

# Transport Impact Assessment

East Newman Structure Plan

CW1200437 / 304900818



Prepared for  
Creating Communities

13 September 2022



now



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# 1 Introduction

## 1.1 Background

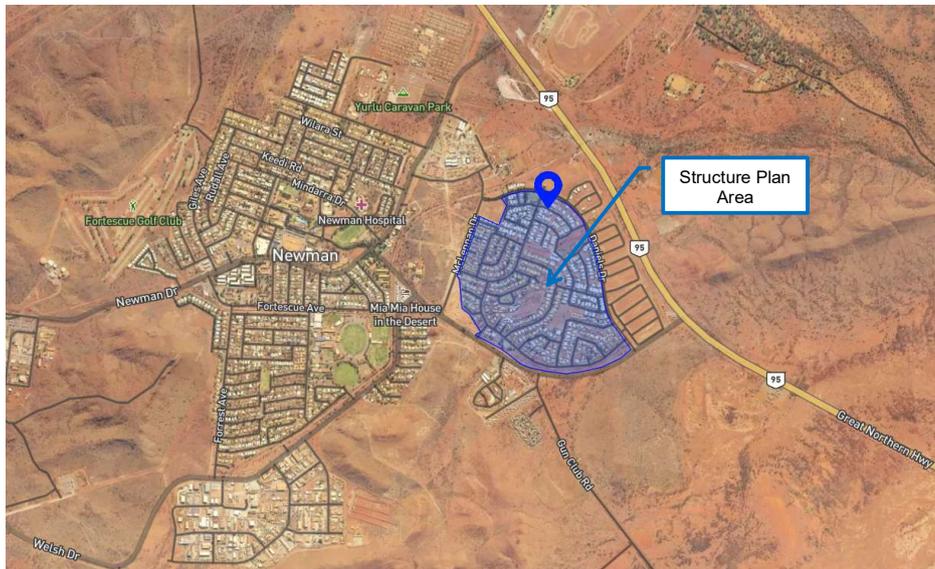
Cardno has been commissioned by Creating Communities (“the Client”) to prepare a Transport Impact Assessment (TIA) for the proposed Local Structure Plan (LSP) in East Newman WA (the “Site”).

This TIA has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines Volume 2 – Planning Schemes, Structure Plans and Activity Centre Zones* (2016).

## 1.2 Site Location

The Site is located in Newman within the Shire of East Pilbara as shown in **Figure 1-1**. The Site is bounded by Daniels Drive to the north and east, McLennan Drive to the west and Kalgan Drive to the south.

Figure 1-1 Site Location



Source: MetroMap 2022

## 2 Proposed Structure Plan

### 2.1 Regional Context

The proposed LSP is located within the town of Newman, in the Pilbara Region of Western Australia; it is located approximately 1,200km north of Perth and 450km south of Port Hedland (see **Figure 2-1**). Newman can be accessed through the Great Northern Highway that connects to the NW Coastal Highway to the north and Perth to the south.

Figure 2-1 Regional Context



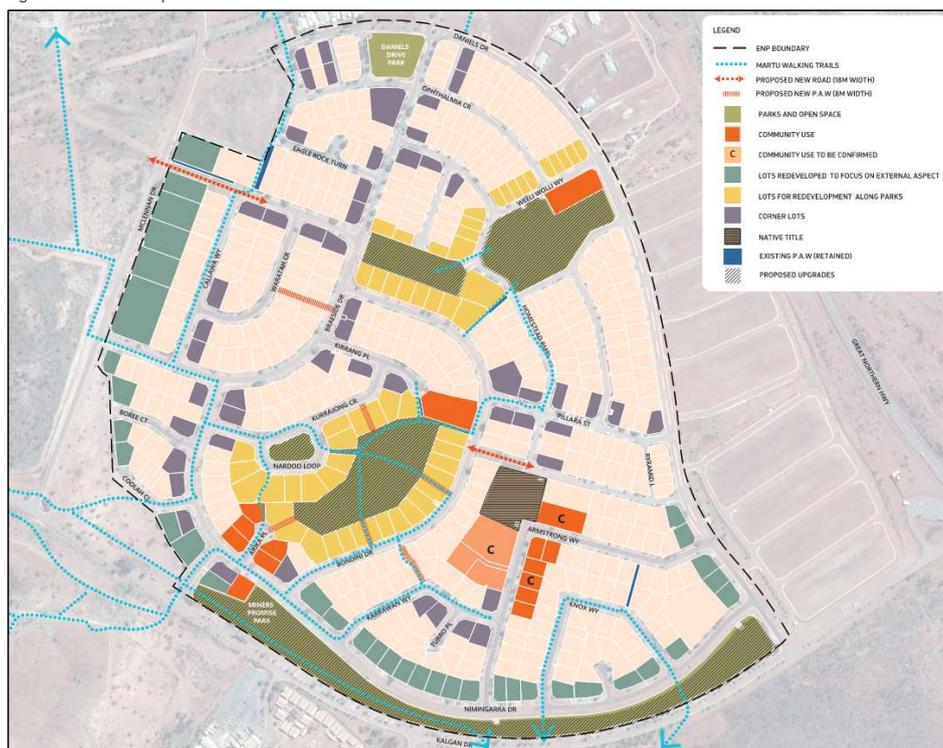
Source: Google Maps 2022

## 2.2 Local Context

The LSP is located to the east of Newman, near the Great Northern Highway as shown in **Figure 2-2**. The land uses include community uses, parks and open spaces, lots for redevelopment and new roads to improve connectivity.

The Concept Plan also identifies areas for increased density of residential dwellings, parks, landscaping and play areas for improvements.

Figure 2-2 Concept Structure Plan



Source: *Creating Communities – Concept Plan September 2022*

The Shire of East Pilbara Local Planning Strategy includes within its strategies for Newman the intent to facilitate the development of Newman as the primary regional centre in the Shire for an estimated population of 10,400 persons by 2035.

The Strategy identifies the large parcel of land south-east of the town centre, East Newman, as the primary location for residential expansion.

### 2.3 Proposed Land Use

The concept structure plan proposes modifications to the existing area which includes the redevelopment of lots abutting the parks, redevelopment of lots focusing on external aspects and community use areas. **Table 2-1** provides a summary of land uses within the proposed LSP.

Table 2-1 Proposed Land Uses within LSP

| Land Use   | Total Number of Lots | Estimated Yield                 |
|--|----------------------|---------------------------------|
| Parks and Open Space                               | 5                    | 82,238 m <sup>2</sup> land area |
| Community Use                                      | 14                   | 17,530 m <sup>2</sup> land area |
| Lots for Redevelopment Along Parks                 | 56                   | 48,692 m <sup>2</sup> land area |
| Corner Lots  | 36                   | 27,854 m <sup>2</sup> land area |
| Lots Redeveloped to Focus on External Aspects      | 23                   | 34,464 m <sup>2</sup> land area |
| Areas with opportunity for increased housing yield | 98                   | 83,466 m <sup>2</sup> land      |
| Native Title                                       | 1                    | 5,884 m <sup>2</sup> land       |

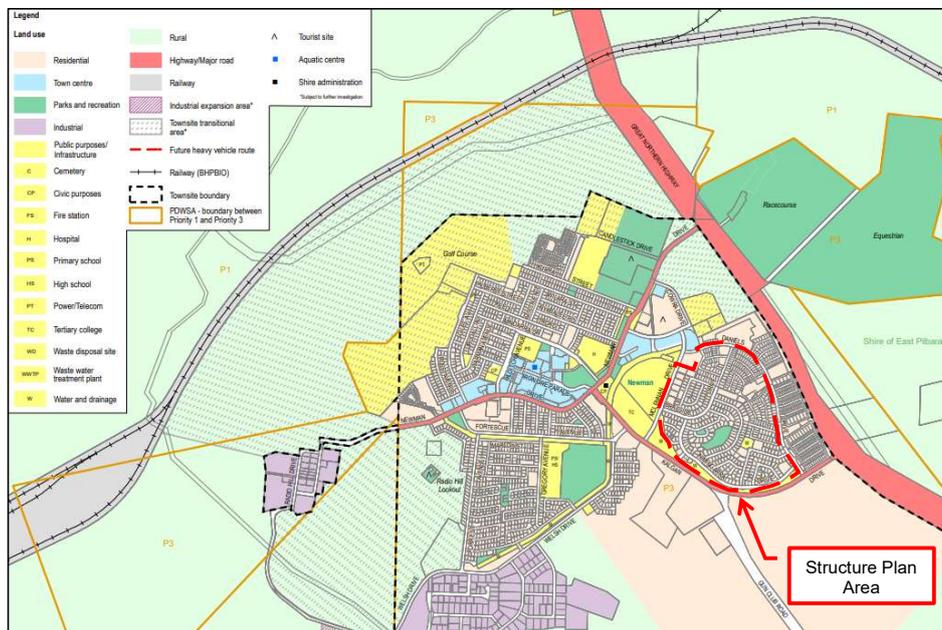
### 3 Existing Situation

#### 3.1 Existing Land Uses

The LSP area is currently zoned as 'Residential'. There are two lots zoned as 'Parks and Recreation' and areas for 'Public Infrastructure – Water and Drainage'.

The LSP is surrounded primarily by residential dwellings to the south and east, Community Purpose - Tertiary college to the west and Rural/Community purpose areas in the areas to the north. Currently, the residential zoning is mixed R15/40 though it appears that most dwellings have adopted the R15 zoning (based on the lot sizes).

Figure 3-1 Existing Local Planning Scheme Zoning



Source: Shire of East Pilbara Local Planning Strategy – Endorsed by WA Planning Commission July 2021

The eastern side of the site corresponds to LandCorp Subdivision projected for single residential dwelling types as shown below in Figure 3-2.

