0.07                | 0.00        | 58.7 |
| All Vehicles                 |      |           | 2827         | 1.4 | 2827          | 1.4 | 0.460     | 2.1         | NA               | 1.5               | 10.9       | 0.06           | 0.11                | 0.06        | 57.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2029PM (Site Folder: Pre-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |            |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|------------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |            | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh ]      | [ Dist ] m |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |            |           |                |                     |             |
| 2                            | T1   | All MCs   | 884          | 1.4 | 884           | 1.4 | 0.229     | 0.1         | LOS A            | 0.0               | 0.0        | 0.00      | 0.00           | 0.00                | 59.9        |
| 3                            | R2   | All MCs   | 69           | 1.4 | 69            | 1.4 | 0.178     | 14.3        | LOS B            | 0.6               | 4.0        | 0.79      | 0.91           | 0.79                | 46.7        |
| 3u                           | U    | All MCs   | 5            | 1.4 | 5             | 1.4 | 0.178     | 22.9        | LOS C            | 0.6               | 4.0        | 0.79      | 0.91           | 0.79                | 46.3        |
| Approach                     |      |           | 958          | 1.4 | 958           | 1.4 | 0.229     | 1.2         | NA               | 0.6               | 4.0        | 0.06      | 0.07           | 0.06                | 58.6        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |            |           |                |                     |             |
| 4                            | L2   | All MCs   | 88           | 1.4 | 88            | 1.4 | 0.111     | 9.2         | LOS A            | 0.5               | 3.6        | 0.57      | 0.72           | 0.57                | 50.2        |
| 6                            | R2   | All MCs   | 48           | 1.4 | 48            | 1.4 | 0.486     | 57.1        | LOS F            | 1.6               | 11.5       | 0.96      | 1.04           | 1.21                | 30.4        |
| Approach                     |      |           | 136          | 1.4 | 136           | 1.4 | 0.486     | 26.1        | LOS D            | 1.6               | 11.5       | 0.71      | 0.83           | 0.80                | 40.8        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |            |           |                |                     |             |
| 7                            | L2   | All MCs   | 196          | 1.4 | 196           | 1.4 | 0.462     | 5.7         | LOS A            | 0.0               | 0.0        | 0.00      | 0.13           | 0.00                | 56.1        |
| 8                            | T1   | All MCs   | 1579         | 1.4 | 1579          | 1.4 | 0.462     | 0.2         | LOS A            | 0.0               | 0.0        | 0.00      | 0.06           | 0.00                | 59.1        |
| 9u                           | U    | All MCs   | 14           | 1.4 | 14            | 1.4 | 0.028     | 12.3        | LOS B            | 0.1               | 0.6        | 0.57      | 0.76           | 0.57                | 47.9        |
| Approach                     |      |           | 1789         | 1.4 | 1789          | 1.4 | 0.462     | 0.9         | NA               | 0.1               | 0.6        | 0.00      | 0.07           | 0.00                | 58.7        |
| All Vehicles                 |      |           | 2883         | 1.4 | 2883          | 1.4 | 0.486     | 2.2         | NA               | 1.6               | 11.5       | 0.06      | 0.11           | 0.06                | 57.5        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2039PM (Site Folder: Pre-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |      |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue | Dist | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | m    |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |      |           |                |                     |             |
| 2                            | T1   | All MCs   | 928          | 1.4 | 928           | 1.4 | 0.240     | 0.1         | LOS A            | 0.0               | 0.0  | 0.00      | 0.00           | 0.00                | 59.9        |
| 3                            | R2   | All MCs   | 73           | 1.4 | 73            | 1.4 | 0.201     | 15.3        | LOS C            | 0.6               | 4.5  | 0.82      | 0.93           | 0.83                | 46.1        |
| 3u                           | U    | All MCs   | 5            | 1.4 | 5             | 1.4 | 0.201     | 24.7        | LOS C            | 0.6               | 4.5  | 0.82      | 0.93           | 0.83                | 45.7        |
| Approach                     |      |           | 1006         | 1.4 | 1006          | 1.4 | 0.240     | 1.3         | NA               | 0.6               | 4.5  | 0.06      | 0.07           | 0.07                | 58.5        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |      |           |                |                     |             |
| 4                            | L2   | All MCs   | 92           | 1.4 | 92            | 1.4 | 0.120     | 9.4         | LOS A            | 0.6               | 3.9  | 0.59      | 0.73           | 0.59                | 50.0        |
| 6                            | R2   | All MCs   | 50           | 1.4 | 50            | 1.4 | 0.545     | 65.1        | LOS F            | 1.9               | 13.1 | 0.96      | 1.06           | 1.27                | 28.5        |
| Approach                     |      |           | 142          | 1.4 | 142           | 1.4 | 0.545     | 29.1        | LOS D            | 1.9               | 13.1 | 0.72      | 0.85           | 0.83                | 39.5        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |      |           |                |                     |             |
| 7                            | L2   | All MCs   | 205          | 1.4 | 205           | 1.4 | 0.484     | 5.7         | LOS A            | 0.0               | 0.0  | 0.00      | 0.13           | 0.00                | 56.0        |
| 8                            | T1   | All MCs   | 1656         | 1.4 | 1656          | 1.4 | 0.484     | 0.2         | LOS A            | 0.0               | 0.0  | 0.00      | 0.06           | 0.00                | 59.1        |
| 9u                           | U    | All MCs   | 15           | 1.4 | 15            | 1.4 | 0.031     | 12.7        | LOS B            | 0.1               | 0.7  | 0.59      | 0.77           | 0.59                | 47.6        |
| Approach                     |      |           | 1877         | 1.4 | 1877          | 1.4 | 0.484     | 0.9         | NA               | 0.1               | 0.7  | 0.00      | 0.07           | 0.00                | 58.6        |
| All Vehicles                 |      |           | 3024         | 1.4 | 3024          | 1.4 | 0.545     | 2.4         | NA               | 1.9               | 13.1 | 0.06      | 0.11           | 0.06                | 57.3        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2029AM (Site Folder: Post-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh ]      | Dist ] m |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 2                            | T1   | All MCs   | 1253         | 4.0 | 1253          | 4.0 | 0.330     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.8        |
| 3                            | R2   | All MCs   | 63           | 4.0 | 63            | 4.0 | 0.104     | 9.3         | LOS A            | 0.4               | 2.7      | 0.55      | 0.75           | 0.55                | 49.8        |
| 3u                           | U    | All MCs   | 11           | 4.0 | 11            | 4.0 | 0.104     | 13.4        | LOS B            | 0.4               | 2.7      | 0.55      | 0.75           | 0.55                | 49.3        |
| Approach                     |      |           | 1327         | 4.0 | 1327          | 4.0 | 0.330     | 0.7         | NA               | 0.4               | 2.7      | 0.03      | 0.04           | 0.03                | 59.1        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 130          | 4.0 | 130           | 4.0 | 0.135     | 7.8         | LOS A            | 0.7               | 4.9      | 0.48      | 0.64           | 0.48                | 51.1        |
| 6                            | R2   | All MCs   | 98           | 4.0 | 98            | 4.0 | 0.687     | 51.2        | LOS F            | 2.9               | 20.9     | 0.95      | 1.14           | 1.62                | 32.0        |
| Approach                     |      |           | 228          | 4.0 | 228           | 4.0 | 0.687     | 26.4        | LOS D            | 2.9               | 20.9     | 0.68      | 0.85           | 0.97                | 40.6        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 52           | 4.0 | 52            | 4.0 | 0.259     | 5.7         | LOS A            | 0.0               | 0.0      | 0.00      | 0.06           | 0.00                | 56.7        |
| 8                            | T1   | All MCs   | 932          | 4.0 | 932           | 4.0 | 0.259     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.03           | 0.00                | 59.6        |
| 9u                           | U    | All MCs   | 1            | 4.0 | 1             | 4.0 | 0.003     | 15.7        | LOS C            | 0.0               | 0.1      | 0.70      | 0.71           | 0.70                | 45.8        |
| Approach                     |      |           | 985          | 4.0 | 985           | 4.0 | 0.259     | 0.4         | NA               | 0.0               | 0.1      | 0.00      | 0.03           | 0.00                | 59.4        |
| All Vehicles                 |      |           | 2539         | 4.0 | 2539          | 4.0 | 0.687     | 2.9         | NA               | 2.9               | 20.9     | 0.08      | 0.11           | 0.10                | 56.9        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2029PM (Site Folder: Post-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | Dist ] m |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 2                            | T1   | All MCs   | 884          | 1.4 | 884           | 1.4 | 0.229     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.9        |
| 3                            | R2   | All MCs   | 83           | 1.4 | 83            | 1.4 | 0.213     | 14.9        | LOS B            | 0.7               | 4.9      | 0.81      | 0.92           | 0.83                | 46.4        |
| 3u                           | U    | All MCs   | 5            | 1.4 | 5             | 1.4 | 0.213     | 23.5        | LOS C            | 0.7               | 4.9      | 0.81      | 0.92           | 0.83                | 46.0        |
| Approach                     |      |           | 971          | 1.4 | 971           | 1.4 | 0.229     | 1.5         | NA               | 0.7               | 4.9      | 0.07      | 0.08           | 0.08                | 58.3        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 109          | 1.4 | 109           | 1.4 | 0.136     | 9.1         | LOS A            | 0.6               | 4.5      | 0.57      | 0.72           | 0.57                | 50.3        |
| 6                            | R2   | All MCs   | 59           | 1.4 | 59            | 1.4 | 0.614     | 67.2        | LOS F            | 2.2               | 15.6     | 0.97      | 1.08           | 1.37                | 28.1        |
| Approach                     |      |           | 168          | 1.4 | 168           | 1.4 | 0.614     | 29.5        | LOS D            | 2.2               | 15.6     | 0.71      | 0.85           | 0.85                | 39.3        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 230          | 1.4 | 230           | 1.4 | 0.471     | 5.7         | LOS A            | 0.0               | 0.0      | 0.00      | 0.15           | 0.00                | 55.9        |
| 8                            | T1   | All MCs   | 1579         | 1.4 | 1579          | 1.4 | 0.471     | 0.2         | LOS A            | 0.0               | 0.0      | 0.00      | 0.06           | 0.00                | 59.1        |
| 9u                           | U    | All MCs   | 14           | 1.4 | 14            | 1.4 | 0.028     | 12.3        | LOS B            | 0.1               | 0.6      | 0.57      | 0.76           | 0.57                | 47.9        |
| Approach                     |      |           | 1824         | 1.4 | 1824          | 1.4 | 0.471     | 1.0         | NA               | 0.1               | 0.6      | 0.00      | 0.08           | 0.00                | 58.5        |
| All Vehicles                 |      |           | 2963         | 1.4 | 2963          | 1.4 | 0.614     | 2.8         | NA               | 2.2               | 15.6     | 0.07      | 0.13           | 0.08                | 56.9        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2039AM (Site Folder: Post-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | Dist ] m |           |                |                     | km/h        |
| South: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 2                            | T1   | All MCs   | 1313         | 4.0 | 1313          | 4.0 | 0.346     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.8        |
| 3                            | R2   | All MCs   | 65           | 4.0 | 65            | 4.0 | 0.113     | 9.6         | LOS A            | 0.4               | 2.9      | 0.57      | 0.77           | 0.57                | 49.5        |
| 3u                           | U    | All MCs   | 12           | 4.0 | 12            | 4.0 | 0.113     | 13.9        | LOS B            | 0.4               | 2.9      | 0.57      | 0.77           | 0.57                | 49.1        |
| Approach                     |      |           | 1391         | 4.0 | 1391          | 4.0 | 0.346     | 0.7         | NA               | 0.4               | 2.9      | 0.03      | 0.04           | 0.03                | 59.1        |
| East: Fursden Road           |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 135          | 4.0 | 135           | 4.0 | 0.143     | 8.0         | LOS A            | 0.7               | 5.2      | 0.49      | 0.65           | 0.49                | 51.0        |
| 6                            | R2   | All MCs   | 101          | 4.0 | 101           | 4.0 | 0.760     | 61.2        | LOS F            | 3.4               | 24.5     | 0.97      | 1.20           | 1.82                | 29.4        |
| Approach                     |      |           | 236          | 4.0 | 236           | 4.0 | 0.760     | 30.7        | LOS D            | 3.4               | 24.5     | 0.69      | 0.88           | 1.06                | 38.8        |
| North: Creek Road            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 54           | 4.0 | 54            | 4.0 | 0.272     | 5.7         | LOS A            | 0.0               | 0.0      | 0.00      | 0.06           | 0.00                | 56.7        |
| 8                            | T1   | All MCs   | 977          | 4.0 | 977           | 4.0 | 0.272     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.03           | 0.00                | 59.6        |
| 9u                           | U    | All MCs   | 1            | 4.0 | 1             | 4.0 | 0.003     | 16.4        | LOS C            | 0.0               | 0.1      | 0.72      | 0.72           | 0.72                | 45.4        |
| Approach                     |      |           | 1032         | 4.0 | 1032          | 4.0 | 0.272     | 0.4         | NA               | 0.0               | 0.1      | 0.00      | 0.03           | 0.00                | 59.4        |
| All Vehicles                 |      |           | 2659         | 4.0 | 2659          | 4.0 | 0.760     | 3.2         | NA               | 3.4               | 24.5     | 0.08      | 0.11           | 0.11                | 56.6        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## Site: 101 [2039PM (Site Folder: Post-Development)]

Creek Road/Fursden Road Intersection

Site Category: (None)

Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |                                         |     |                                          |     |                      |                        |                  |                                 |             |           |                |                     |                         |
|------------------------------|------|-----------|-----------------------------------------|-----|------------------------------------------|-----|----------------------|------------------------|------------------|---------------------------------|-------------|-----------|----------------|---------------------|-------------------------|
| Mov ID                       | Turn | Mov Class | Demand Flows<br>[ Total HV ]<br>veh/h % |     | Arrival Flows<br>[ Total HV ]<br>veh/h % |     | Deg. Satn<br><br>v/c | Aver. Delay<br><br>sec | Level of Service | 95% Back Of Queue<br>[ Veh. veh | Dist ]<br>m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed<br><br>km/h |
| South: Creek Road            |      |           |                                         |     |                                          |     |                      |                        |                  |                                 |             |           |                |                     |                         |
| 2                            | T1   | All MCs   | 928                                     | 1.4 | 928                                      | 1.4 | 0.240                | 0.1                    | LOS A            | 0.0                             | 0.0         | 0.00      | 0.00           | 0.00                | 59.9                    |
| 3                            | R2   | All MCs   | 87                                      | 1.4 | 87                                       | 1.4 | 0.239                | 16.0                   | LOS C            | 0.8                             | 5.6         | 0.83      | 0.94           | 0.88                | 45.8                    |
| 3u                           | U    | All MCs   | 5                                       | 1.4 | 5                                        | 1.4 | 0.239                | 25.5                   | LOS D            | 0.8                             | 5.6         | 0.83      | 0.94           | 0.88                | 45.4                    |
| Approach                     |      |           | 1019                                    | 1.4 | 1019                                     | 1.4 | 0.240                | 1.5                    | NA               | 0.8                             | 5.6         | 0.07      | 0.08           | 0.08                | 58.2                    |
| East: Fursden Road           |      |           |                                         |     |                                          |     |                      |                        |                  |                                 |             |           |                |                     |                         |
| 4                            | L2   | All MCs   | 113                                     | 1.4 | 113                                      | 1.4 | 0.145                | 9.4                    | LOS A            | 0.7                             | 4.8         | 0.59      | 0.74           | 0.59                | 50.1                    |
| 6                            | R2   | All MCs   | 61                                      | 1.4 | 61                                       | 1.4 | 0.683                | 78.8                   | LOS F            | 2.5                             | 17.9        | 0.98      | 1.11           | 1.48                | 25.8                    |
| Approach                     |      |           | 174                                     | 1.4 | 174                                      | 1.4 | 0.683                | 33.8                   | LOS D            | 2.5                             | 17.9        | 0.72      | 0.87           | 0.90                | 37.6                    |
| North: Creek Road            |      |           |                                         |     |                                          |     |                      |                        |                  |                                 |             |           |                |                     |                         |
| 7                            | L2   | All MCs   | 240                                     | 1.4 | 240                                      | 1.4 | 0.494                | 5.7                    | LOS A            | 0.0                             | 0.0         | 0.00      | 0.15           | 0.00                | 55.9                    |
| 8                            | T1   | All MCs   | 1656                                    | 1.4 | 1656                                     | 1.4 | 0.494                | 0.2                    | LOS A            | 0.0                             | 0.0         | 0.00      | 0.06           | 0.00                | 59.0                    |
| 9u                           | U    | All MCs   | 15                                      | 1.4 | 15                                       | 1.4 | 0.031                | 12.7                   | LOS B            | 0.1                             | 0.7         | 0.59      | 0.77           | 0.59                | 47.6                    |
| Approach                     |      |           | 1911                                    | 1.4 | 1911                                     | 1.4 | 0.494                | 1.0                    | NA               | 0.1                             | 0.7         | 0.00      | 0.08           | 0.00                | 58.5                    |
| All Vehicles                 |      |           | 3105                                    | 1.4 | 3105                                     | 1.4 | 0.683                | 3.0                    | NA               | 2.5                             | 17.9        | 0.07      | 0.13           | 0.08                | 56.7                    |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

**SIDRA INTERSECTION 9.1 | Copyright © 2000-2023 Akcelik and Associates Pty Ltd | sidrasolutions.com**

Organisation: PEKOL TRAFFIC AND TRANSPORT | Licence: NETWORK / 1PC | Created: Friday, 26 June 2026 12:37:32 PM

Project: P:\2025-26\26-520 141 Fursden Road, Carina\Calcs\Creek\_Fursden.sip9

## **APPENDIX D: DEVELOPMENT PLANS**



### Site Cover

|                                     |             |
|-------------------------------------|-------------|
| Total Site Area                     | 13 570 msq  |
| Multiple Dwelling Site Area         | 12 120 msq  |
| Childcare Centre Site Area          | 1 450 msq   |
| Density (Multiple Dwelling/Hectare) | 59.41 m/h   |
| Total Number of Multiple Dwelling   | 72          |
| Multiple Dwelling Site Cover        | 4 525.3 msq |
| % of Multiple Dwelling Site Cover   | 37.3%       |

### Internal Road Details

|                     |             |
|---------------------|-------------|
| Area of New Roads   | 2 698.6 msq |
| Length of New Roads | 452.1 m     |

### Landscaping Details

Landscaping is indicative only. Refer to Landscaping Plans by Saunders Havill

### Multiple Dwelling Open Space

|                                            |             |
|--------------------------------------------|-------------|
| Multiple Dwelling Communal Open Space      | 605.6 msq   |
| % of Multiple Dwelling Site                | 5.0 %       |
| Multiple Dwelling Deep Planting Open Space | 1 224.9 msq |
| % of Multiple Dwelling Site                | 10.1 %      |
| Multiple Dwelling Private Open Space       | 2 794.6 msq |
| % of Multiple Dwelling Site                | 23.3 %      |
| Multiple Dwelling Total Open Space         | 4 625.1 msq |
| % of Multiple Dwelling Site                | 38.3 %      |

### Legend

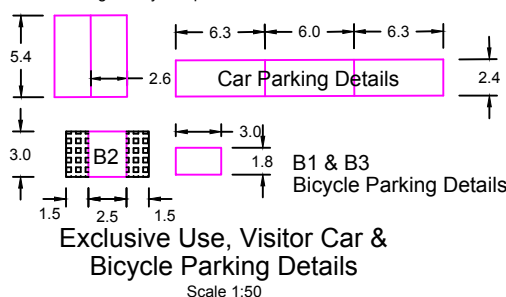
|  |                   |
|--|-------------------|
|  | Manager's Office  |
|  | 2 Storey Townhome |
|  | 3 Storey Townhome |

### Multiple Dwelling Private Open Space Areas

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| Lot 1 - 35.6 msq  | Lot 16 - 38.8 msq | Lot 31 - 43.8 msq | Lot 46 - 39.6 msq | Lot 60 - 40.1 msq |
| Lot 2 - 38.7 msq  | Lot 17 - 36.0 msq | Lot 32 - 47.4 msq | Lot 47 - 39.6 msq | Lot 61 - 40.1 msq |
| Lot 3 - 35.2 msq  | Lot 18 - 36.0 msq | Lot 33 - 51.2 msq | Lot 48 - 40.1 msq | Lot 62 - 39.6 msq |
| Lot 4 - 39.0 msq  | Lot 19 - 36.0 msq | Lot 34 - 51.2 msq | Lot 49 - 40.1 msq | Lot 63 - 39.6 msq |
| Lot 5 - 36.2 msq  | Lot 20 - 35.2 msq | Lot 35 - 47.4 msq | Lot 50 - 39.6 msq | Lot 64 - 39.6 msq |
| Lot 6 - 39.9 msq  | Lot 21 - 35.3 msq | Lot 36 - 46.1 msq | Lot 51 - 39.6 msq | Lot 65 - 39.6 msq |
| Lot 7 - 39.9 msq  | Lot 22 - 37.6 msq | Lot 37 - 40.1 msq | Lot 52 - 39.6 msq | Lot 66 - 40.1 msq |
| Lot 8 - 35.1 msq  | Lot 23 - 36.7 msq | Lot 38 - 39.6 msq | Lot 53 - 39.6 msq | Lot 67 - 40.1 msq |
| Lot 9 - 36.4 msq  | Lot 24 - 35.1 msq | Lot 39 - 39.6 msq | Lot 54 - 40.1 msq | Lot 68 - 39.6 msq |
| Lot 10 - 35.0 msq | Lot 25 - 37.5 msq | Lot 40 - 39.6 msq | Lot 55 - 40.1 msq | Lot 69 - 39.6 msq |
| Lot 11 - 38.8 msq | Lot 26 - 40.3 msq | Lot 41 - 39.6 msq | Lot 56 - 39.6 msq | Lot 70 - 39.6 msq |
| Lot 12 - 36.0 msq | Lot 27 - 49.9 msq | Lot 42 - 40.1 msq | Lot 57 - 39.6 msq | Lot 71 - 39.6 msq |
| Lot 13 - 36.0 msq | Lot 28 - 51.4 msq | Lot 43 - 40.1 msq | Lot 58 - 39.6 msq | Lot 72 - 40.1 msq |
| Lot 14 - 38.6 msq | Lot 29 - 47.4 msq | Lot 44 - 39.6 msq | Lot 59 - 39.6 msq |                   |
| Lot 15 - 35.1 msq | Lot 30 - 43.8 msq | Lot 45 - 39.6 msq |                   |                   |

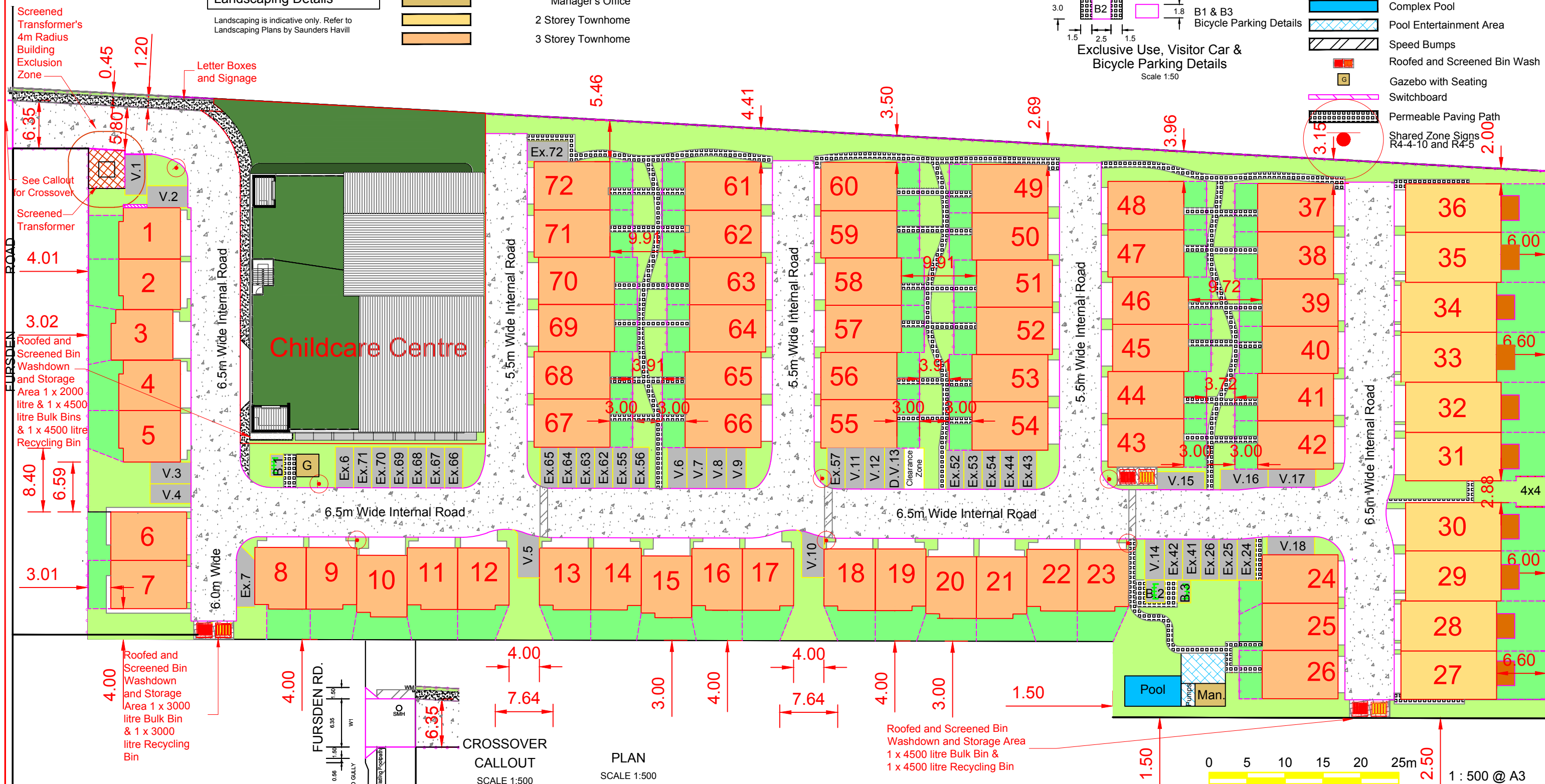
### Multiple Dwelling Parking

|                                                                |     |
|----------------------------------------------------------------|-----|
| Garaging                                                       | 144 |
| Exclusive use bays (Ex.)                                       | 26  |
| Visitor's bays (V.) (Including 1 Disabled Visitor Parking Bay) | 18  |
| Carparking Total                                               | 188 |
| Bicycle Parking                                                |     |
| - B1 Bicycle spaces                                            | 6   |
| - B2 Bicycle spaces                                            | 10  |
| - B3 Bicycle spaces                                            | 6   |
| - Garaged Bicycle Spaces                                       | 72  |



### Legend

|  |                                    |
|--|------------------------------------|
|  | 1 Lot Number                       |
|  | 1.2m high Pool Fence               |
|  | 1.8m high Timber Fence             |
|  | Proposed New Kerb                  |
|  | Open Space                         |
|  | Private Use Open Space             |
|  | Internal Road                      |
|  | Internal Parking                   |
|  | Complex Pool                       |
|  | Pool Entertainment Area            |
|  | Speed Bumps                        |
|  | Roofed and Screened Bin Wash       |
|  | Gazebo with Seating                |
|  | Switchboard                        |
|  | Permeable Paving Path              |
|  | Shared Zone Signs R4-4-10 and R4-5 |





### Site Cover

|                                     |             |
|-------------------------------------|-------------|
| Total Site Area                     | 13 570 msq  |
| Multiple Dwelling Site Area         | 12 120 msq  |
| Childcare Centre Site Area          | 1 450 msq   |
| Density (Multiple Dwelling/Hectare) | 59.41 m/h   |
| Total Number of Multiple Dwelling   | 72          |
| Multiple Dwelling Site Cover        | 4 525.3 msq |
| % of Multiple Dwelling Site Cover   | 37.3%       |

### Internal Road Details

|                     |             |
|---------------------|-------------|
| Area of New Roads   | 2 698.6 msq |
| Length of New Roads | 452.1 m     |

### Landscaping Details

Landscaping is indicative only. Refer to Landscaping Plans by Saunders Havill

### Multiple Dwelling Open Space

|                                            |             |
|--------------------------------------------|-------------|
| Multiple Dwelling Communal Open Space      | 605.6 msq   |
| % of Multiple Dwelling Site                | 5.0 %       |
| Multiple Dwelling Deep Planting Open Space | 1 224.9 msq |
| % of Multiple Dwelling Site                | 10.1 %      |
| Multiple Dwelling Private Open Space       | 2 794.6 msq |
| % of Multiple Dwelling Site                | 23.3 %      |
| Multiple Dwelling Total Open Space         | 4 625.1 msq |
| % of Multiple Dwelling Site                | 38.3 %      |

### Legend

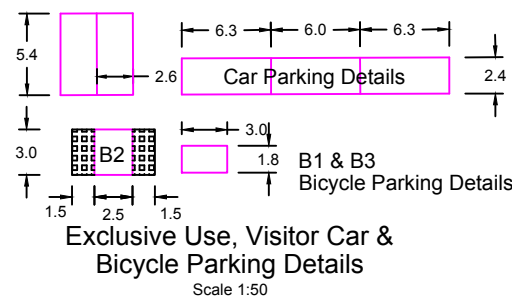
|  |                   |
|--|-------------------|
|  | Manager's Office  |
|  | 2 Storey Townhome |
|  | 3 Storey Townhome |