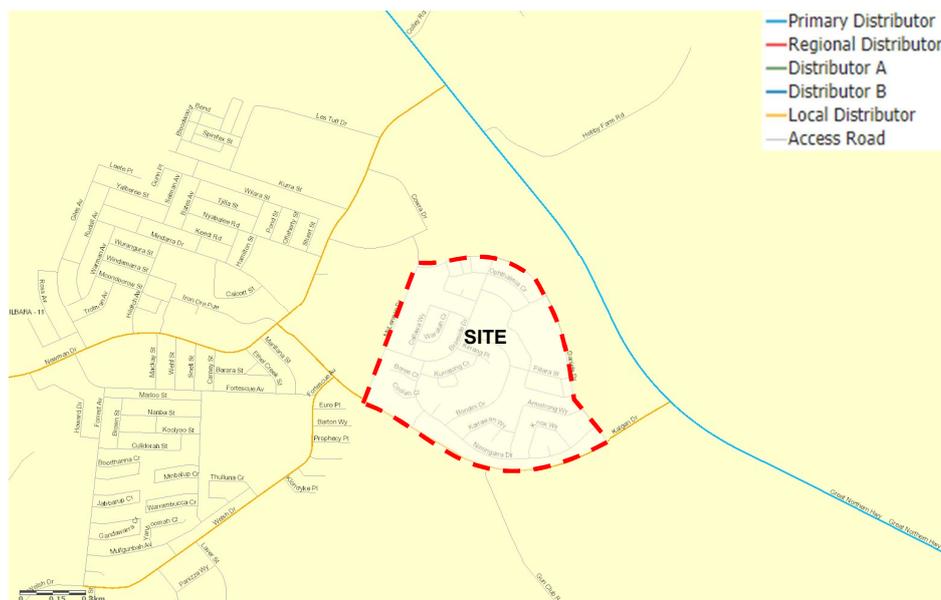


The Site is bounded by McLennan Drive to the west and Kalgan Drive to the south and Daniels Drive to the north/east. The surrounding road network is further described in **Table 3-1** and shows the hierarchy as per the Main Roads WA Road Information Mapping System, whilst **Figure 3-3** shows the road hierarchy.

Table 3-1 Road Network Classification

| Road Names             | Road Hierarchy      |                  |              | Road Network     |           |                    |
|------------------------|---------------------|------------------|--------------|------------------|-----------|--------------------|
|                        | Road Hierarchy      | Jurisdiction     | No. of Lanes | No. of Footpaths | Width (m) | Speed Limit (km/h) |
| McLennan Drive         | Access Road         | Local Government | 2            | 1                | 7.6       | 50                 |
| Daniels Drive          | Access Road         | Local Government | 2            | 1-2              | 11.5      | 50                 |
| Kalgan Drive           | Local Distributor   | Local Government | 2            | 1                | 8         | 60                 |
| Great Northern Highway | Primary Distributor | Main Roads WA    | 2            | 0                | 7         | 70                 |

Figure 3-3 Road Hierarchy Map



Source: MRWA Road Information Mapping System

The following discusses the intersections / roads that surround the proposed Site:

- > **Daniels Drive / Kalgan Drive intersection** is located at the south-eastern corner of the site. The intersection is a three-way give way control intersection where Daniels Drive forms the minor road and gives way to Kalgan Drive.

Figure 3-4 Daniels Drive / Kalgan Road Intersection



Source: MetroMap 2022

- > **Corunna Way / Kalgan Drive** is located near the south-western corner of the site. The intersection is a three-way give way control T-intersection, with Kalgan Drive having traffic priority over Corunna Way.

Figure 3-5 Corunna Way / Kalgan Drive Intersection



Source: MetroMap 2022

- > **McLennan Drive / Kalgan Drive** is located on the southwest corner of the site. The intersection is a three-way give way control T-intersection, with Kalgan Drive having the traffic priority.

Figure 3-6 McLennan Drive / Kalgan Drive Intersection



Source: MetroMap 2022

- > **McLennan Drive / Braeside Drive** is located towards the west of the site. The intersection is a three-way give way control T-intersection, with McLennan Drive having traffic priority over Braeside Drive.

Figure 3-7 McLennan Drive / Braeside Drive Intersection



Source: MetroMap 2022

- > **McLennan Drive / Daniels Drive** is located on the northwest corner of the site. The intersection is a three-way give way control T-intersection, with McLennan Drive being the priority road. Daniels Drive is a two-way divided road with a 3.2m wide median.

Figure 3-8 McLennan Drive / Daniels Drive Intersection



Source: MetroMap 2022

### 3.3 Existing Traffic Volumes

Existing weekday traffic volumes were obtained from data provided by the Shire of East Pilbara for key road sections in the vicinity of the Site.

Table 3-2 Existing Weekdays Traffic Volume

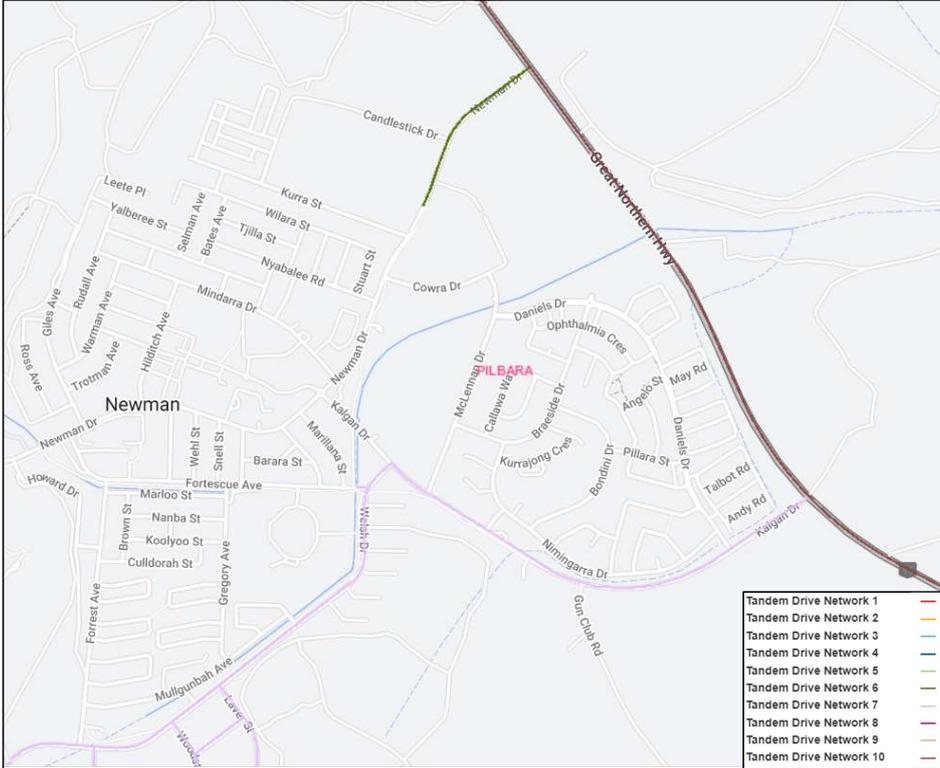
| Road Name                                 | Year      | Daily (vpd) | AM Peak Hour (vph) | PM Peak Hour (vph) | Heavy Vehicle % |
|---|-----------|-------------|--------------------|--------------------|-----------------|
| Kalgan Drive 20m West of McLennan Drive   | 2019      | 5,047       | 386                | 415                | 20.5%           |
| Kalgan Drive 20m West of Corunna Way      | 2019      | 3,682       | 297                | 293                | 20.2%           |
| Kalgan Drive 30m East of Corunna Way      | 2019      | 2,515       | 220                | 196                | 28.2%           |
| McLennan Drive 100m North of Kalgan Drive | 2019      | 1,281       | 102                | 121                | 8.2%            |
| Daniels Drive 40m East of Joffre Lane     | 2019-2020 | 336         | 19                 | 31                 | 10.6%           |

Source: Shire of East Pilbara Traffic Count Data (MetroCount)

### 3.4 Existing Restricted Access Vehicles (RAV) Network

The existing RAV network is shown below in **Figure 3-9**. Most of the roads within the area are not included in the RAV network. Great Northern Highway is included as part of the RAV 10 network and Kalgan Drive is part of the RAV 7 network with conditions.

Figure 3-9 RAV Network Map



Source: Main Roads WA Tandem Drive Network

### 3.5 Existing Public Pedestrian/Cyclist Network

There are no dedicated cycling facilities within the LSP itself, as well as on the road frontages of the LSP. In the surrounding network, 2m shared paths are provided on at least one side of important access streets for shared pedestrian/cyclists use.

### 3.6 Existing Public Transport Network

Newman currently does not have Public Transport Services. The available service by the Shire of East Pilbara is the Regular Passenger Transport Bus that covers the Shire of east Pilbara and operates from Monday to Friday.

### 3.7 Crash Assessment

A crash assessment within close proximity of the subject site has been completed. The assessment covers all the recorded accidents in between 1 January 2017 and 31 December 2021 at the intersections and sections of road within this area.

The severity of the crashes recorded at the intersections listed above are shown in **Figure 3-10**.

Figure 3-10 Crash Locations

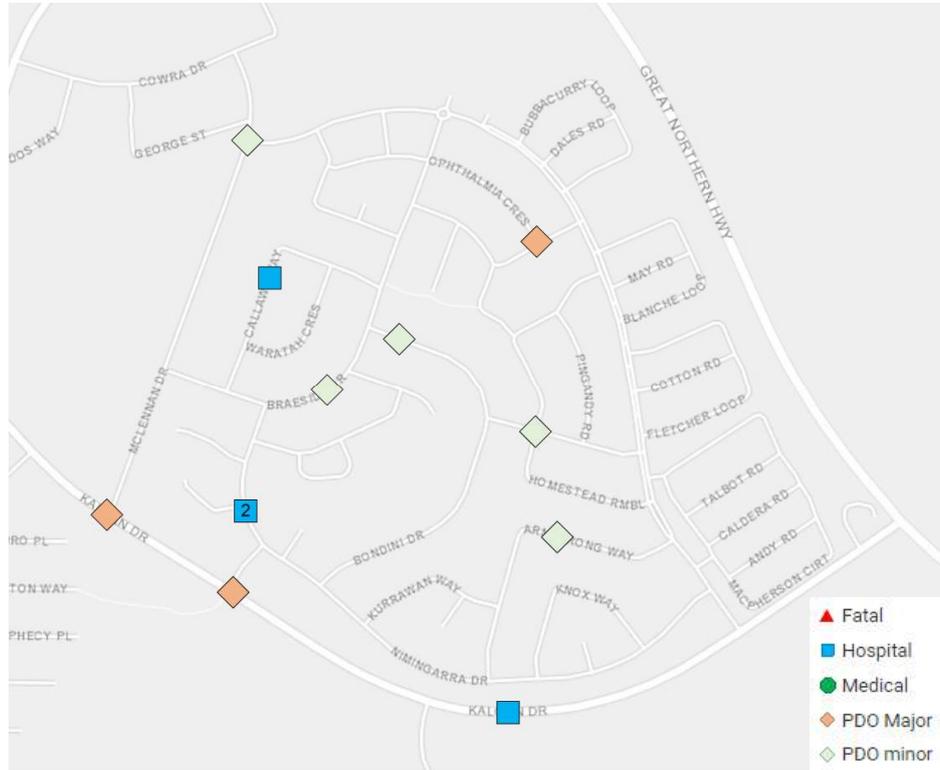


Table 3-3 Summary of Midblock Crashes

| Roads Midblocks | Fatal    | Hospital | Medical  | Major Property Damage | Minor Property Damage | Total Crashes |
|-----------------|----------|----------|----------|-----------------------|-----------------------|---------------|
| Weeli Wolli Wy  | -        | -        | -        | 1                     | -                     | 1             |
| Nimingarra Dr   | -        | 2        | -        | -                     | -                     | 2             |
| Armstrong Wy    | -        | -        | -        | -                     | 1                     | 1             |
| Bondini Dr      | -        | -        | -        | -                     | 1                     | 1             |
| Callawa Wy      | -        | 1        | -        | -                     | -                     | 1             |
| Braeside Dr     | -        | -        | -        | -                     | 1                     | 1             |
| Kalgan Dr       | -        | 1        | -        | -                     | -                     | 1             |
| <b>Total</b>    | <b>0</b> | <b>4</b> | <b>0</b> | <b>1</b>              | <b>3</b>              | <b>8</b>      |

Table 3-4 Summary of Intersection Crashes

| Road Intersections        | Fatal    | Hospital | Medical  | Major Property Damage | Minor Property Damage | Total Crashes |
|---------------------------|----------|----------|----------|-----------------------|-----------------------|---------------|
| Pillara St/Homestead Rmbl | -        | -        | -        | -                     | 1                     | 1             |
| Daniels Dr/McLennan Dr    | -        | -        | -        | -                     | 1                     | 1             |
| Kalgan Dr/McLennan Dr     | -        | -        | -        | 1                     | -                     | 1             |
| Kalgan Dr/Corunna Wy      | -        | -        | -        | 1                     | -                     | 1             |
| <b>Total</b>              | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b>              | <b>2</b>              | <b>4</b>      |

Table 3-5 Summary of Crashes by Type

| Road Intersections | Fatal    | Hospital | Medical  | Major Property Damage | Minor Property Damage | Total Crashes |
|--------------------|----------|----------|----------|-----------------------|-----------------------|---------------|
| Right Angle        | -        | -        | -        | 3                     | 1                     | 4             |
| Hit Object         | -        | -        | -        | -                     | 3                     | 3             |
| Non-Collision      | -        | -        | 2        | -                     | -                     | 2             |
| Rear End           | -        | -        | -        | -                     | 1                     | 1             |
| Hit Pedestrian     | -        | -        | 2        | -                     | -                     | 2             |
| <b>Total</b>       | <b>0</b> | <b>0</b> | <b>4</b> | <b>3</b>              | <b>5</b>              | <b>12</b>     |

From the crash assessment conducted above, the following conclusions can be derived:

- > 4 crashes requiring hospital treatment were recorded within the surrounding area though it appears that these crashes were the result of driver error
- > Kalgan Drive had the highest number of crashes with 3 in total.
- > There does not appear to be a reoccurring pattern of crashes which suggest that many of these crashes are independent of one another.
- > Overall, the number of crashes within the surrounding area of the Site is not considered to be significant and the safety impacts of the proposed development is likely to be negligible on the road network.

## 4 Proposed Internal Transport Network

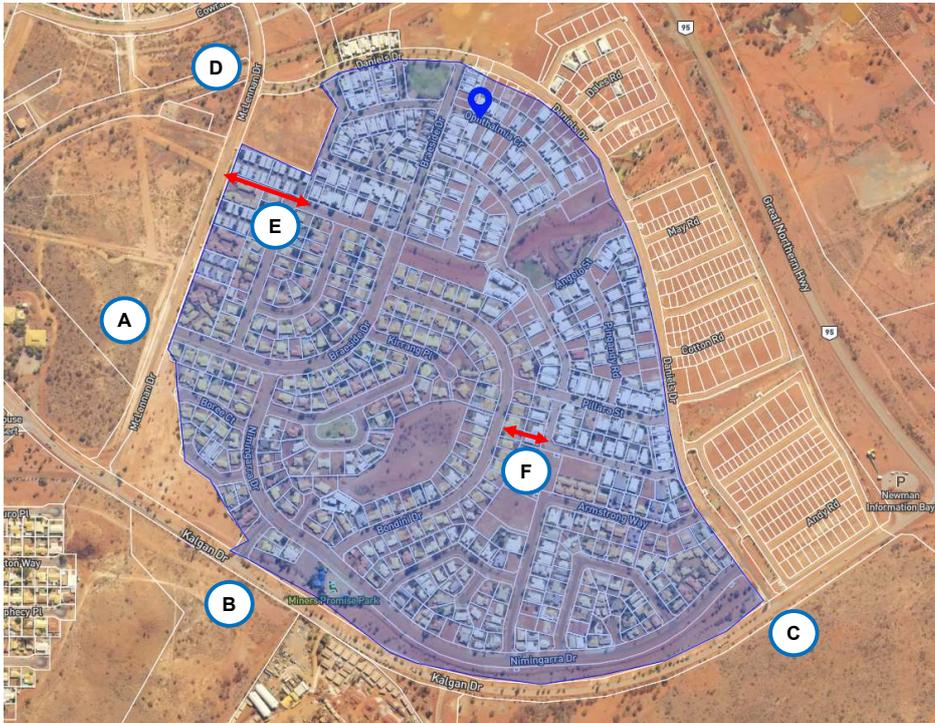
### 4.1 Internal Road Network / Access

The proposed internal road network and accesses are shown below in **Figure 4-1**. There are 4 main access points proposed to the LSP:

- > Access A – Braeside / McLennan Drive. T intersection, all movements allowed.
- > Access B – Kalgan Drive / Corunna Way. T intersection, all movements allowed.
- > Access C – Kalgan Drive / Daniels Drive. T intersection, all movements allowed.
- > Access D – McLennan Drive / Daniels Drive. T intersection, all movements allowed.

The LSP is also proposing two new road links to improve connectivity; one connecting McLennan Drive and Callawa Way (Access E) and an internal connection between Bondini Drive and Homestead Ramble (connection F).

Figure 4-1 Internal Road Network and Access



### 4.2 Intersection Controls

Most intersections within the LSP area (including the main access points) comprise of T-intersections which are give-way controlled.

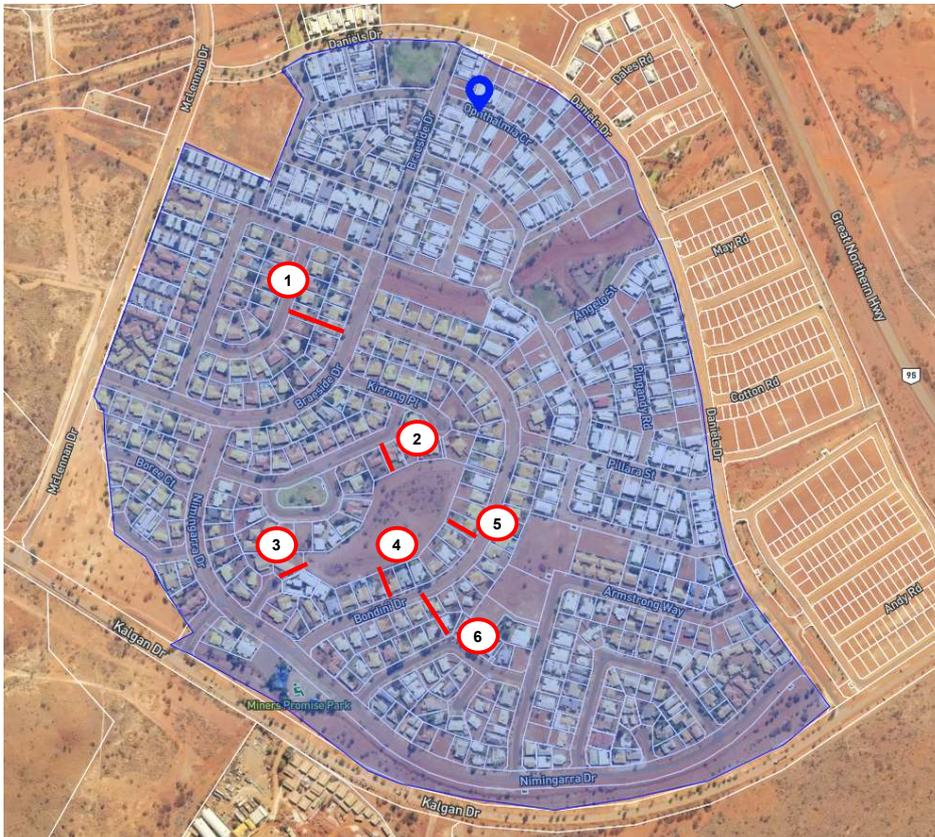
### 4.3 Internal Pedestrian / Cycle Network

In addition to the existing path network, there are six (6) new path connections proposed within the area with the goal of improving access to open space areas and walkability within the precinct (refer to **Figure 4-2**).

- > Path 1 – Providing connection between Waratah Crescent and Braeside Drive.
- > Path 2 – Providing connection between Kurrajong Crescent and the Iconic Central Park.
- > Path 3 – Providing connection between Arika Place and the Iconic Central Park.
- > Path 4 and 5 – Providing connection between Bondini Drive and the Iconic Central Park.
- > Path 6 – Providing connection between Karrawan Way and Bondini Drive.

Details for the pedestrian/cycling access will be provided at individual development stage when detailed site plans are available. It is envisaged that adequate connections between the LSP and the surrounding path network will be provided, as well as internal path and crossing facilities between car parks and buildings within the LSP.

Figure 4-2 Internal Pedestrian / Cycle Network



## 5 Changes to External Transport Network

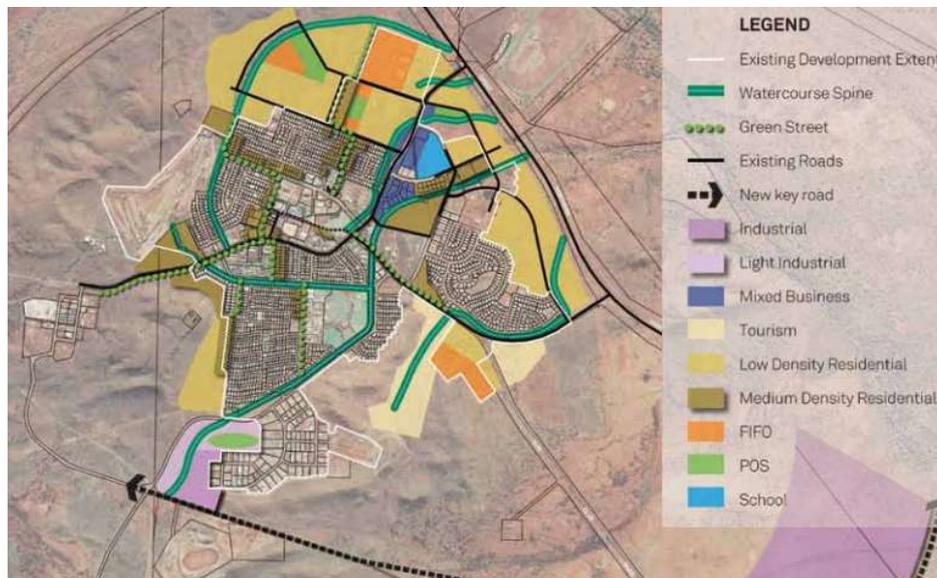
### 5.1 External Road Network

Based on the information provided by Main Roads WA and the Shire of East Pilbara, there are no proposed road upgrades within the vicinity of the site.