### Multiple Dwelling Private Open Space Areas

|                   |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| Lot 1 - 35.6 msq  | Lot 16 - 38.8 msq | Lot 31 - 43.8 msq | Lot 46 - 39.6 msq | Lot 60 - 40.1 msq |
| Lot 2 - 38.7 msq  | Lot 17 - 36.0 msq | Lot 32 - 47.4 msq | Lot 47 - 39.6 msq | Lot 61 - 40.1 msq |
| Lot 3 - 35.2 msq  | Lot 18 - 36.0 msq | Lot 33 - 51.2 msq | Lot 48 - 40.1 msq | Lot 62 - 39.6 msq |
| Lot 4 - 39.0 msq  | Lot 19 - 36.0 msq | Lot 34 - 51.2 msq | Lot 49 - 40.1 msq | Lot 63 - 39.6 msq |
| Lot 5 - 36.2 msq  | Lot 20 - 35.2 msq | Lot 35 - 47.4 msq | Lot 50 - 39.6 msq | Lot 64 - 39.6 msq |
| Lot 6 - 39.9 msq  | Lot 21 - 35.3 msq | Lot 36 - 46.1 msq | Lot 51 - 39.6 msq | Lot 65 - 39.6 msq |
| Lot 7 - 39.9 msq  | Lot 22 - 37.6 msq | Lot 37 - 40.1 msq | Lot 52 - 39.6 msq | Lot 66 - 40.1 msq |
| Lot 8 - 35.1 msq  | Lot 23 - 36.7 msq | Lot 38 - 39.6 msq | Lot 53 - 39.6 msq | Lot 67 - 40.1 msq |
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| Lot 13 - 36.0 msq | Lot 28 - 51.4 msq | Lot 43 - 40.1 msq | Lot 58 - 39.6 msq | Lot 72 - 40.1 msq |
| Lot 14 - 38.6 msq | Lot 29 - 47.4 msq | Lot 44 - 39.6 msq | Lot 59 - 39.6 msq |                   |
| Lot 15 - 35.1 msq | Lot 30 - 43.8 msq | Lot 45 - 39.6 msq | Lot 60 - 40.1 msq |                   |

### Multiple Dwelling Parking

|                                                                |     |
|----------------------------------------------------------------|-----|
| Garaging                                                       | 144 |
| Exclusive use bays (Ex.)                                       | 26  |
| Visitor's bays (V.) (Including 1 Disabled Visitor Parking Bay) | 18  |
| Carparking Total                                               | 188 |
| Bicycle Parking                                                |     |
| - B1 Bicycle spaces                                            | 6   |
| - B2 Bicycle spaces                                            | 10  |
| - B3 Bicycle spaces                                            | 6   |
| - Garaged Bicycle Spaces                                       | 72  |



### Legend

|  |                                    |
|--|------------------------------------|
|  | 1 Lot Number                       |
|  | 1.2m high Pool Fence               |
|  | 1.8m high Timber Fence             |
|  | Proposed New Kerb                  |
|  | Open Space                         |
|  | Private Use Open Space             |
|  | Internal Road                      |
|  | Internal Parking                   |
|  | Complex Pool                       |
|  | Pool Entertainment Area            |
|  | Speed Bumps                        |
|  | Roofed and Screened Bin Wash       |
|  | Gazebo with Seating                |
|  | Switchboard                        |
|  | Permeable Paving Path              |
|  | Shared Zone Signs R4-4-10 and R4-5 |

Screened Transformer's 4m Radius Building Exclusion Zone

Letter Boxes and Signage

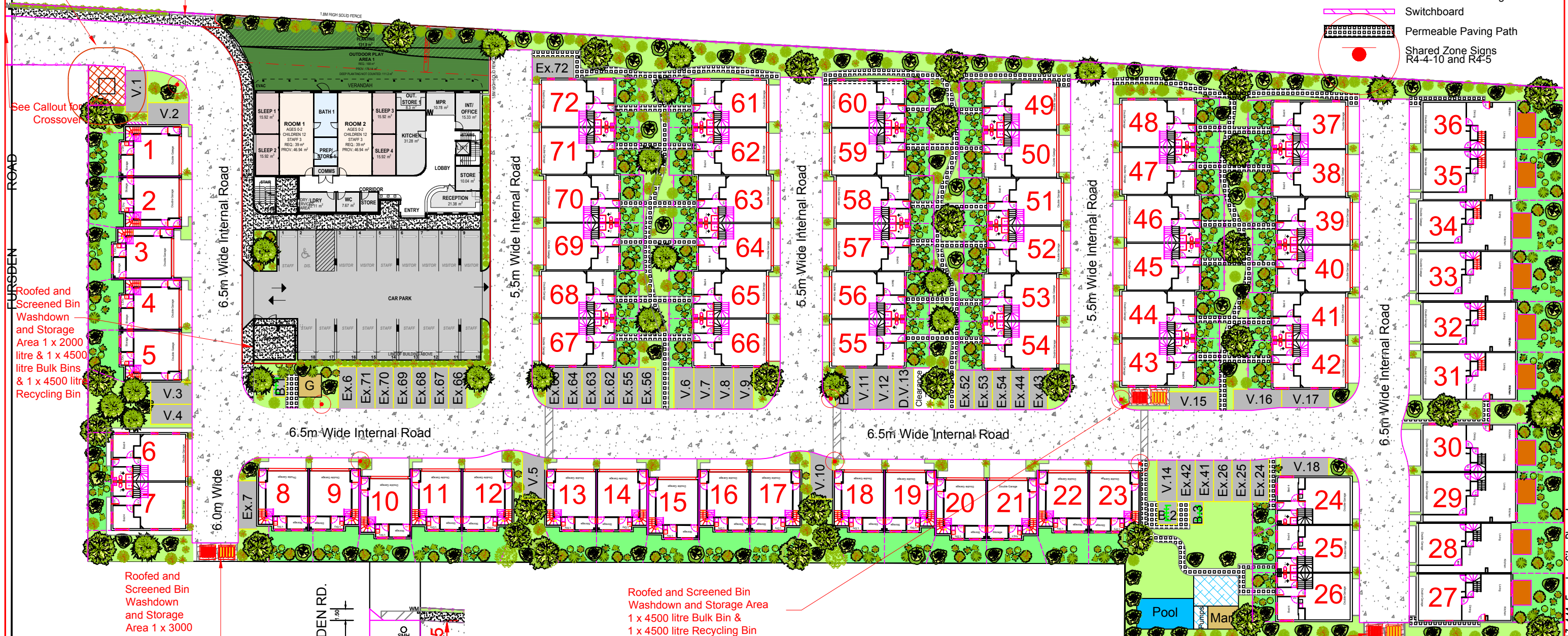
See Callout for Crossover

Roofed and Screened Bin Washdown and Storage Area 1 x 2000 litre & 1 x 4500 litre Bulk Bins & 1 x 4500 litre Recycling Bin

Roofed and Screened Bin Washdown and Storage Area 1 x 3000 litre Bulk Bin & 1 x 3000 litre Recycling Bin

Roofed and Screened Bin Washdown and Storage Area 1 x 4500 litre Bulk Bin & 1 x 4500 litre Recycling Bin

Roofed and Screened Bin Washdown and Storage Area 1 x 4500 litre Bulk Bin & 1 x 4500 litre Recycling Bin



|      |            |                                                                                      |       |
|------|------------|--------------------------------------------------------------------------------------|-------|
| Rev. | Date       | Description                                                                          | Drawn |
| S    | 2025.05.16 | Lots 6 and 7 amended to 4 bedrooms, extra VP added and areas updated                 | RB    |
| T    | 2025.05.19 | Exclusive Use Carparking Numbers Amended                                             | RB    |
| U    | 2025.11.17 | Childcare Centre added and number of Lots reduced from 85-72                         | RB    |
| V    | 2026.03.30 | Pedestrian Path continues West past Childcare Centre to North South Internal Roadway | RB    |
| W    | 2026.04.09 | Childcare Centre Inserted with Indicative Landscaping                                | RB    |
| X    | 2026.04.13 | Childcare Centre Bin Bay Extended                                                    | RB    |

|                                                                                                                                                                                                                                                                                                                     |                |                                                                  |                                                                                                                                           |                                    |                                                         |                                                       |                                    |                            |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------|-------------------------------------------------------|------------------------------------|----------------------------|-------------------|
| Copyright © - This document is and shall remain the property of Roycorp Pty Ltd. The information disclosed in this document is private and confidential. Unauthorised use of this document in any form whatsoever is prohibited. Express written permission is required from Roycorp Pty Ltd prior to reproduction. | <b>ROYCORP</b> | Roycorp Pty Ltd.<br>QBCC Licence 713327<br>A.B.N. 80 082 976 163 | 142 Queen Street,<br>Southport, QLD, 4215<br>PO Box 1067,<br>Southport, QLD, 4215<br>email: admin.dept@roycorp.com<br>Office 07 5531 2105 | Lot Description:<br>Lot 2 SP305062 | Address:<br><b>141 FURSDEN ROAD<br/>CARINA, Q, 4152</b> | Subject:<br><b>GROUND FLOOR DETAILS<br/>SITE PLAN</b> | Submission:<br><b>FOR APPROVAL</b> | Dwg. No.:<br><b>S-0002</b> | Rev.:<br><b>X</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------|-------------------------------------------------------|------------------------------------|----------------------------|-------------------|



### Site Cover

|                                     |             |
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|                     |             |
|---------------------|-------------|
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|                                            |             |
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| % of Multiple Dwelling Site                | 10.1 %      |
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### Legend

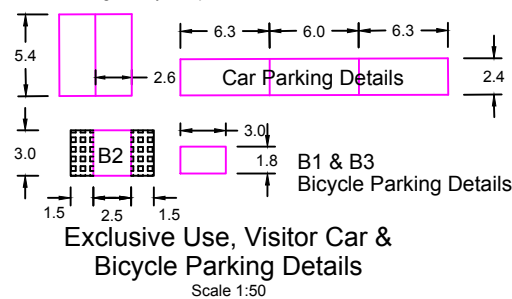
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| Lot 10 - 35.0 msq | Lot 25 - 37.5 msq | Lot 40 - 39.6 msq | Lot 55 - 40.1 msq | Lot 69 - 39.6 msq |
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| Lot 12 - 36.0 msq | Lot 27 - 49.9 msq | Lot 42 - 40.1 msq | Lot 57 - 39.6 msq | Lot 71 - 39.6 msq |
| Lot 13 - 36.0 msq | Lot 28 - 51.4 msq | Lot 43 - 40.1 msq | Lot 58 - 39.6 msq | Lot 72 - 40.1 msq |
| Lot 14 - 38.6 msq | Lot 29 - 47.4 msq | Lot 44 - 39.6 msq | Lot 59 - 39.6 msq |                   |
| Lot 15 - 35.1 msq | Lot 30 - 43.8 msq | Lot 45 - 39.6 msq |                   |                   |

### Multiple Dwelling Parking

|                                                                |     |
|----------------------------------------------------------------|-----|
| Garaging                                                       | 144 |
| Exclusive use bays (Ex.)                                       | 26  |
| Visitor's bays (V.) (Including 1 Disabled Visitor Parking Bay) | 18  |
| Carparking Total                                               | 188 |
| Bicycle Parking                                                |     |
| - B1 Bicycle spaces                                            | 6   |
| - B2 Bicycle spaces                                            | 10  |
| - B3 Bicycle spaces                                            | 6   |
| - Garaged Bicycle Spaces                                       | 72  |



### Legend

|  |                                    |
|--|------------------------------------|
|  | 1 Lot Number                       |
|  | 1.2m high Pool Fence               |
|  | 1.8m high Timber Fence             |
|  | Proposed New Kerb                  |
|  | Open Space                         |
|  | Private Use Open Space             |
|  | Internal Road                      |
|  | Internal Parking                   |
|  | Complex Pool                       |
|  | Pool Entertainment Area            |
|  | Speed Bumps                        |
|  | Roofed and Screened Bin Wash       |
|  | Gazebo with Seating                |
|  | Switchboard                        |
|  | Permeable Paving Path              |
|  | Shared Zone Signs R4-4-10 and R4-5 |



|      |            |                                                                                      |       |         |                                                                                                                            |                                 |                                           |                                           |                          |
|------|------------|--------------------------------------------------------------------------------------|-------|---------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------|-------------------------------------------|--------------------------|
| Rev. | Date       | Description                                                                          | Drawn | ROYCORP | 142 Queen Street, Southport, QLD, 4215 PO Box 1067, Southport, QLD, 4215 email: admin.dept@roycorp.com Office 07 5531 2105 | Lot Description: Lot 2 SP305062 | Address: 141 FURSDEN ROAD CARINA, Q, 4152 | Subject: BULK EARTHWORKS LEVELS SITE PLAN | Submission: FOR APPROVAL |
| S    | 2025.05.16 | Lots 6 and 7 amended to 4 bedrooms, extra VP added and areas updated                 | RB    |         |                                                                                                                            |                                 |                                           |                                           |                          |
| T    | 2025.05.19 | Exclusive Use Carparking Numbers Amended                                             | RB    |         |                                                                                                                            |                                 |                                           |                                           |                          |
| U    | 2025.11.17 | Childcare Centre added and number of Lots reduced from 85-72                         | RB    |         |                                                                                                                            |                                 |                                           |                                           |                          |
| V    | 2026.03.30 | Pedestrian Path continues West past Childcare Centre to North South Internal Roadway | RB    |         |                                                                                                                            |                                 |                                           |                                           |                          |
| W    | 2026.04.09 | Childcare Centre Inserted with Indicative Landscaping                                | RB    |         |                                                                                                                            |                                 |                                           |                                           |                          |
| X    | 2026.04.13 | Childcare Centre Bin Bay Extended                                                    | RB    |         |                                                                                                                            |                                 |                                           |                                           |                          |

## **APPENDIX E: 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 on 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