### 5.2 External Pedestrian / Cycle Network

The Local Planning Strategy includes commentary on implementing a pathway plan to prioritise pedestrian and cycle upgrades and connect the townsite, extending the existing pedestrian and cycle network to improve connectivity.

Figure 5-1 Pedestrian Connection



Source: Newman Revitalisation Plan – Volume I. Implementation Plan

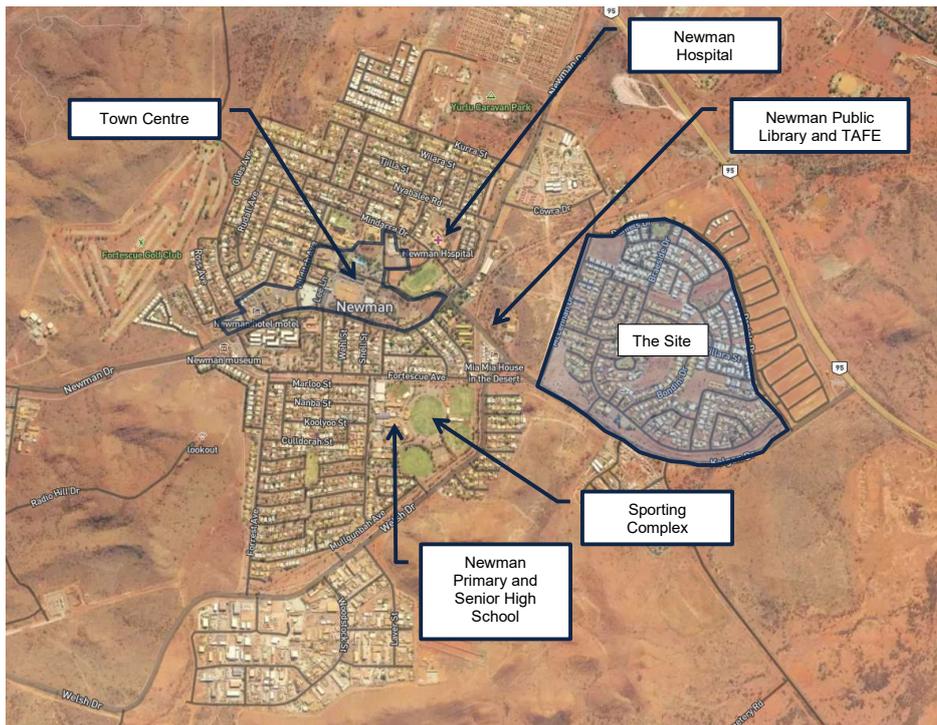
### 5.3 Public Transport Network

Discussions around the public transport network in Newman were included in the *Newman Revitalisation Plan - Volume 1*. The Public Transport Authority has advised that a town of 15,000 people would require a fleet of seven buses and a 4ha bus depot site. East Newman is considered beyond a reasonable (10 minute) walking distance from the town centre and the tolerance for walking distances should be considered reduced even further in environments lacking shade or amenity. In the short to medium term, it may be appropriate for the Shire of East Pilbara to introduce a community shuttle bus service between outer areas and key locations such as the town centre, hospital, recreation centre and high school. An Integrated Transport Plan is required, which should examine the future provision of a community bus service as the size and population of Newman town site grows.

## 6 Integration with Surrounding Area

### 6.1 Surrounding Attractors and Generators

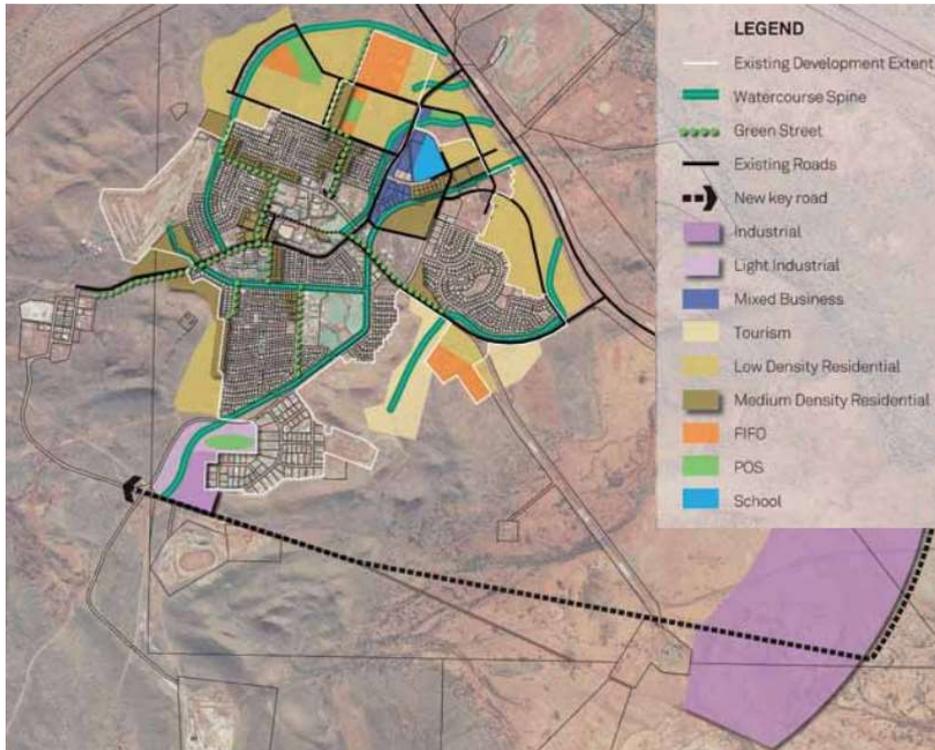
The major traffic generators that would be attracted to the LSP would be from the surrounding public community purpose infrastructure, the town centre and recreation areas within Newman.



### 6.2 Proposed Changes to Surrounding Land Uses

The area surrounding the LSP is currently vacant land, though the *Newman Revitalisation Plan's Integrated Strategy* indicates low to medium density residential and tourism facilities in the immediate vicinities of the Site as shown below in **Figure 6-1**.

Figure 6-1 Integrated Strategy – Land uses



Source: Newman Revitalisation Plan – Volume I. Implementation Plan

### 6.3 Accessibility to Surrounding Area

Good vehicular access to the above trip attractors is available via the existing road network within Newman. The site is connected to the Great Northern Highway and Marble Bar Road which provide connection to the other towns within the Shire.

There are no public transport services within the town; the existing bus service corresponds to the RPT (Regular Passenger Transport) that covers the route of Newman, Nullagine, Marble Bar, Port Hedland and South Hedland.

The existing internal path network connects pedestrians and cyclists to the surrounding areas; additionally, the Martu Walking Trails connect the site to the north, west and south. Additional paths will be provided within the site to improve connectivity and expand the path network.

## 7 Analysis of Transport Network

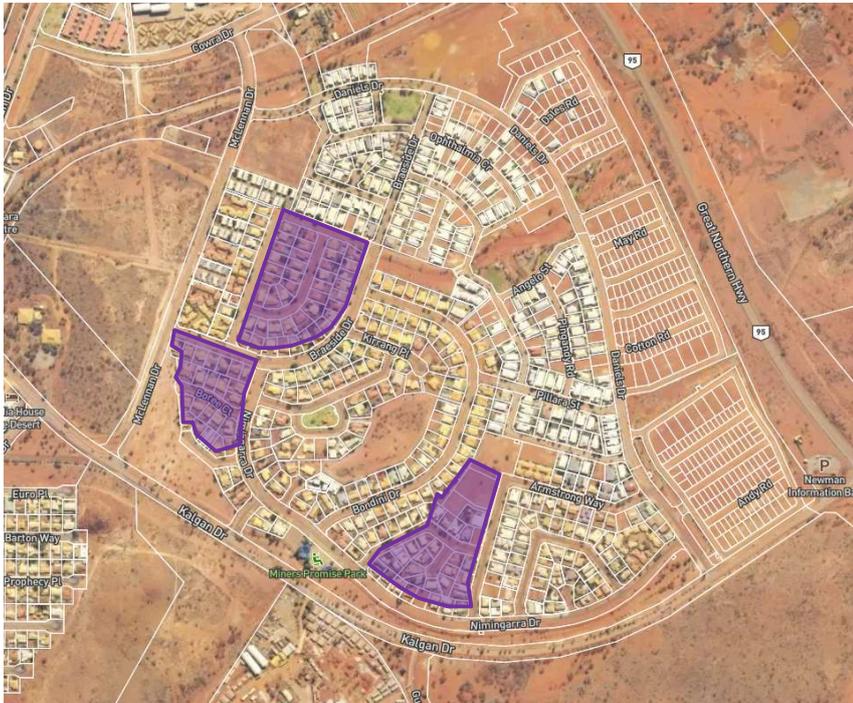
### 7.1 Development Traffic Generation

Trip generation rates were sourced from the Trip Generation Manual 10<sup>th</sup> Edition from the Institute of Transportation Engineers ITE based on the land uses proposed for the Structure Plan. **Table 7-1** below shows the trip rates for the proposed land use, **Table 7-2** shows the directional distribution and **Table 7-3** shows the resultant trip generation.

The LSP also proposes an increase to the residential density of the R15/40 areas shown in **Figure 7-1**. Therefore, three trip generation scenarios have been determined based on the different residential densities as summarised below:

- > All R40 residential in selected areas
- > Mix of R40 and R15 residential in selected areas (assumed to be split 50/50 and shown in **Table 7-4**)
- > All R15 residential in selected areas (shown in **Table 7-5**)

Figure 7-1 Areas for Increase Housing Yield



Note that the trip generation is very conservative due to the following reasons:

- > Consideration for internal trip capture and walking trips have not been included (i.e. every vehicle is considered to be a new trip generated externally). It is likely that a high proportion of trips will be generated internally from locals that walk or drive to the commercial/retail stores and community use facilities.
- > The proposed LSP includes the removal or changes to some residential dwellings. The traffic volumes generated by these removed land uses has not been removed from the surrounding road network.