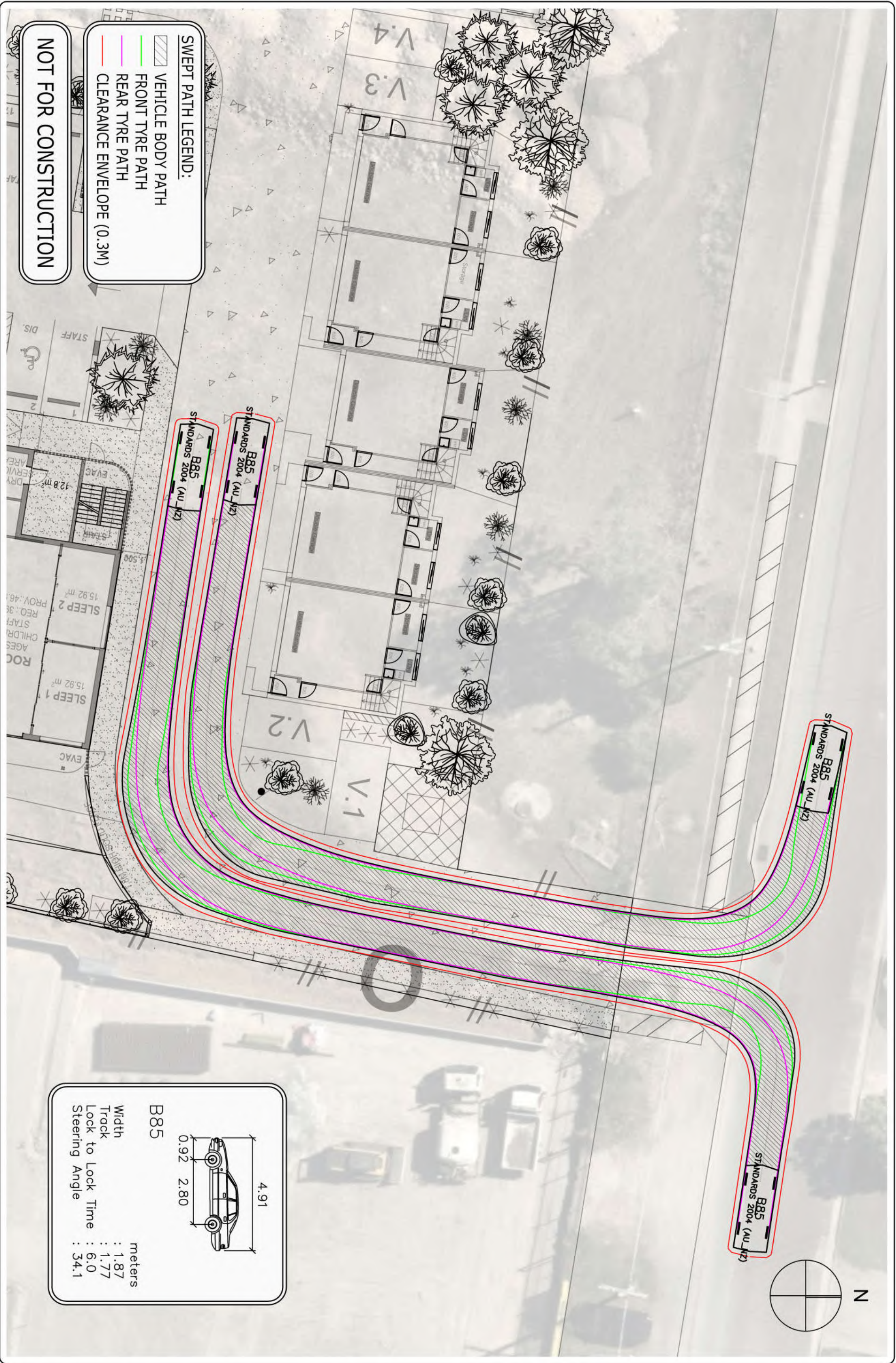
Institute of Transport Studies Monash University (2003), *Traffic Engineering and Management*, Volume 2, Caulfield East

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 F: SWEPT PATH DRAWINGS**



SWEPT PATH LEGEND:

- VEHICLE BODY PATH
- FRONT TYRE PATH
- REAR TYRE PATH
- CLEARANCE ENVELOPE (0.3M)

NOT FOR CONSTRUCTION



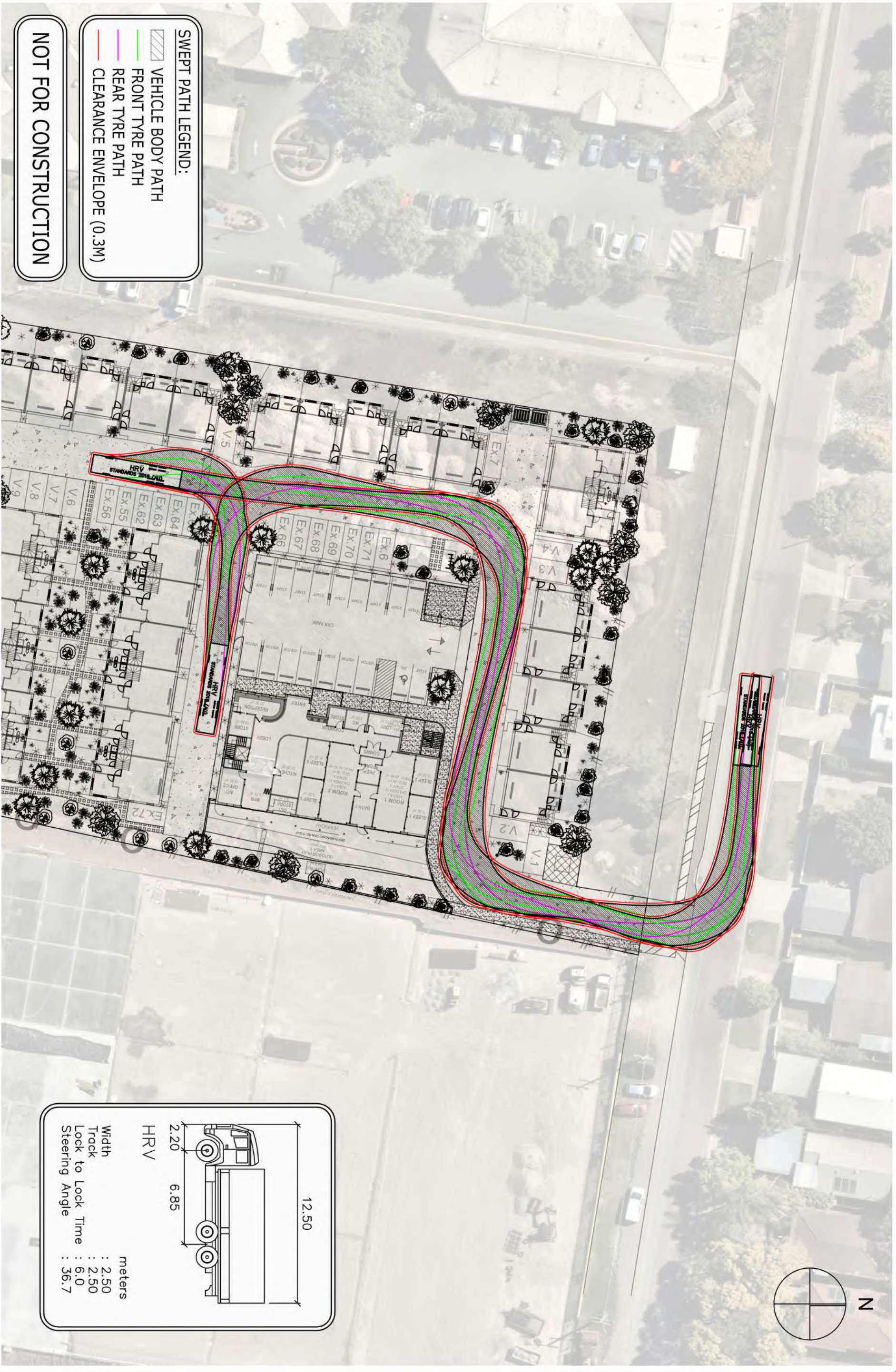
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ABN 96 067 593 962  
P 07 3839 6771 WWW.PTT.COM.AU  
Level 2, 62 Astor Tce, Spring Hill QLD 4000

| REV | DESCRIPTION   | CG | DRN | DATE |
|-----|---------------|----|-----|------|
| A   | INITIAL ISSUE |    |     |      |

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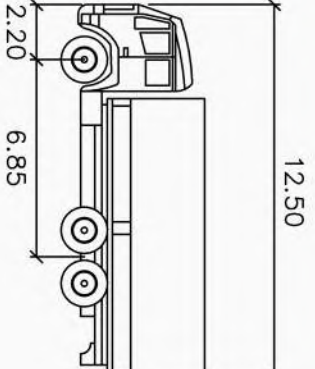


NOT FOR CONSTRUCTION

SWEPT PATH LEGEND:

- VEHICLE BODY PATH
- FRONT TYRE PATH
- REAR TYRE PATH
- CLEARANCE ENVELOPE (0.3M)

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



DRAWING TITLE:  
HRV SWEPT PATH PART 1

PROJECT TITLE:  
141 FURSDEN ROAD, CARINA

| REV | DESCRIPTION   | DRN | DATE     |
|-----|---------------|-----|----------|
| A   | INITIAL ISSUE | CG  | 10/06/26 |

CLIENT:  
ROYCORP

DRAWING NO:  
26-520-002

REV:  
A

SCALE:  
1:500 @ A3

APPROVED BY:  
CG  
(RPEQ 34450)

*C. Spence*

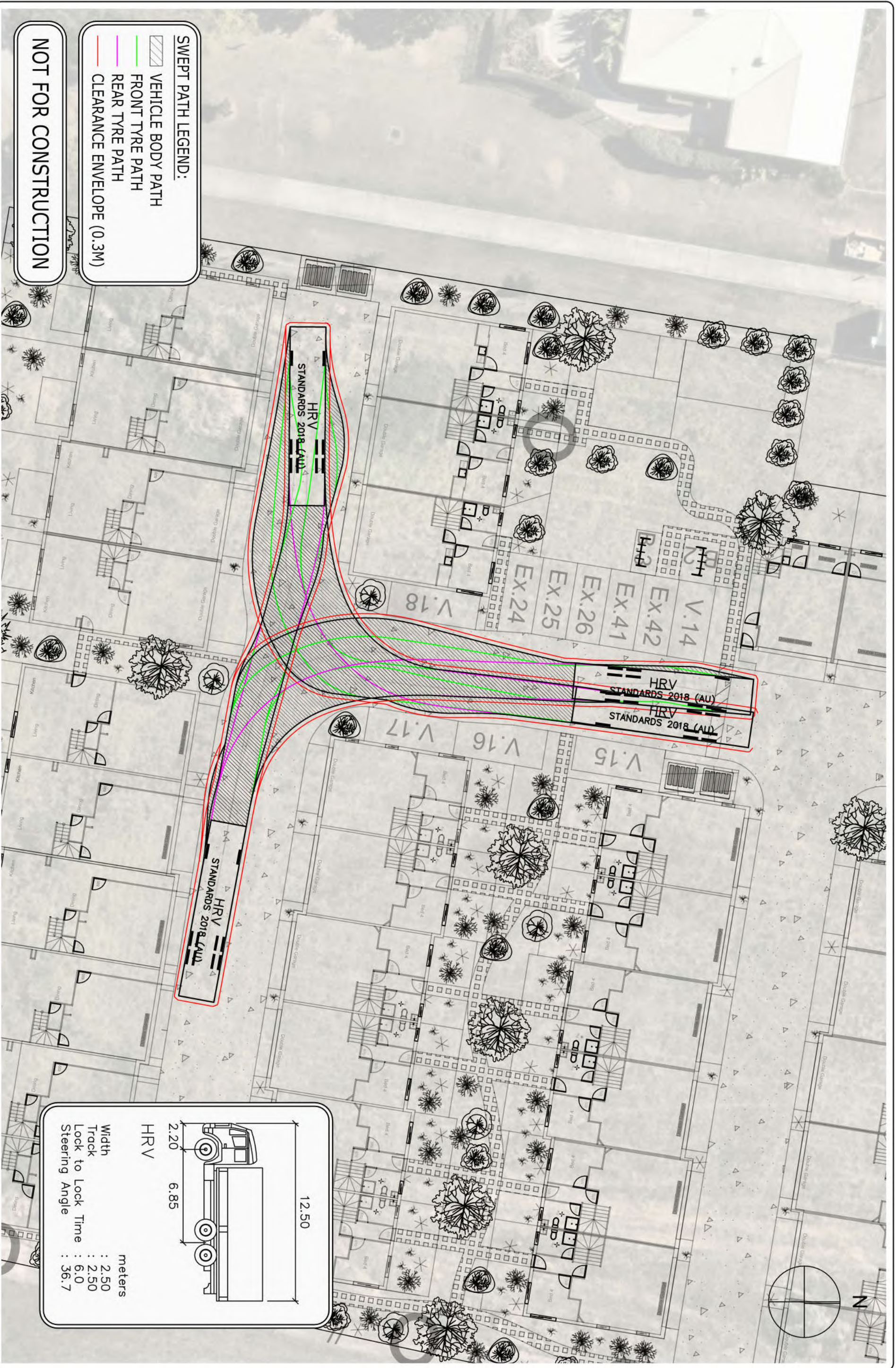


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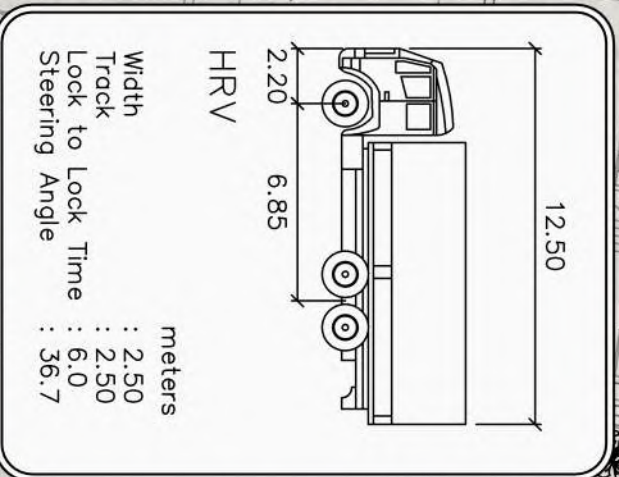
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**SWEPT PATH LEGEND:**

- VEHICLE BODY PATH
- FRONT TYRE PATH
- REAR TYRE PATH
- CLEARANCE ENVELOPE (0.3M)

**NOT FOR CONSTRUCTION**



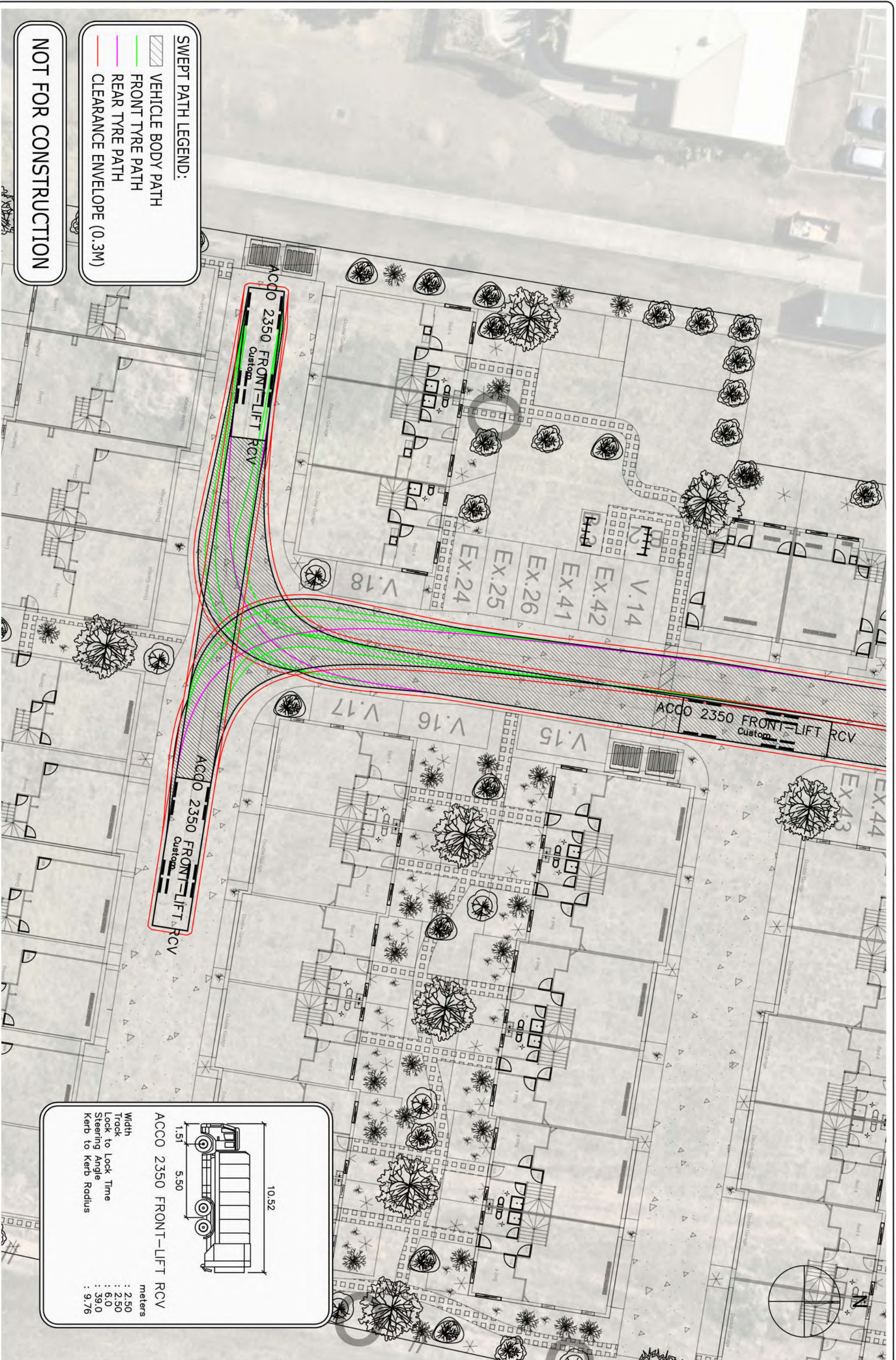
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Level 2, 62 Astor Tce, Spring Hill QLD 4000

| REV | DESCRIPTION   | DRN | DATE     |
|-----|---------------|-----|----------|
| A   | INITIAL ISSUE | CG  | 10/06/26 |

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| PROJECT TITLE:<br>141 FURSDEN ROAD, CARINA |  | CLIENT:<br>ROYCORP        |  |                |  |                      |  |                                 |  |





**SWEPT PATH LEGEND:**

- VEHICLE BODY PATH
- FRONT TYRE PATH
- REAR TYRE PATH
- CLEARANCE ENVELOPE (0.3M)

**NOT FOR CONSTRUCTION**

ACCO 2350 FRONT-LIFT RCV

Width  
Track  
Lock to Lock Time  
Steering Angle  
Kerb to Kerb Radius

1.51  
5.50  
10.52

meters

: 2.50  
: 2.50  
: 6.0  
: 39.0  
: 9.76



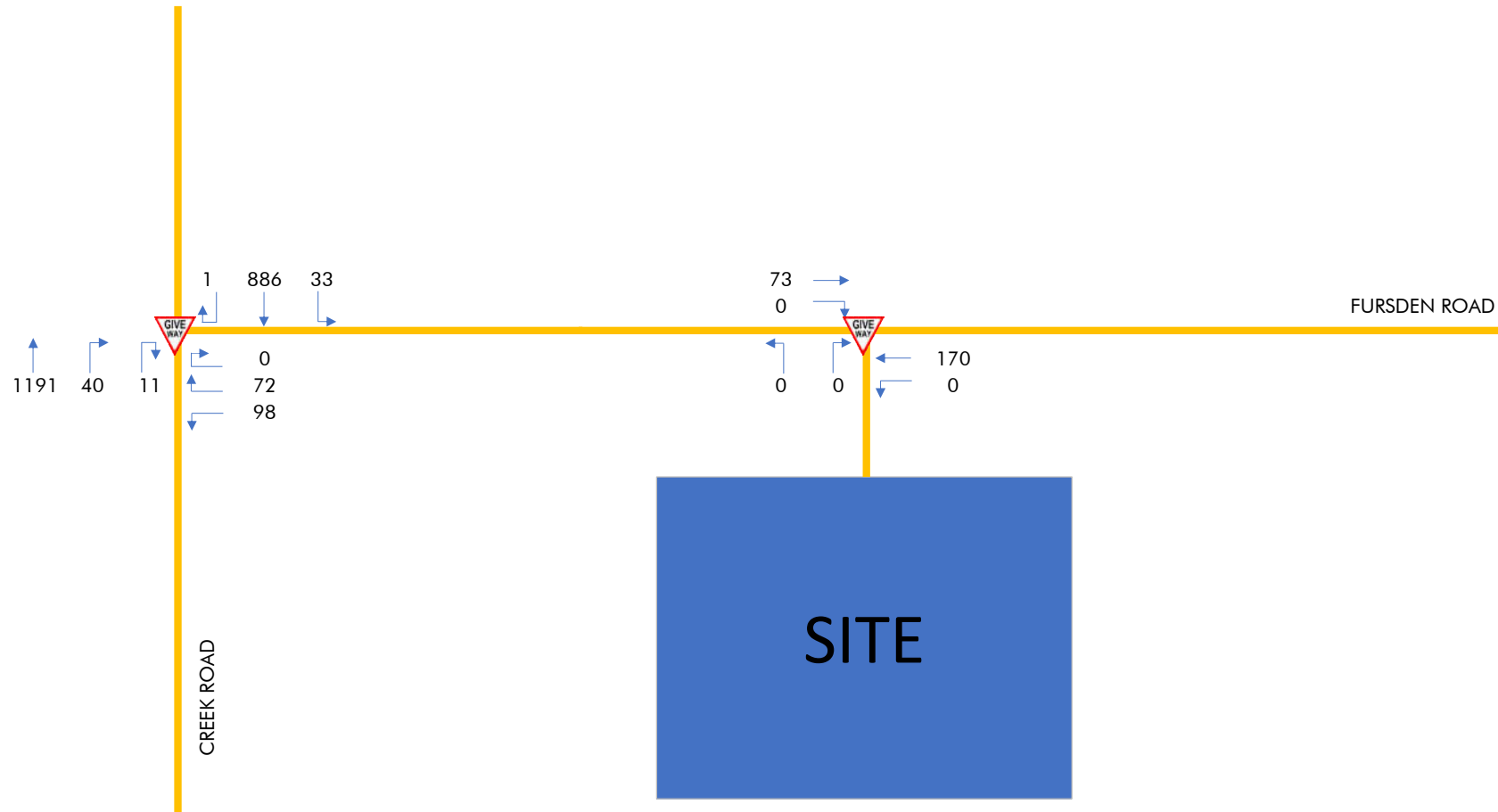
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P 07 3839 6771 WWW.PTT.COM.AU  
Level 2, 62 Astor Tce, Spring Hill QLD 4000

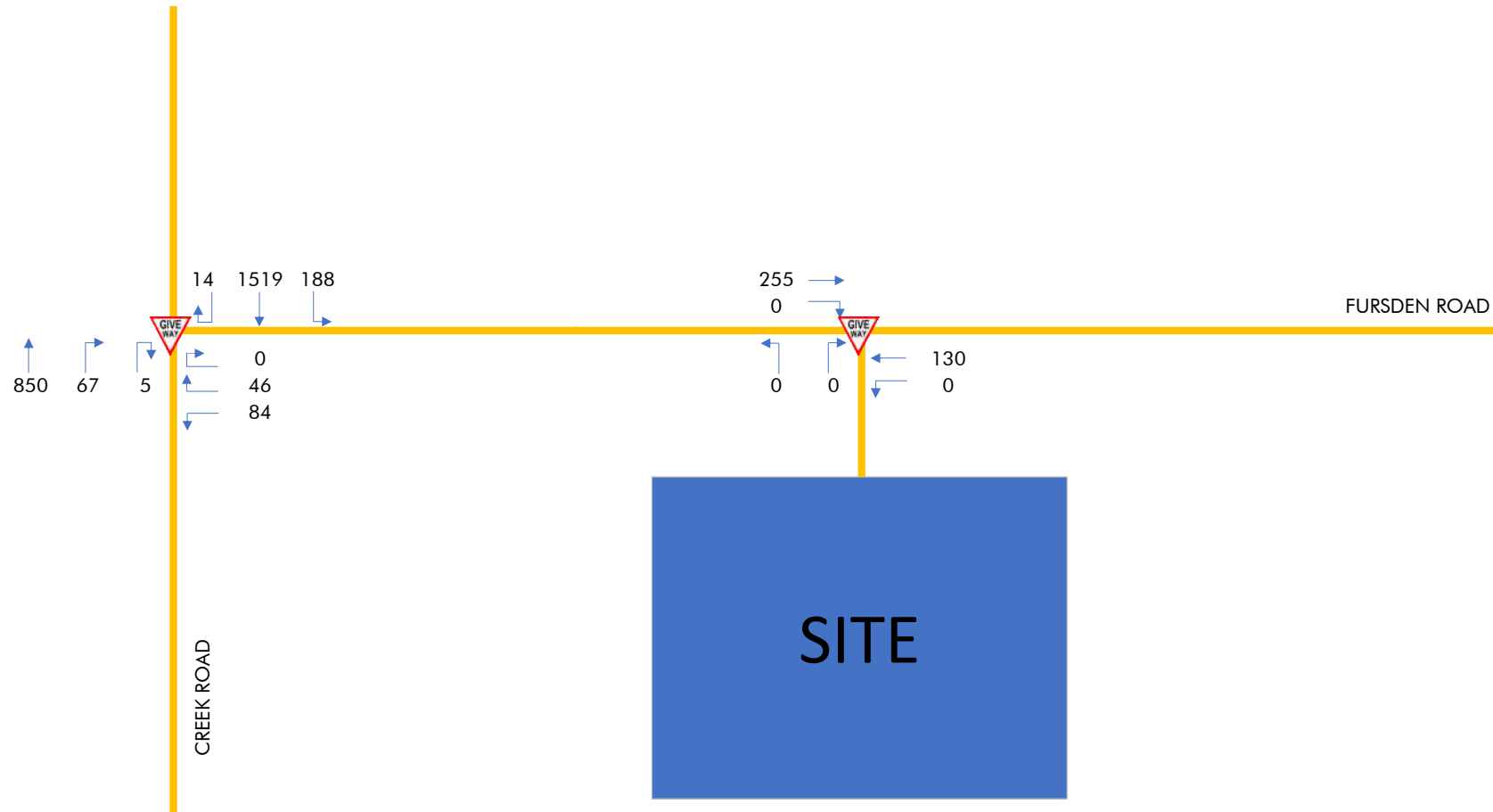
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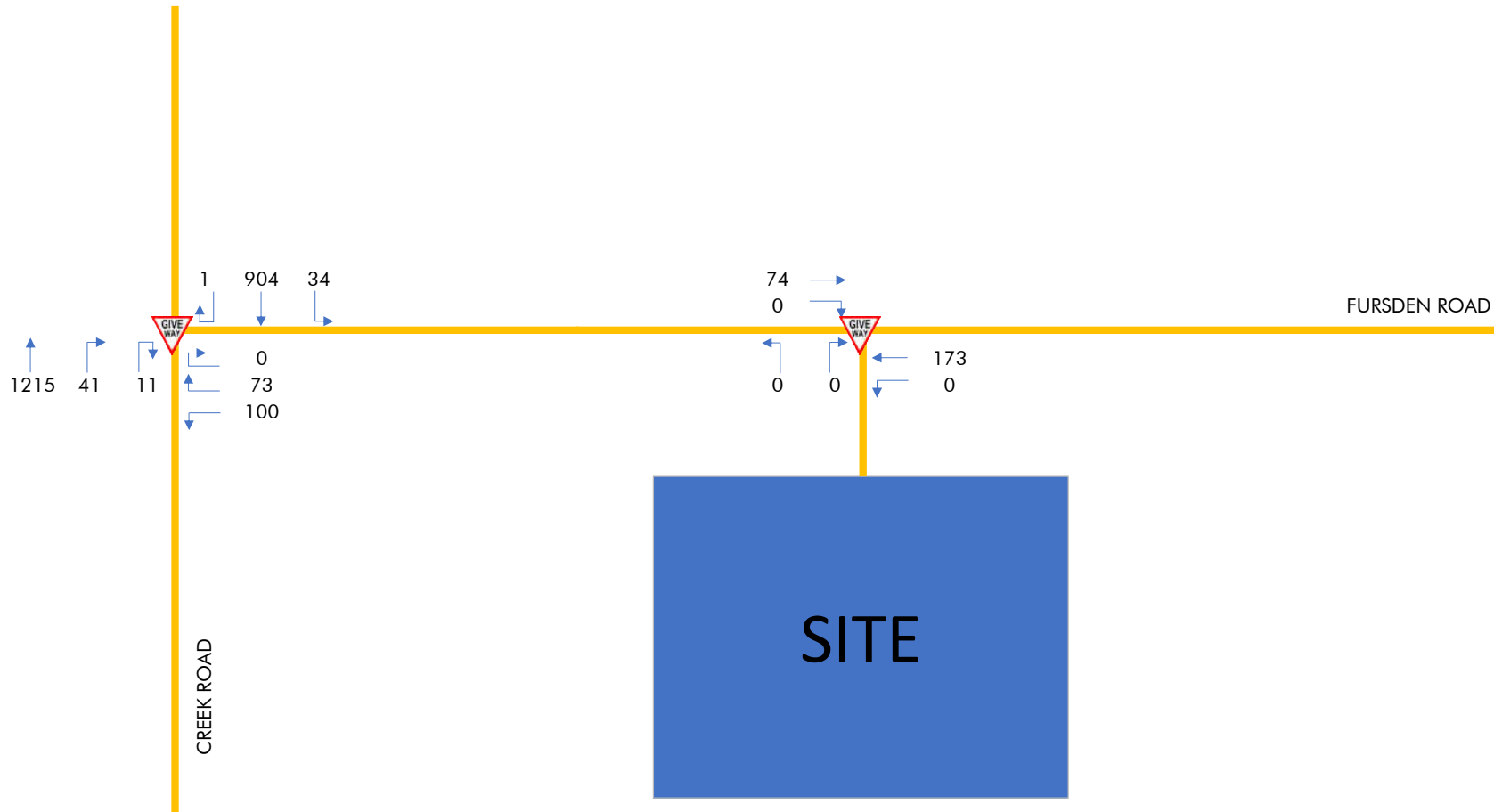
## **APPENDIX G: TURNING MOVEMENT FORECASTS**