Commented [RC1]: no reference to 7-4 or 7-5

- > The actual building footprint or occupied areas usually does not cover the entire lot area. Therefore, using the lot areas to calculate the non-residential trip generation results in much higher traffic volume estimates.

Table 7-1 Trip Generation Rate

| Land Use          | Source  | AM Peak Rate               | PM Peak Rate               | Daily Rate                  |
|-------------------|---------|----------------------------|----------------------------|-----------------------------|
| Residential       | ITE 210 | 0.76 per dwelling          | 1 per dwelling             | 9.44 per dwelling           |
| Community Use     | ITE 495 | 1.86 per 100m <sup>2</sup> | 2.48 per 100m <sup>2</sup> | 31.02 per 100m <sup>2</sup> |
| Medical           | ITE 630 | 5.62 per 100m <sup>2</sup> | 4.99 per 100m <sup>2</sup> | 41.08 per 100m <sup>2</sup> |
| Commercial/Retail | ITE 820 | 3.23 per 100m <sup>2</sup> | 4.53 per 100m <sup>2</sup> | 40.64 per 100m <sup>2</sup> |

Table 7-2 Trip Directional Distribution

| Land Use          | AM Peak |     | PM Peak |     | Daily |     |
|-------------------|---------|-----|---------|-----|-------|-----|
|                   | In      | Out | In      | Out | In    | Out |
| Residential       | 26%     | 74% | 64%     | 36% | 50%   | 50% |
| Community Use     | 63%     | 37% | 46%     | 54% | 50%   | 50% |
| Medical           | 58%     | 42% | 46%     | 54% | 50%   | 50% |
| Commercial/Retail | 54%     | 46% | 50%     | 50% | 50%   | 50% |

Table 7-3 Estimated Trip Generation (with R40 Residential)

| Land Use          | Yield                | AM Peak    |            | PM Peak    |            | Daily       |             |
|-------------------|----------------------|------------|------------|------------|------------|-------------|-------------|
|                   |                      | In         | Out        | In         | Out        | In          | Out         |
| Residential (R40) | 335 dwellings        | 66         | 188        | 214        | 121        | 1582        | 1582        |
| Community Use     | ~9845 m <sup>2</sup> | 115        | 68         | 112        | 132        | 1528        | 1528        |
| Medical           | ~4382 m <sup>2</sup> | 143        | 103        | 101        | 118        | 901         | 901         |
| Commercial/Retail | ~3303 m <sup>2</sup> | 58         | 49         | 75         | 75         | 672         | 672         |
| <b>Total</b>      |                      | <b>382</b> | <b>409</b> | <b>502</b> | <b>445</b> | <b>4683</b> | <b>4683</b> |
|                   |                      | <b>791</b> |            | <b>947</b> |            | <b>9366</b> |             |

Table 7-4 Estimated Trip Generation (with R40/15 Residential)

| Land Use             | Yield                | AM Peak    |            | PM Peak    |            | Daily       |             |
|----------------------|----------------------|------------|------------|------------|------------|-------------|-------------|
|                      |                      | In         | Out        | In         | Out        | In          | Out         |
| Residential (R40/15) | 230 dwellings        | 45         | 129        | 147        | 83         | 1086        | 1086        |
| Community Use        | ~9845 m <sup>2</sup> | 115        | 68         | 112        | 132        | 1528        | 1528        |
| Medical              | ~4382 m <sup>2</sup> | 143        | 103        | 101        | 118        | 901         | 901         |
| Commercial/Retail    | ~3303 m <sup>2</sup> | 58         | 49         | 75         | 75         | 672         | 672         |
| <b>Total</b>         |                      | <b>361</b> | <b>350</b> | <b>435</b> | <b>408</b> | <b>4187</b> | <b>4187</b> |
|                      |                      | <b>711</b> |            | <b>842</b> |            | <b>8374</b> |             |

Table 7-5 Estimated Trip Generation (with R15 Residential)

| Land Use          | Yield                | AM Peak    |            | PM Peak    |            | Daily       |             |
|-------------------|----------------------|------------|------------|------------|------------|-------------|-------------|
|                   |                      | In         | Out        | In         | Out        | In          | Out         |
| Residential (R15) | 126 dwellings        | 25         | 71         | 81         | 45         | 595         | 595         |
| Community Use     | ~9845 m <sup>2</sup> | 115        | 68         | 112        | 132        | 1528        | 1528        |
| Medical           | ~4382 m <sup>2</sup> | 143        | 103        | 101        | 118        | 901         | 901         |
| Commercial/Retail | ~3303 m <sup>2</sup> | 58         | 49         | 75         | 75         | 672         | 672         |
| <b>Total</b>      |                      | <b>341</b> | <b>291</b> | <b>368</b> | <b>370</b> | <b>3696</b> | <b>3696</b> |
|                   |                      |            | <b>632</b> |            | <b>738</b> |             | <b>7392</b> |

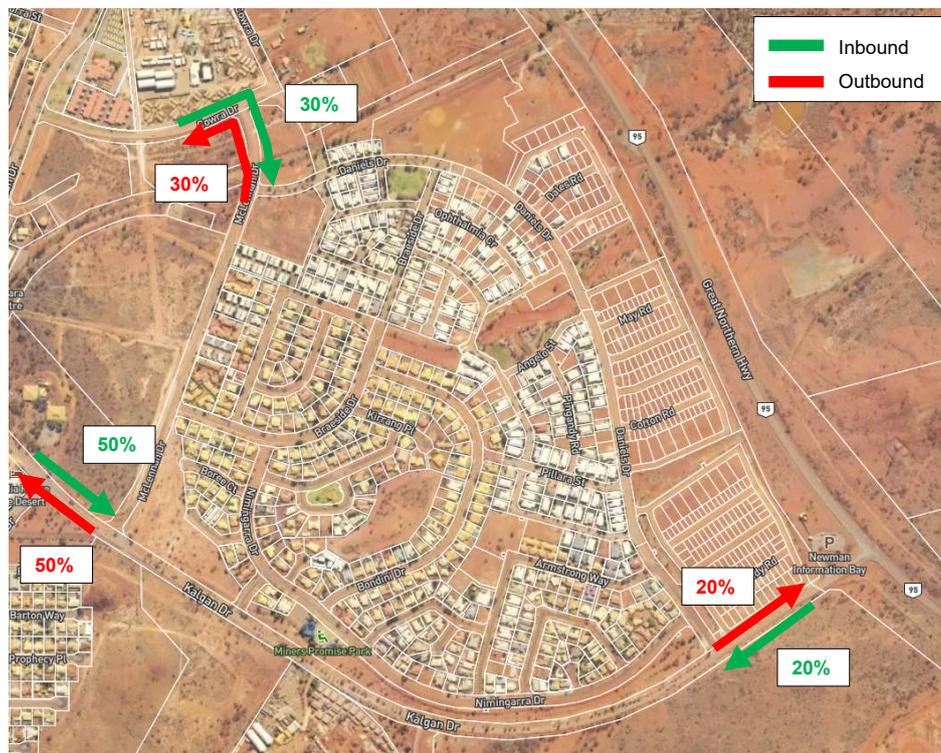
### 7.2 Trip Distribution

Figure 7-2 shows the assumed trip distribution for the different land uses within the LSP. The majority of traffic (50%) is expected to travel to/from the west along Kalgan Drive. This assumption is based on the fact that Kalgan Drive serves as the primary route to and from the Newman Town Centre where most of the traffic from this development is travelling to/from.

A proportion (30%) of traffic is expected to travel to/from the north along McLennan Drive which links to Newman Drive via Cowra Drive. This route is most likely to be used by people who reside in the northern areas of the LSP.

A small proportion is anticipated to travel to/from east heading to Great Northern Highway to account for mine site workers heading in this direction.

Figure 7-2 Trip Distribution



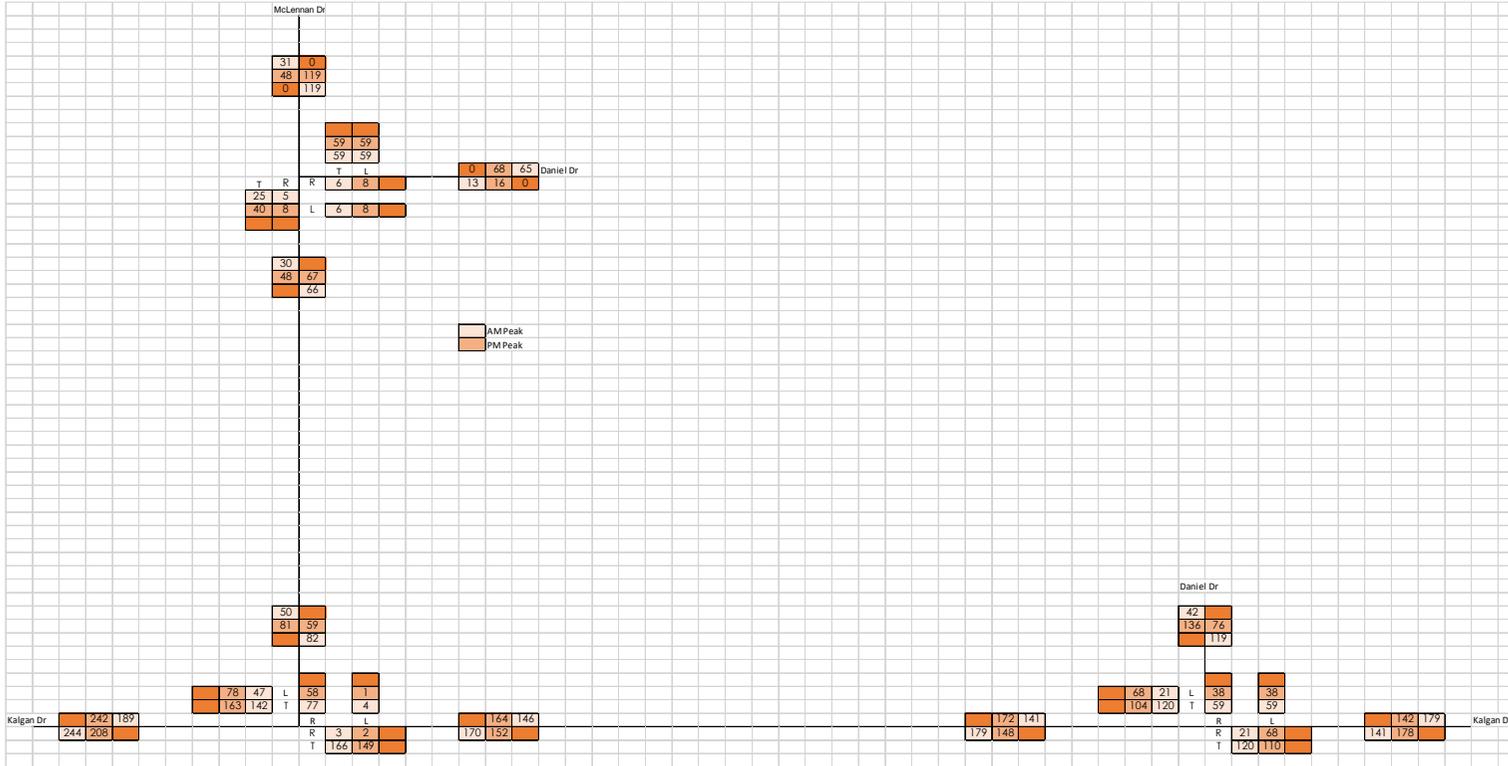
### 7.3 Background Traffic

Background traffic data was sourced from available traffic data provided by Shire of East Pilbara. As the traffic data was recorded in 2019/2020 a 2% background growth was applied up to 2022 (further growth beyond 2022 has not been applied as the LSP will be responsible for most of the growth within the surrounding road network). With regards to turning movements at the intersections, the following methodology was used for each of the intersection assessments:

- > McLennan Drive/Daniels Drive – traffic volumes were available on the eastern approach along Daniels Drive and these volumes were assumed to distribute 50% north and 50% south.
- > McLennan Drive/Kalgan Drive – as the data provided midblock counts at all approaches to this intersection, a simple gravity model was used to distribute the turning movements at this intersection
- > Daniels Drive/Kalgan Drive – A trip generation exercise was conducted to estimate the volumes of traffic entering and existing Daniels Drive at this intersection (based on proximity to the intersection). These volumes were assumed to distribute of 50% west and 50% east.

**Figure 7-3** shows the background traffic volumes for the assessment intersections.

Figure 7-3 Scenario 1 – Base Year 2022



## 7.4 Key Intersection Analysis

### 7.4.1 Analysis Scenario Summary

The following assessment scenarios were undertaken. Background growth on the surrounding road network was not considered as the main cause for traffic growth is associated with the LSP development.

- > Scenario 1 – Base Year 2022
- > Scenario 2 – Base Year + 20% Development (Opening Year)
- > Scenario 3 – Base year + Full Development Buildout

A SIDRA Network analysis has been undertaken for the AM and PM peak hours for the following intersections:

- > McLennan Drive/Daniels Drive
- > McLennan Drive/Kalgan Drive
- > Daniels Drive/Kalgan Drive

### 7.4.2 SIDRA Results Definition

The subject intersections were analysed using the SIDRA analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters are defined as follows:

- > Degree of Saturation (DOS) is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The theoretical intersection capacity is exceeded for an unsignalised intersection where  $DOS > 0.80$ ;
- > 95% Queue is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected;
- > Average Delay is the average of all travel time delays for vehicles through the intersection. An unsignalised intersection can be considered to be operating at capacity where the average delay exceeds 55 seconds for any movement; and
- > Level of Service (LOS) is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 7-6**.

Table 7-6 Level of Service (LoS) Performance Criteria

| LOS | Description                                     | Signalised Intersection | Unsignalised Intersection |
|-----|---|-------------------------|---------------------------|
| A   | Free-flow operations (best condition)           | ≤10 sec                 | ≤10 sec                   |
| B   | Reasonable free-flow operations                 | 10-20 sec               | 10-15 sec                 |
| C   | At or near free-flow operations                 | 20-35 sec               | 15-25 sec                 |
| D   | Decreasing free-flow levels                     | 35-55 sec               | 25-35 sec                 |
| E   | Operations at capacity                          | 55-80 sec               | 35-50 sec                 |
| F   | A breakdown in vehicular flow (worst condition) | ≥80 sec                 | ≥50 sec                   |

A LOS exceeding these values indicates that the road section is exceeding its practical capacity. Above these values, users of the intersection are likely to experience unsatisfactory queuing and delays during the peak hour periods. The SIDRA outputs are provided in **Appendix B**.

### 7.4.3 Assessment Assumptions

The following assumptions were used for the purpose of this assessment:

- > Though the trip generation was calculated for 3 different residential density scenarios, only the R40 residential scenario has been considered for the purpose of this assessment as it is considered the worst case.

- > Existing traffic volumes and heavy vehicle proportions were provided by the Shire of East Pilbara. Regarding turning movements at the intersections, the following methodology was used for each of the assessment intersection:
  - McLennan Drive/Daniels Drive – traffic volumes were available on the eastern approach along Daniels Drive and these volumes were assumed to distribute 50% north and 50% south.
  - McLennan Drive/Kalgan Drive – as the data provided midblock counts at all approaches to this intersection, a simple gravity model was used to distribute the turning movements at this intersection
  - Daniels Drive/Kalgan Drive – A trip generation exercise was conducted to estimate the volumes of traffic entering and existing Daniels Drive at this intersection (based on proximity to the intersection). These volumes were assumed to distribute of 50% west and 50% east.
- > No background growth has been applied to the surrounding road network as the increase in traffic volumes along these roads are associated with the development within the LSP.
- > For the purpose of a conservative assessment, the traffic generated by the existing developments in the LSP were not removed from the road network.

#### 7.4.4 Peak Hour Traffic Flows

**Figure 7-4** and **Figure 7-5** shows the opening year and full development traffic peak hour traffic flows.

Figure 7-4 Scenario 2 – Base Year + 20% Development (Opening Year)

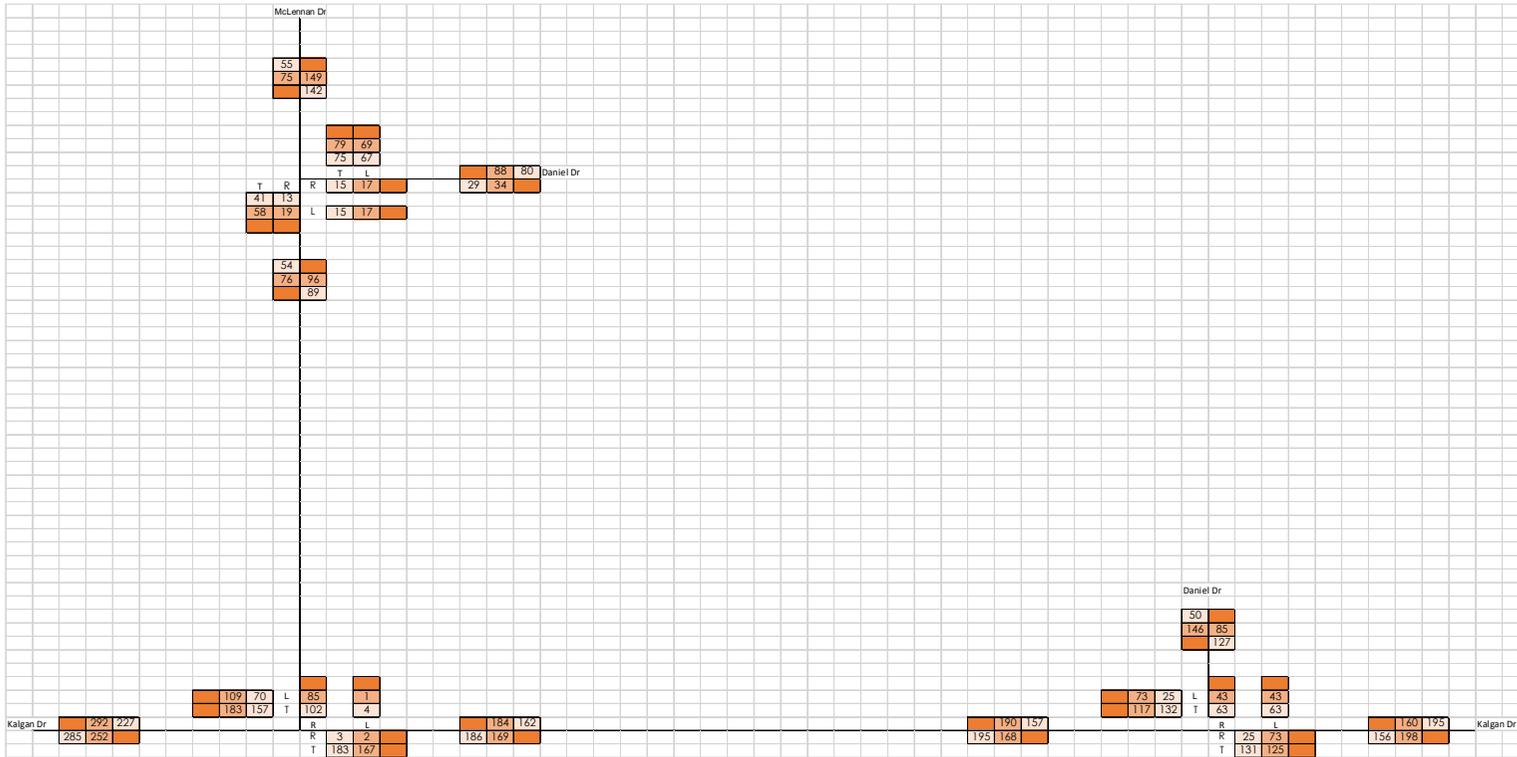
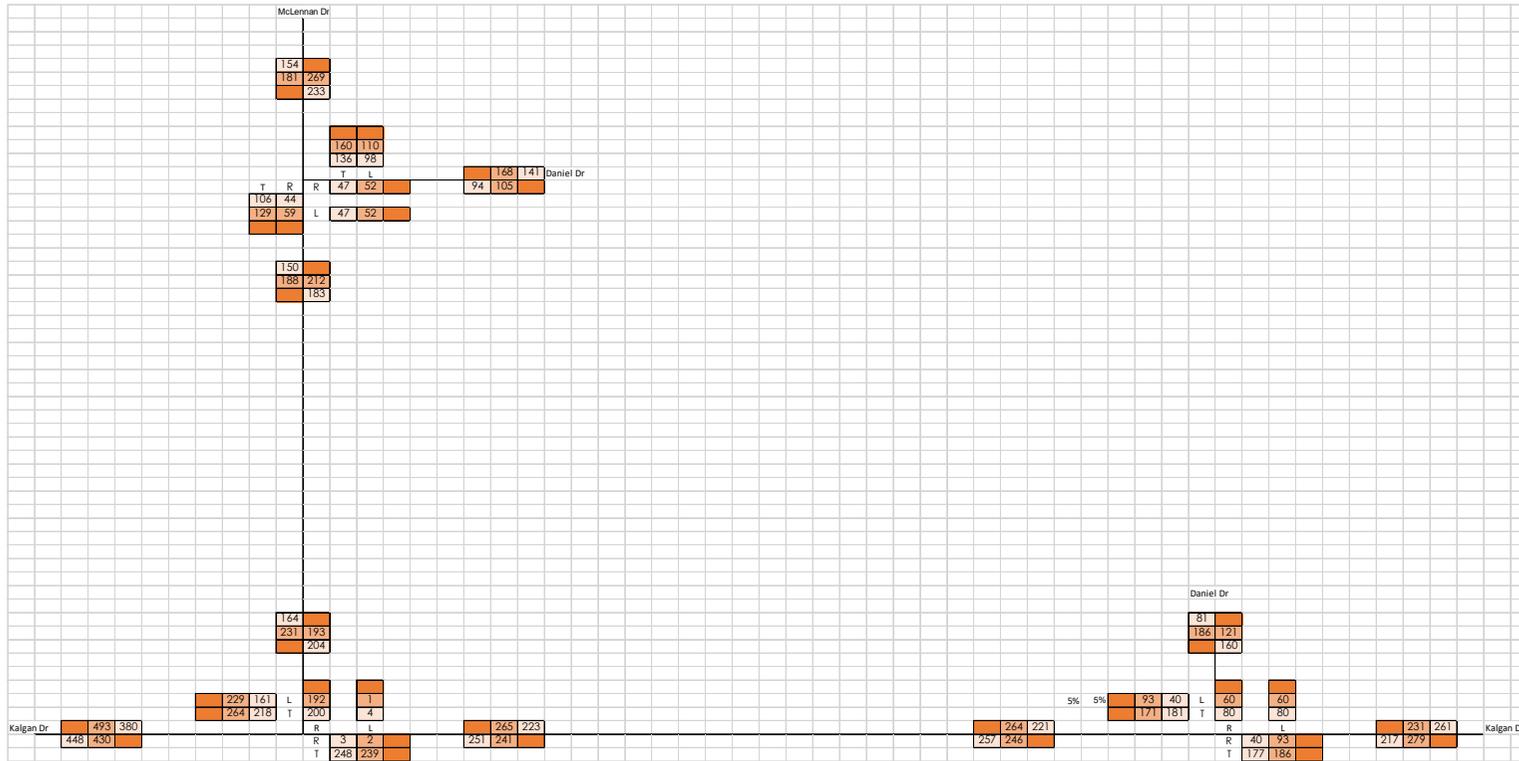