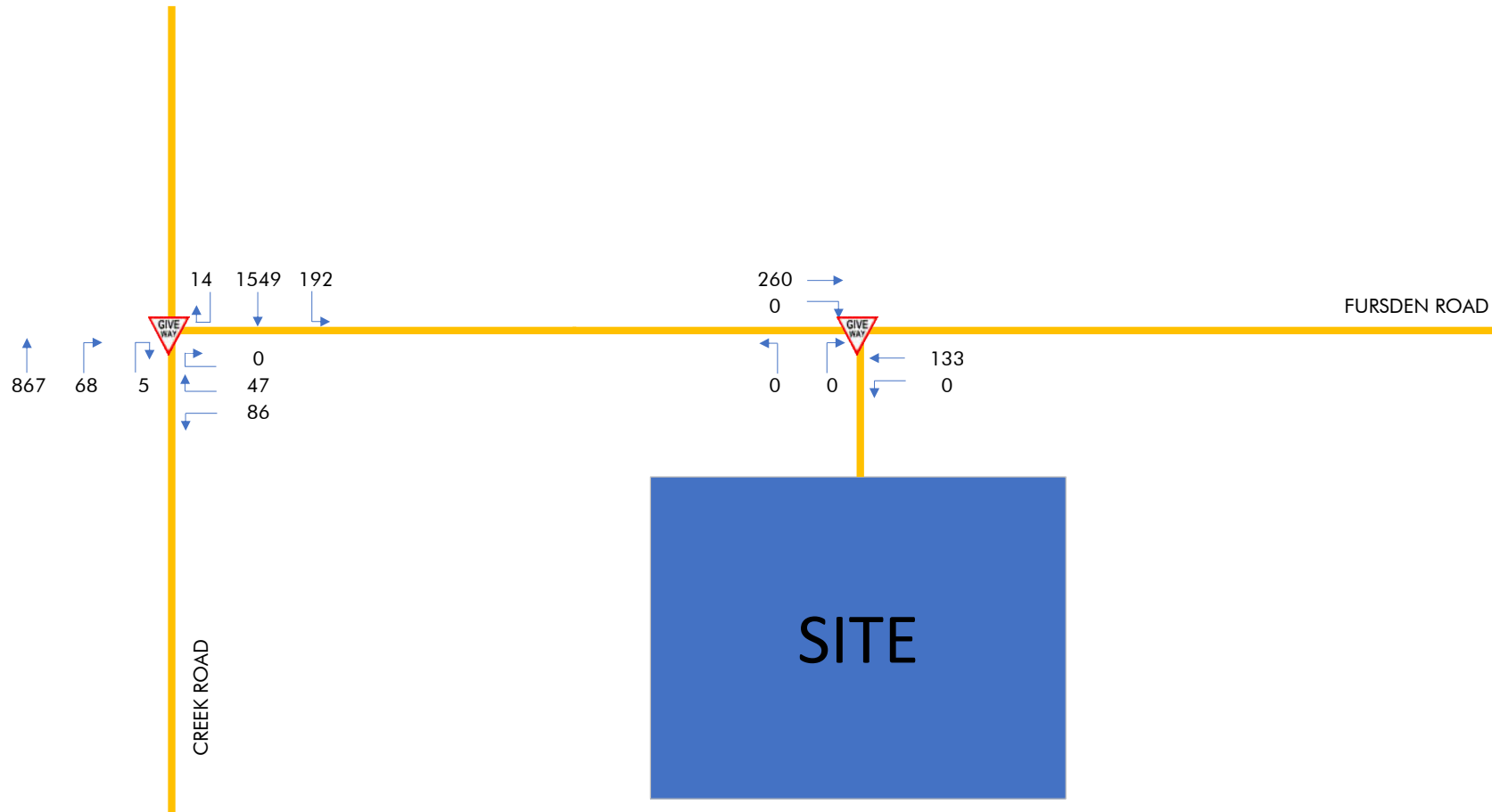
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| Date                            | 26/06/2026 | Figure                   | Job No. |
|                                 |            | Figure 1                 | 26-520  |
| 2026 Existing Morning Peak Hour |            |                          |         |



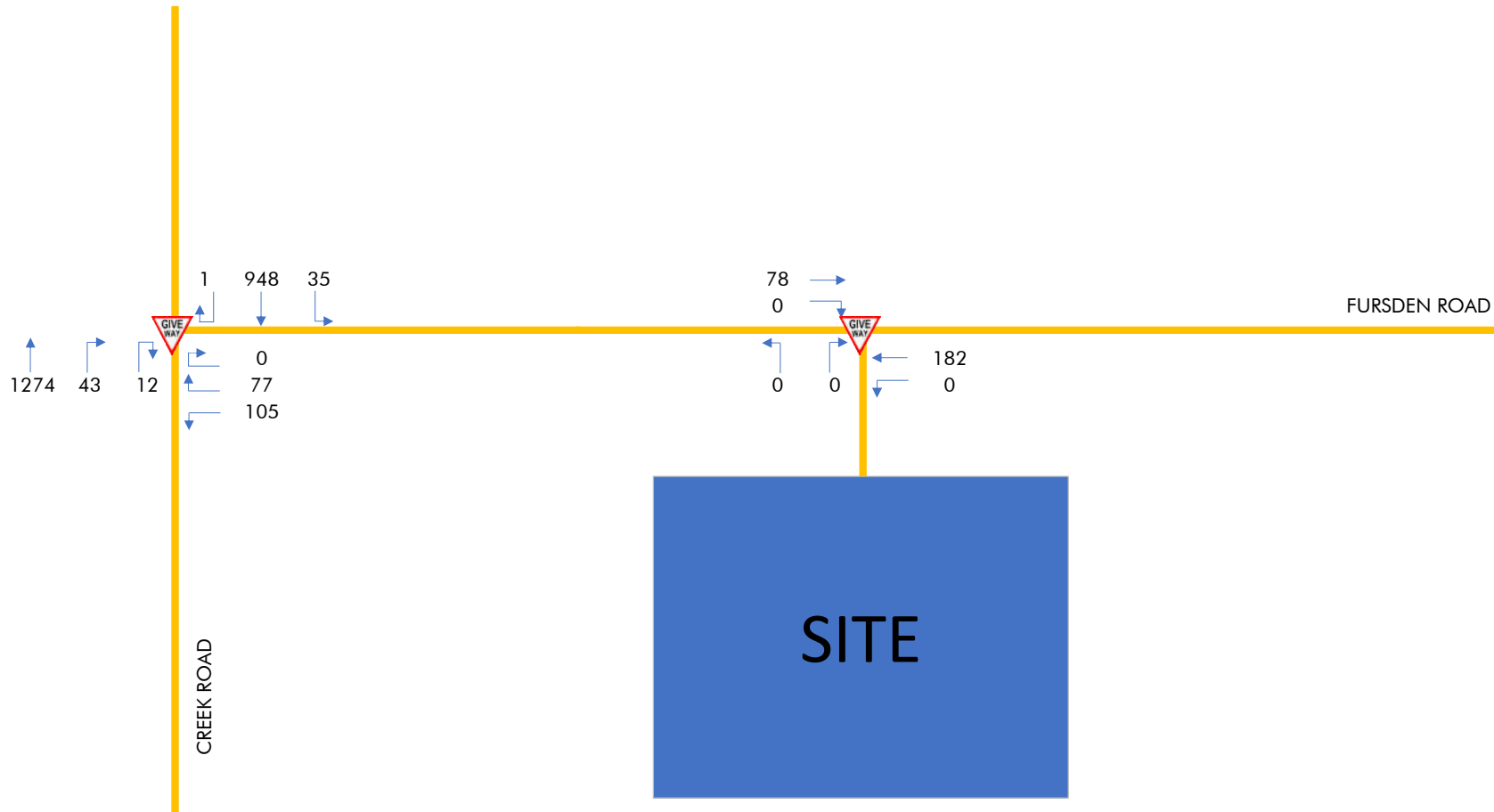
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| 2026 Existing Evening Peak Hour |            |                          |         |



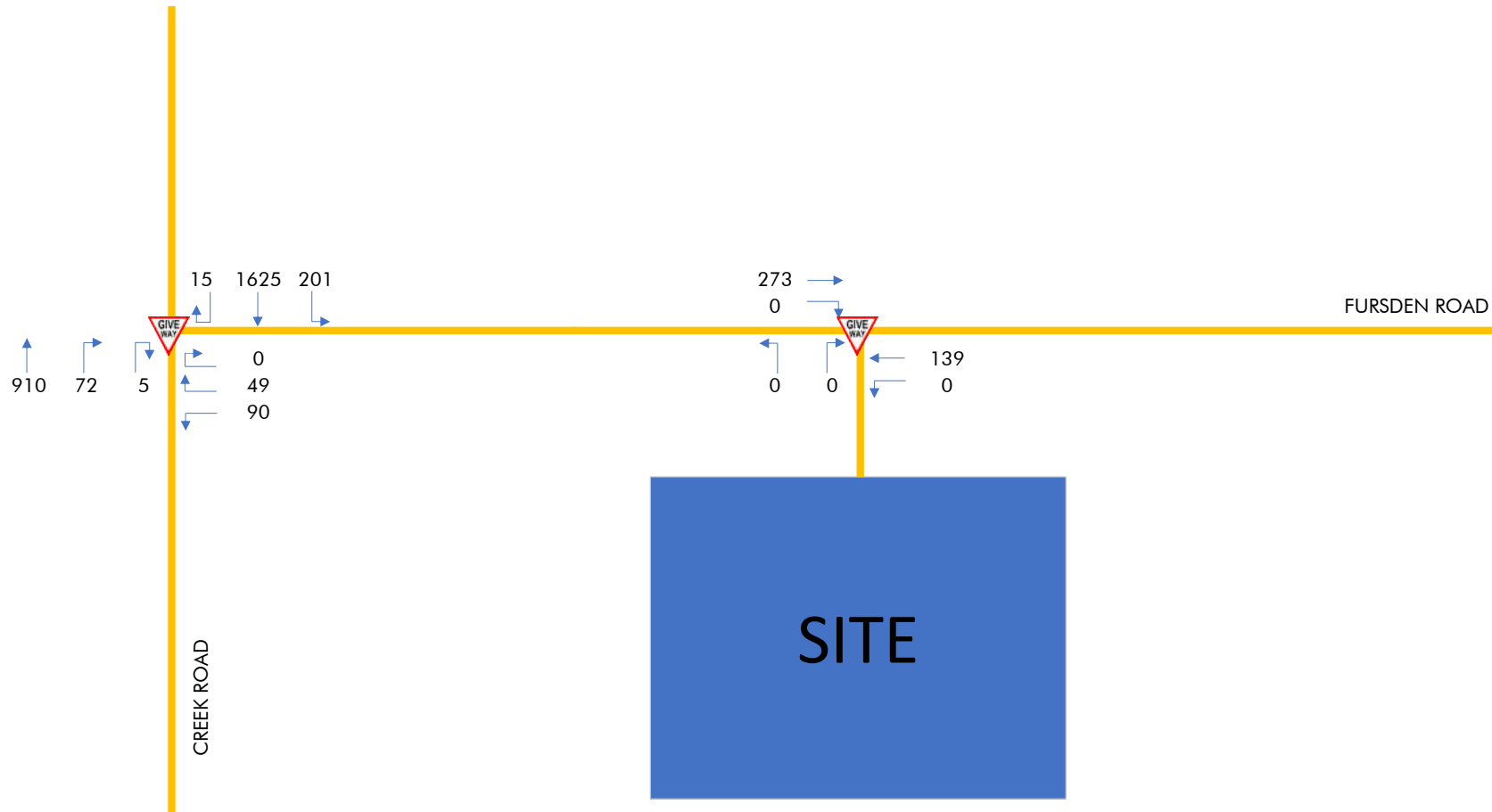
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| 2029 Pre-Development Morning Peak Hour |            |                          |         |



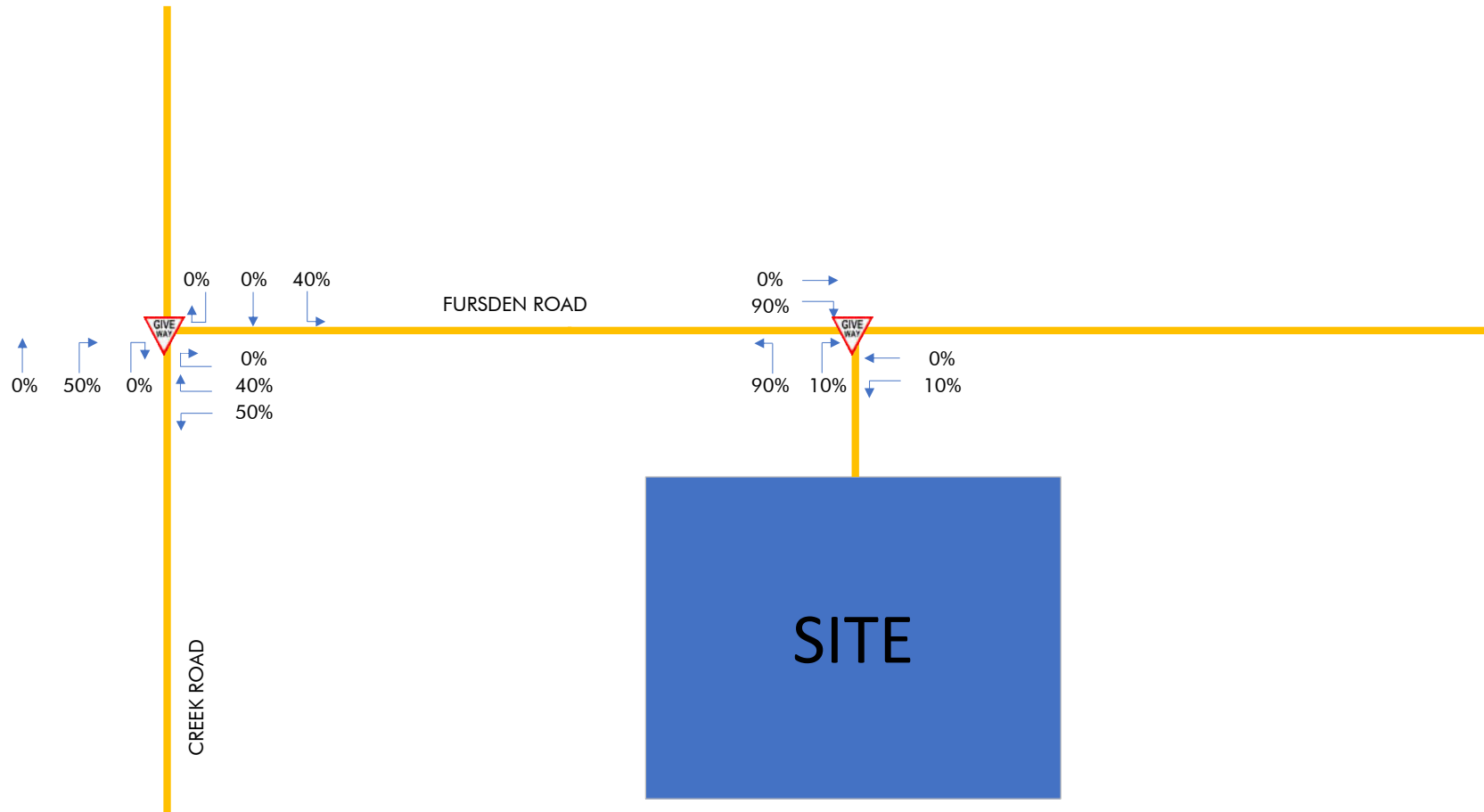
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| Date                                   | 26/06/2026 | Figure                   | Job No. |
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| 2029 Pre-Development Evening Peak Hour |            |                          |         |



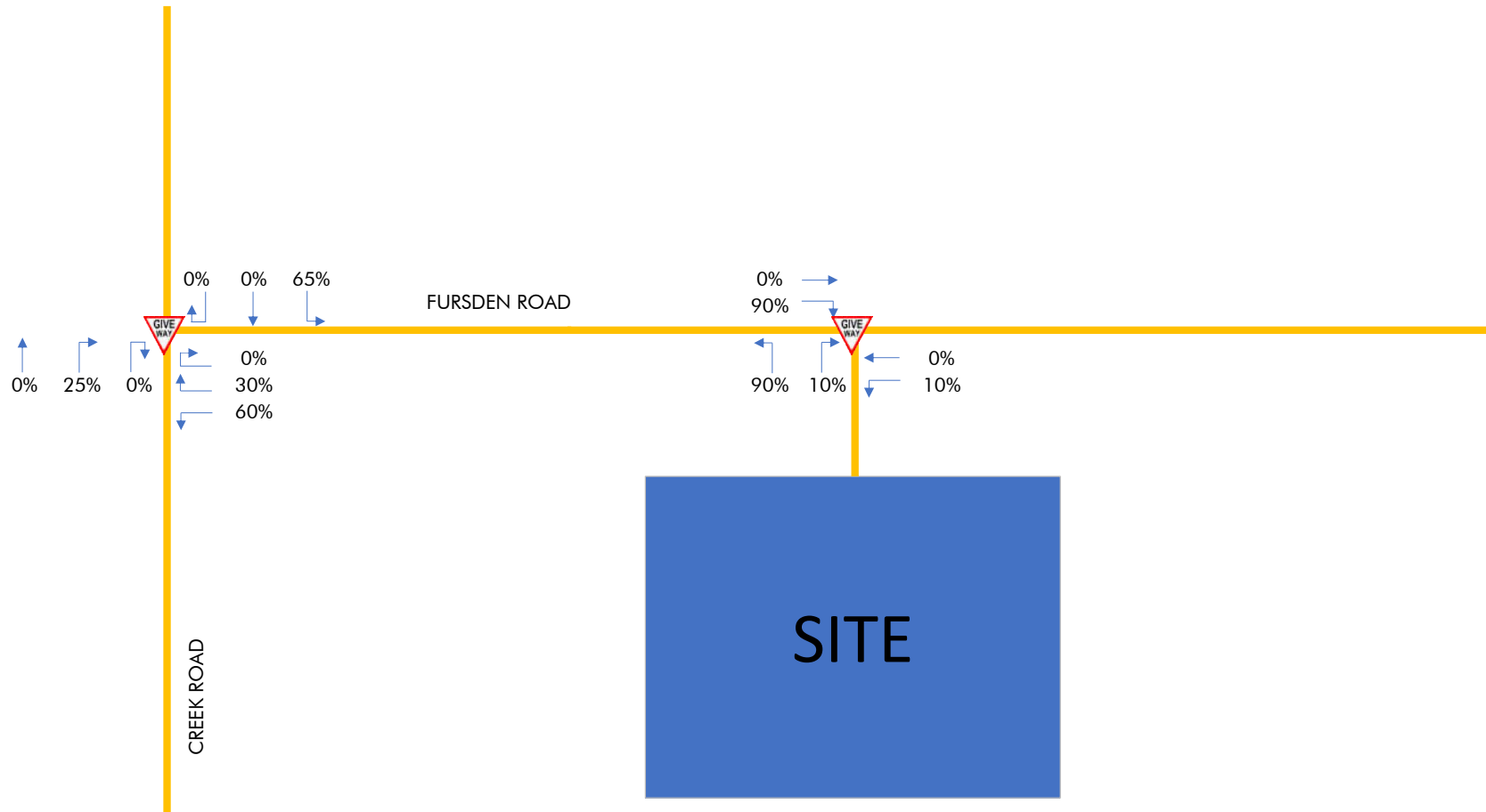
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| Date                                   | 26/06/2026 | Figure                   | Job No. |
|                                        |            | Figure 5                 | 26-520  |
| 2039 Pre-Development Morning Peak Hour |            |                          |         |



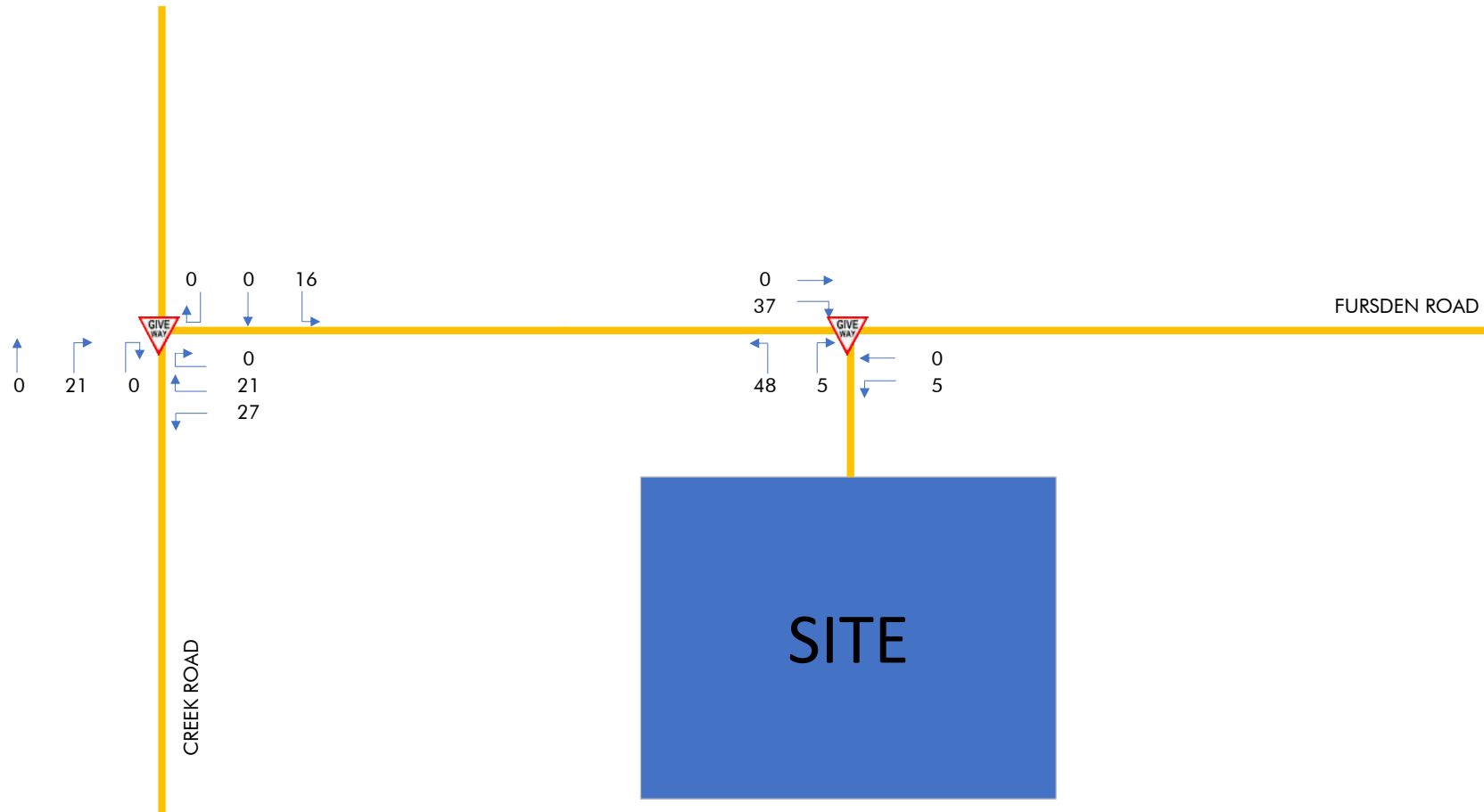
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|                                        |            | Figure 6                 | 26-520  |
| 2039 Pre-Development Evening Peak Hour |            |                          |         |



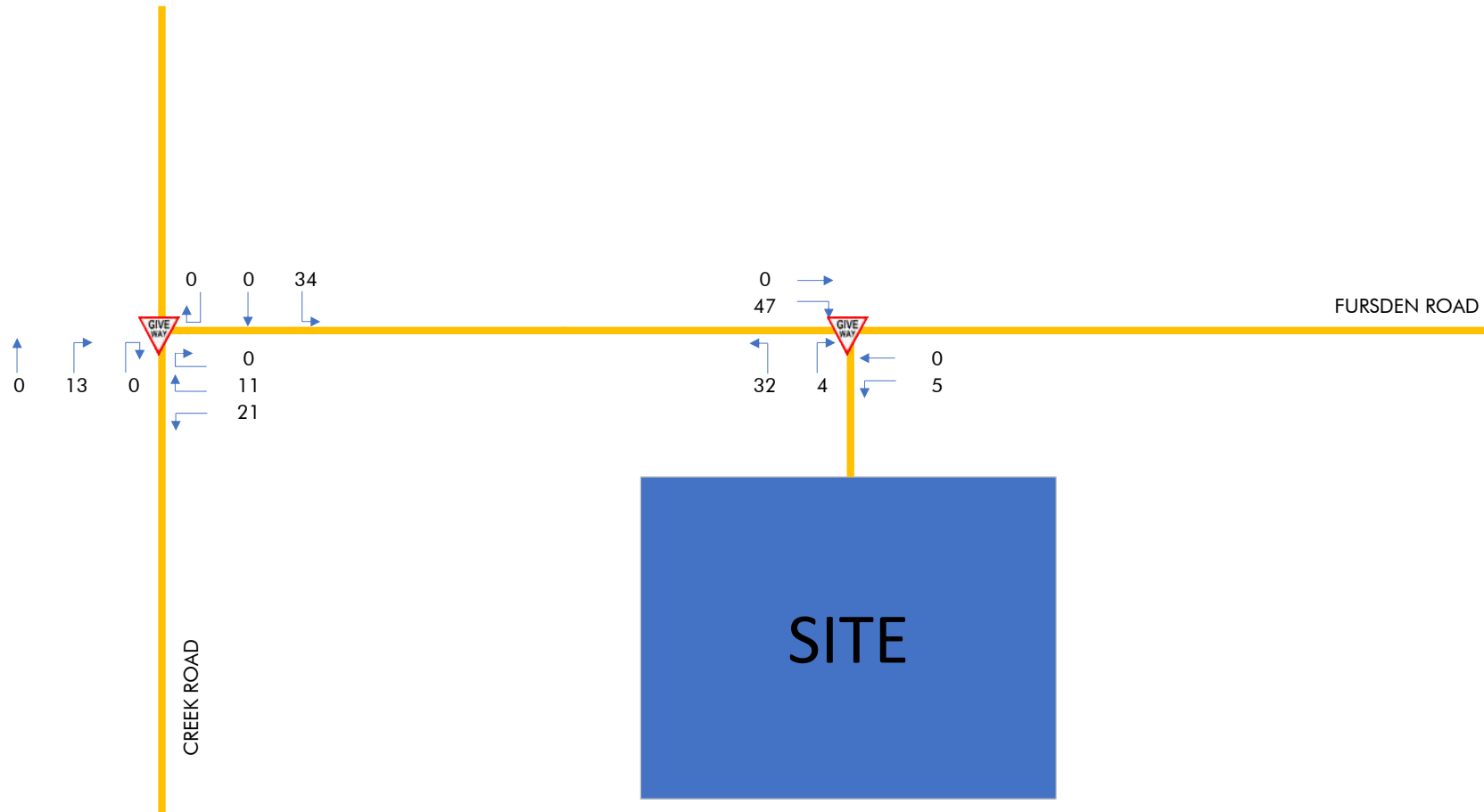
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|                                                      |            | Figure 7                 | 26-520  |
| Development Traffic Distribution - Morning Peak Hour |            |                          |         |