Figure 7-5 Scenario 3 – Base year + Full Development Buildout



7.4.5 McLennan Drive/Daniels Drive

The SIDRA layout of McLennan Drive/Daniels Drive is shown in **Figure 7-6**. The analysis results for intersection are presented in **Table 7-7** through to **Table 7-9**.

The results show that the intersection would operate satisfactorily in year 2032 and would be able to cater for the proposed LSP.

Figure 7-6 McLennan Drive/Daniels Drive SIDRA Layout

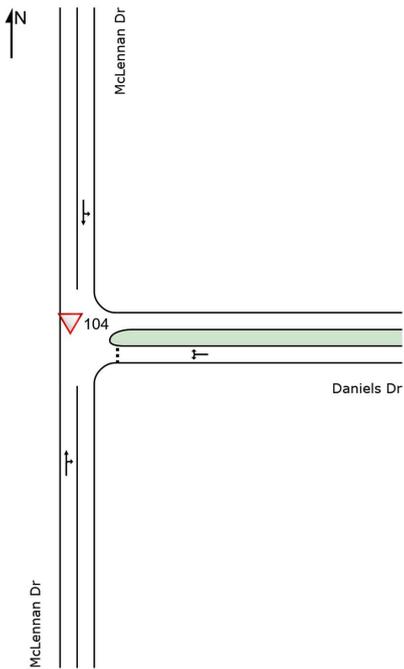


Table 7-7 McLennan Drive/Daniels Drive SIDRA Results – Scenario 1

| Intersection Approach | Base Year 2022 |       |     |               |         |       |     |               |     |
|-----------------------|----------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                       | AM Peak        |       |     |               | PM Peak |       |     |               |     |
|                       | DOS            | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| South: McLennan Drive | T              | 0.016 | 0.1 | A             | 0.2     | 0.027 | 0   | A             | 0.4 |
|                       | R              | 0.016 | 5.7 | A             | 0.2     | 0.027 | 5.6 | A             | 0.4 |
| East: Daniels Drive   | L              | 0.01  | 5.8 | A             | 0.2     | 0.013 | 5.7 | A             | 0.3 |
|                       | R              | 0.01  | 5.8 | A             | 0.2     | 0.013 | 5.8 | A             | 0.3 |
| North: McLennan Drive | L              | 0.049 | 5.5 | A             | 0       | 0.038 | 5.5 | A             | 0   |
|                       | T              | 0.049 | 0   | A             | 0       | 0.038 | 0   | A             | 0   |
| All Vehicles          |                | 0.049 | 1   | A             | 0.2     | 0.038 | 1.5 | A             | 0.4 |

Table 7-8 McLennan Drive/Daniels Drive SIDRA Results – Scenario 2

| Intersection Approach | Base Year 2024 + 20% Development |       |     |               |         |       |     |               |     |
|-----------------------|----------------------------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                       | AM Peak                          |       |     |               | PM Peak |       |     |               |     |
|                       | DOS                              | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| South: McLennan Drive | T                                | 0.031 | 0.1 | A             | 0.6     | 0.043 | 0.1 | A             | 0.8 |
|                       | R                                | 0.031 | 5.8 | A             | 0.6     | 0.043 | 5.7 | A             | 0.8 |
| East: Daniels Drive   | L                                | 0.023 | 5.8 | A             | 0.6     | 0.026 | 5.8 | A             | 0.6 |
|                       | R                                | 0.023 | 6   | A             | 0.6     | 0.026 | 6   | A             | 0.6 |
| North: McLennan Drive | L                                | 0.062 | 5.5 | A             | 0       | 0.055 | 5.5 | A             | 0   |
|                       | T                                | 0.062 | 0   | A             | 0       | 0.055 | 0   | A             | 0   |
| All Vehicles          |                                  | 0.062 | 1.7 | A             | 0.6     | 0.055 | 2   | A             | 0.8 |

Table 7-9 McLennan Drive/Daniels Drive SIDRA Results – Scenario 3

| Intersection Approach | Base Year 2034 + Full Development |       |     |               |         |       |     |               |     |
|-----------------------|-----------------------------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                       | AM Peak                           |       |     |               | PM Peak |       |     |               |     |
|                       | DOS                               | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| South: McLennan Drive | T                                 | 0.09  | 0.3 | A             | 2.1     | 0.114 | 0.4 | A             | 2.9 |
|                       | R                                 | 0.09  | 6.2 | A             | 2.1     | 0.114 | 6.3 | A             | 2.9 |
| East: Daniels Drive   | L                                 | 0.088 | 6.1 | A             | 2.2     | 0.1   | 6.1 | A             | 2.5 |
|                       | R                                 | 0.088 | 6.9 | A             | 2.2     | 0.1   | 7.1 | A             | 2.5 |
| North: McLennan Drive | L                                 | 0.115 | 5.5 | A             | 0       | 0.126 | 5.5 | A             | 0   |
|                       | T                                 | 0.115 | 0   | A             | 0       | 0.126 | 0   | A             | 0   |
| All Vehicles          |                                   | 0.115 | 2.6 | A             | 2.2     | 0.126 | 2.8 | A             | 2.9 |

#### 7.4.6 Kalgan Drive/McLennan Drive

The SIDRA layout of Kalgan Drive/McLennan Drive is shown in **Figure 7-7**. The analysis results for intersection are presented in **Table 7-10** through to **Table 7-12**.

The results show that the intersection would operate satisfactorily and would be able to cater for the proposed LSP. No upgrade is proposed for this intersection.

Figure 7-7 Kalgan Drive/McLennan Drive SIDRA Layout

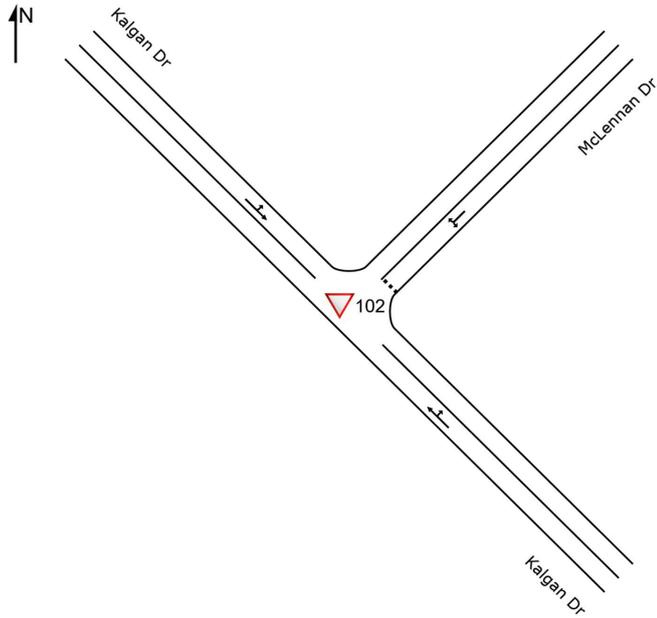


Table 7-10 Kalgan Drive/McLennan Drive SIDRA Results – Scenario 1

| Intersection Approach      | Base Year 2022 |       |     |               |         |       |     |               |     |
|----------------------------|----------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                            | AM Peak        |       |     |               | PM Peak |       |     |               |     |
|                            | DOS            | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| South East: Kalgan Drive   | T              | 0.108 | 0   | A             | 0.2     | 0.096 | 0   | A             | 0.1 |
|                            | R              | 0.108 | 6.1 | A             | 0.2     | 0.096 | 6.4 | A             | 0.1 |
| North East: McLennan Drive | L              | 0.092 | 6.2 | A             | 2.3     | 0.069 | 6.3 | A             | 1.7 |
|                            | R              | 0.092 | 7.3 | A             | 2.3     | 0.069 | 7.3 | A             | 1.7 |
| North West: Kalgan Drive   | L              | 0.117 | 5.5 | A             | 0       | 0.148 | 5.5 | A             | 0   |
|                            | T              | 0.117 | 0   | A             | 0       | 0.148 | 0   | A             | 0   |
| All Vehicles               |                | 0.117 | 2   | A             | 2.3     | 0.148 | 2   | A             | 1.7 |

Table 7-11 Kalgan Drive/McLennan Drive SIDRA Results – Scenario 2

| Intersection Approach      | Base Year + 20% Development |       |     |               |         |       |     |               |     |
|----------------------------|-----------------------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                            | AM Peak                     |       |     |               | PM Peak |       |     |               |     |
|                            | DOS                         | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| South East: Kalgan Drive   | T                           | 0.118 | 0   | A             | 0.1     | 0.109 | 0   | A             | 0.1 |
|                            | R                           | 0.118 | 6.3 | A             | 0.1     | 0.109 | 6.6 | A             | 0.1 |
| North East: McLennan Drive | L                           | 0.129 | 6.3 | A             | 3.3     | 0.11  | 6.4 | A             | 2.8 |
|                            | R                           | 0.129 | 7.6 | A             | 3.3     | 0.11  | 7.8 | A             | 2.8 |
| North West: Kalgan Drive   | L                           | 0.14  | 5.5 | A             | 0       | 0.178 | 5.5 | A             | 0   |
|                            | T                           | 0.14  | 0   | A             | 0       | 0.178 | 0   | A             | 0   |
| All Vehicles               |                             | 0.14  | 2.3 | A             | 3.3     | 0.178 | 2.4 | A             | 2.8 |

Table 7-12 Kalgan Drive/McLennan Drive SIDRA Results – Scenario 3

| Intersection Approach      | Base Year + Full Development |       |     |               |         |       |     |               |      |
|----------------------------|------------------------------|-------|-----|---------------|---------|-------|-----|---------------|------|
|                            | AM Peak                      |       |     |               | PM Peak |       |     |               |      |
|                            | DOS                          | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |      |
| South East: Kalgan Drive   | T                            | 0.164 | 0   | A             | 0.2     | 0.157 | 0   | A             | 0.2  |
|                            | R                            | 0.164 | 7.3 | A             | 0.2     | 0.157 | 8.1 | A             | 0.2  |
| North East: McLennan Drive | L                            | 0.32  | 7.1 | A             | 10.1    | 0.339 | 7.6 | A             | 10.7 |
|                            | R                            | 0.32  | 10  | A             | 10.1    | 0.339 | 11  | B             | 10.7 |
| North West: Kalgan Drive   | L                            | 0.234 | 5.6 | A             | 0       | 0.302 | 5.6 | A             | 0    |
|                            | T                            | 0.234 | 0   | A             | 0       | 0.302 | 0   | A             | 0    |
| All Vehicles               |                              | 0.32  | 3.6 | A             | 10.1    | 0.339 | 3.7 | A             | 10.7 |

### 7.4.7 Kalgan Drive/Daniels Drive

The SIDRA layout of Kalgan Drive/Daniels Drive is shown in **Figure 7-8**. The analysis results for intersection are presented in **Table 7-13** through to **Table 7-15**.

The results show that the access would operate satisfactorily and would be able to cater for the proposed LSP traffic.

Figure 7-8 Kalgan Drive/Daniels Drive SIDRA Layout

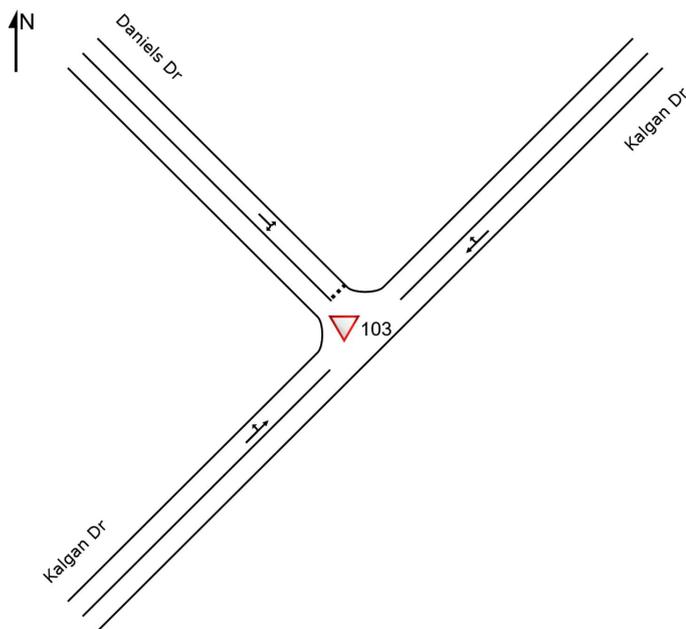


Table 7-13 Kalgan Drive/Daniels Drive SIDRA Results – Scenario 1

| Intersection Approach     | Base Year 2022 |       |     |               |         |       |     |               |     |
|---------------------------|----------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                           | AM Peak        |       |     |               | PM Peak |       |     |               |     |
|                           | DOS            | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| North East: Kalgan Drive  | T              | 0.093 | 0.1 | A             | 1.1     | 0.113 | 0.3 | A             | 3.1 |
|                           | R              | 0.093 | 6   | A             | 1.1     | 0.113 | 6.1 | A             | 3.1 |
| North West: Daniels Drive | L              | 0.101 | 5.3 | A             | 2.6     | 0.066 | 5.2 | A             | 1.7 |
|                           | R              | 0.101 | 6   | A             | 2.6     | 0.066 | 6.1 | A             | 1.7 |
| South West: Kalgan Drive  | L              | 0.097 | 5.6 | A             | 0       | 0.11  | 5.6 | A             | 0   |
|                           | T              | 0.097 | 0   | A             | 0       | 0.11  | 0   | A             | 0   |
| All Vehicles              |                | 0.101 | 2.3 | A             | 2.6     | 0.113 | 3   | A             | 3.1 |

Table 7-14 Kalgan Drive/Daniels Drive SIDRA Results – Scenario 2

| Intersection Approach     | Base Year + 20% Development |       |     |               |         |       |     |               |     |
|---------------------------|-----------------------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                           | AM Peak                     |       |     |               | PM Peak |       |     |               |     |
|                           | DOS                         | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| North East: Kalgan Drive  | T                           | 0.103 | 0.1 | A             | 1.3     | 0.128 | 0.4 | A             | 3.5 |
|                           | R                           | 0.103 | 6.1 | A             | 1.3     | 0.128 | 6.2 | A             | 3.5 |
| North West: Daniels Drive | L                           | 0.111 | 5.3 | A             | 2.9     | 0.076 | 5.2 | A             | 1.9 |
|                           | R                           | 0.111 | 6.2 | A             | 2.9     | 0.076 | 6.4 | A             | 1.9 |
| South West: Kalgan Drive  | L                           | 0.108 | 5.6 | A             | 0       | 0.123 | 5.6 | A             | 0   |
|                           | T                           | 0.108 | 0   | A             | 0       | 0.123 | 0   | A             | 0   |
| All Vehicles              |                             | 0.111 | 2.4 | A             | 2.9     | 0.128 | 3   | A             | 3.5 |

Table 7-15 Kalgan Drive/Daniels Drive SIDRA Results – Scenario 3

| Intersection Approach     | Base Year 2034 + Full Development |       |     |               |         |       |     |               |     |
|---------------------------|-----------------------------------|-------|-----|---------------|---------|-------|-----|---------------|-----|
|                           | AM Peak                           |       |     |               | PM Peak |       |     |               |     |
|                           | DOS                               | Delay | LOS | 95% Queue (m) | DOS     | Delay | LOS | 95% Queue (m) |     |
| North East: Kalgan Drive  | T                                 | 0.147 | 0.2 | A             | 2.4     | 0.19  | 0.6 | A             | 5.4 |
|                           | R                                 | 0.147 | 6.4 | A             | 2.4     | 0.19  | 6.7 | A             | 5.4 |
| North West: Daniels Drive | L                                 | 0.157 | 5.6 | A             | 4.1     | 0.128 | 5.6 | A             | 3.2 |
|                           | R                                 | 0.157 | 7.1 | A             | 4.1     | 0.128 | 7.6 | A             | 3.2 |
| South West: Kalgan Drive  | L                                 | 0.154 | 5.6 | A             | 0       | 0.182 | 5.6 | A             | 0   |
|                           | T                                 | 0.154 | 0.1 | A             | 0       | 0.182 | 0.1 | A             | 0   |
| All Vehicles              |                                   | 0.157 | 2.6 | A             | 4.1     | 0.19  | 3.1 | A             | 5.4 |

## 8 Summary

This assessment has been prepared in accordance with the *WAPC Transport Assessment Guidelines for Developments: Volume 2 – Planning Schemes, Structure Plans and Activity Centre Plans* (2016).

The following conclusions have been made regarding the proposed LSP:

- > The concept structure plan proposes modifications to the existing area which include the redevelopment of lots along the parks, redevelopment of lots focusing on external aspects and community use areas.
- > Two new internal road links are proposed to improve connectivity. One connecting McLennan Drive and Callawa Way and an internal connection between Bondini Drive and Homestead Ramble.
- > In addition to the existing path network, there are six new path connections proposed within the area with the goal of improving access to open space areas and walkability within the precinct as described below:
  - Path connection between Waratah Crescent and Braeside Drive.
  - Path connection between Kurrajong Crescent and the Iconic Central Park.
  - Path connection between Arika Place and the Iconic Central Park.
  - Path connection between Bondini Drive and the Iconic Central Park.
  - Path connection between Karrawan Way and Bondini Drive.
- > The three trip generation scenarios which represent the proposed changes to the residential density are summarised below.

Table 8-1 Summary of Trip Generation Scenarios

| Land Use                     | AM Peak    |            | PM Peak    |            | Daily       |             |
|------------------------------|------------|------------|------------|------------|-------------|-------------|
|                              | In         | Out        | In         | Out        | In          | Out         |
| <b>with R40 Residential*</b> | <b>382</b> | <b>409</b> | <b>502</b> | <b>445</b> | <b>4683</b> | <b>4683</b> |
| with R40/15 Residential      | 361        | 350        | 435        | 408        | 4187        | 4187        |
| with R15 Residential         | 341        | 291        | 368        | 370        | 3696        | 3696        |

\* this represents the worse-case scenario which was used for the SIDRA assessment

- > Analysis of the key intersections has been undertaken with the following conclusions:
  - The intersection of McLennan Drive and Daniels Drive will operate at an acceptable level of service for all assessment scenarios and no intersection upgrades are required.
  - The intersection of Kalgan Drive and McLennan Drive will operate at an acceptable level of service for all assessment scenarios and no intersection upgrades are required.
  - The intersection of Kalgan Drive and Daniels Drive will operate at an acceptable level of service for all assessment scenarios and no intersection upgrades are required.
- > Overall, the traffic impacts associated with the proposed LSP will be minimal on the internal and external transport network.
- > The number of crashes within the surrounding area of the Site is not considered to be significant and the likely safety impacts of the proposed development is likely to be negligible on the road network.

East Newman Structure Plan

APPENDIX

A

SITE PLAN



now





East Newman Structure Plan

APPENDIX

B

SIDRA RESULTS



now





## About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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