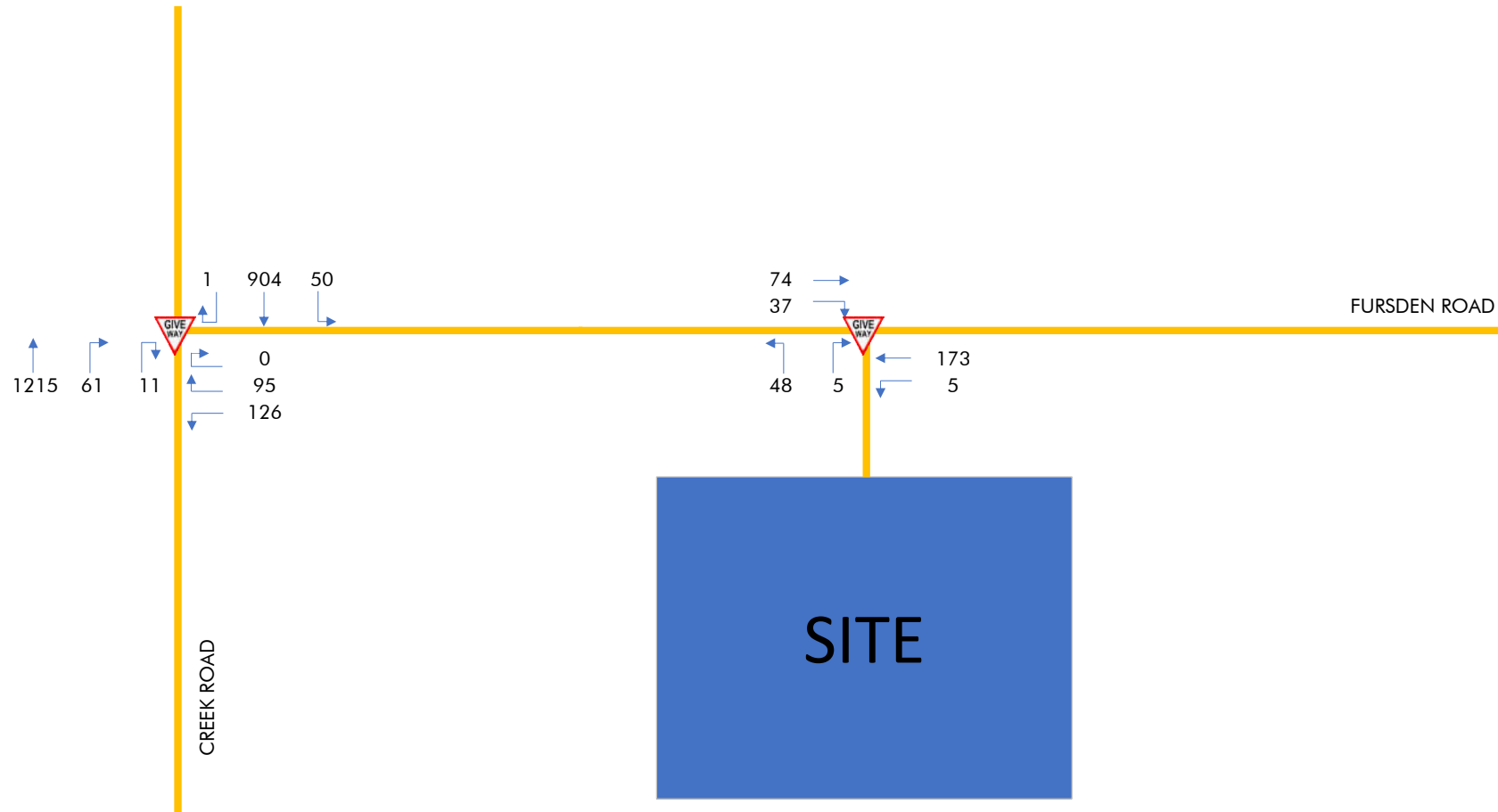
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| Date                                                 | 26/06/2026 | Figure                   | Job No. |
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| Development Traffic Distribution - Evening Peak Hour |            |                          |         |



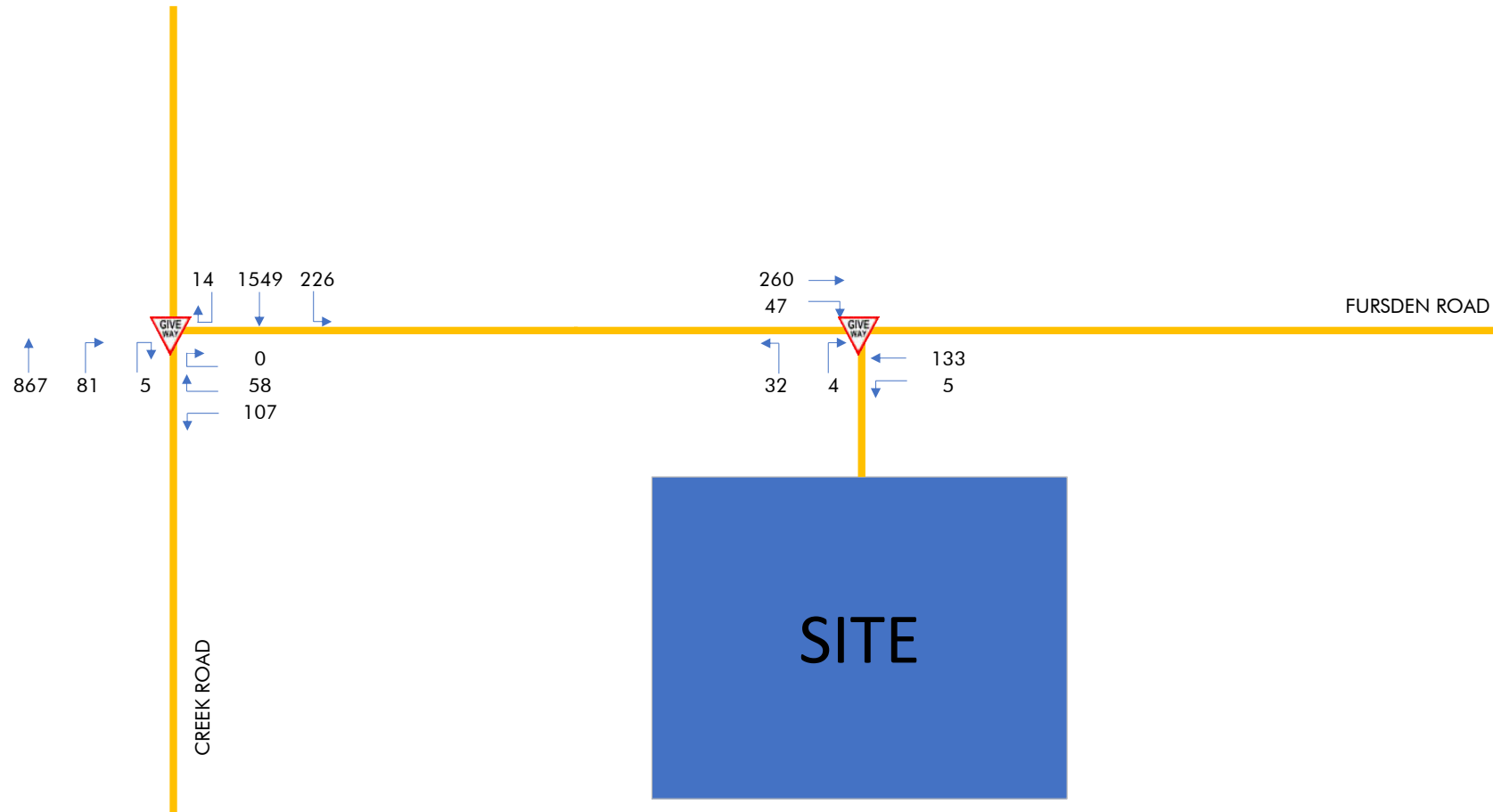
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|                                                    |            | Figure 9                 | 26-520  |
| Development Traffic Generation - Morning Peak Hour |            |                          |         |



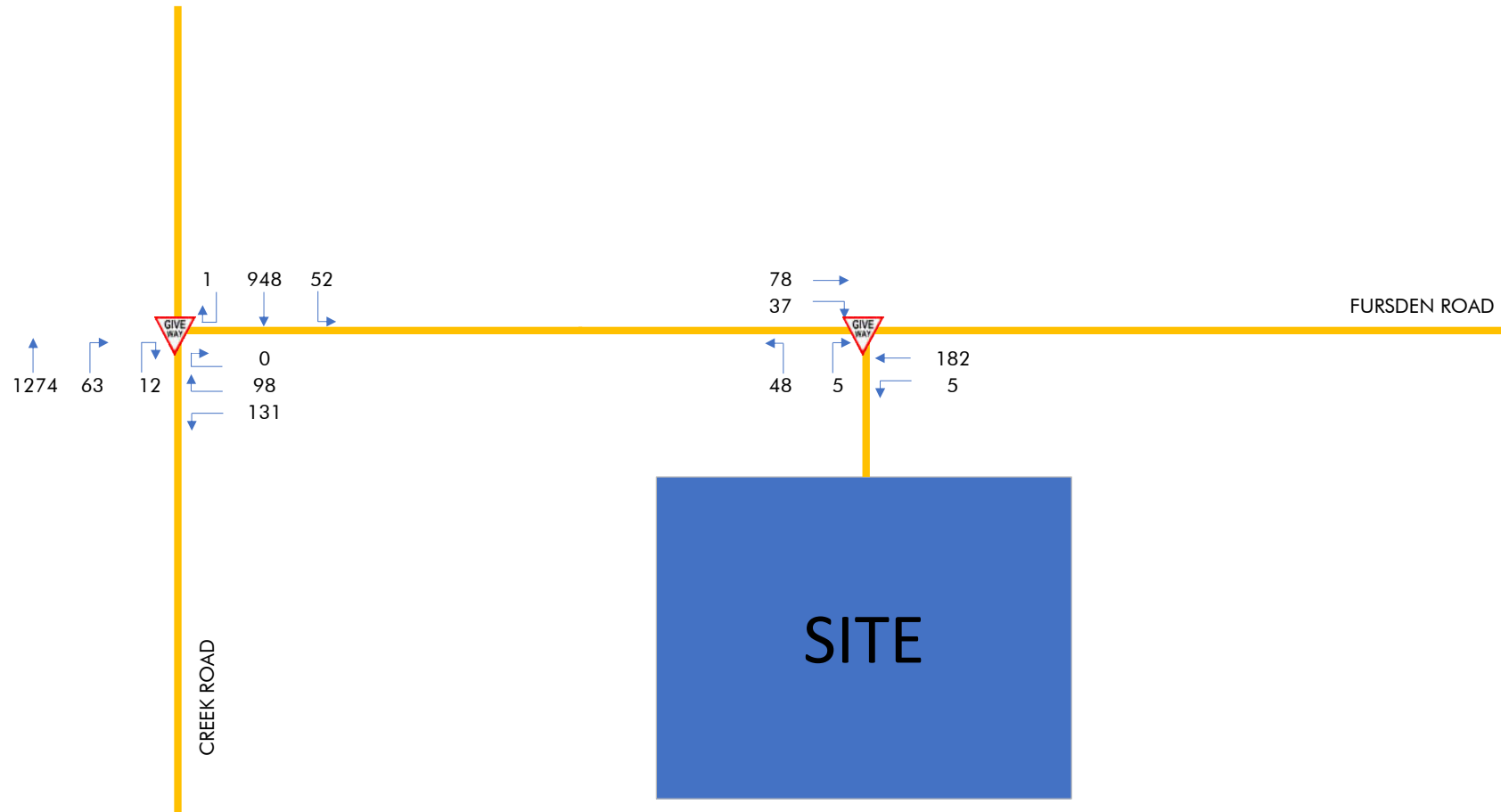
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| Development Traffic Generation - Evening Peak Hour |            |                          |         |



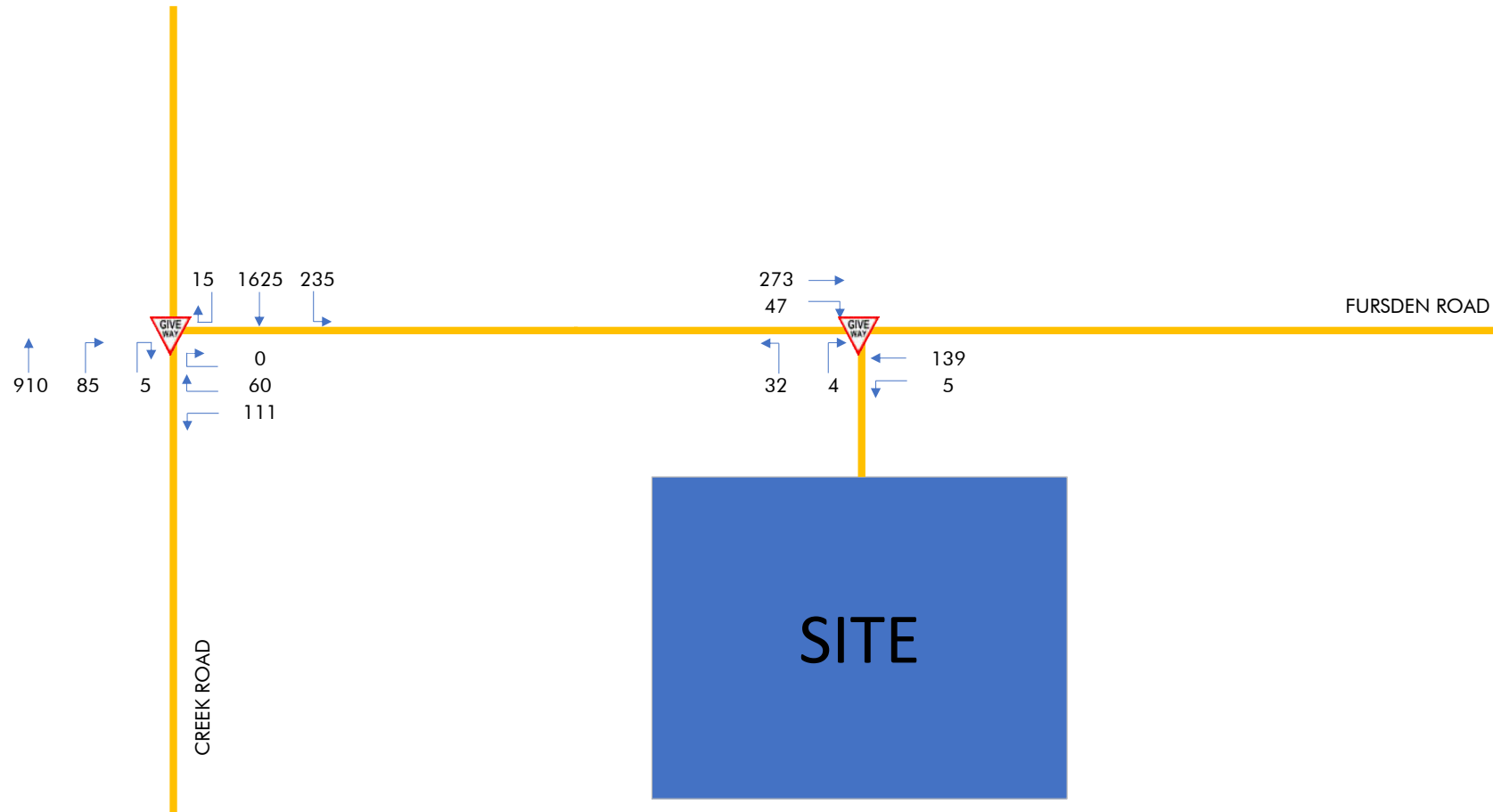
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| Date                                    | 26/06/2026 | Figure                   | Job No. |
|                                         |            | Figure 11                | 26-520  |
| 2029 Post-Development Morning Peak Hour |            |                          |         |



|                                         |            |                          |         |
|-----------------------------------------|------------|--------------------------|---------|
| Client                                  |            | Project                  |         |
| Roycorp                                 |            | 141 Fursden Road, Carina |         |
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| 2029 Post-Development Evening Peak Hour |            |                          |         |



|                                         |            |                          |         |
|-----------------------------------------|------------|--------------------------|---------|
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| Roycorp                                 |            | 141 Fursden Road, Carina |         |
| Date                                    | 26/06/2026 | Figure                   | Job No. |
|                                         |            | Figure 13                | 26-520  |
| 2039 Post-Development Morning Peak Hour |            |                          |         |



|                                         |            |                          |         |
|-----------------------------------------|------------|--------------------------|---------|
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| Roycorp                                 |            | 141 Fursden Road, Carina |         |
| Date                                    | 26/06/2026 | Figure                   | Job No. |
|                                         |            | Figure 14                | 26-520  |
| 2039 Post-Development Evening Peak Hour |            |                          |         |