Transport Impact Assessment

Mundijong Structure Plan

CW1039600

Prepared for
Shire of Serpentine Jarrahdale

29 June 2020

Cardno

Contact Information

Cardno (WA) Pty Ltd
ABN 77 009 119 000

11 Harvest Terrace
West Perth WA 6005
Australia

www.cardno.com
Phone +61 8 9273 3888
Fax +61 8 9486 8664

Document Information

Prepared for	Shire of Serpentine Jarrahdale
Project Name	Mundijong Structure Plan
File Reference	CW10396 Mundijong Structure Plan TIA (Rev E).docx
Job Reference	CW1039600
Date	29 June 2020
Version Number	E

Author(s):

Edmond Hoang
Traffic Engineer

Effective Date 16/11/2018

Approved By:

Jacob Martin
Team Leader – Transport Planning

Date Approved 16/11/2018

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	06/11/2018	For Issue	EH	JM
B	19/11/2018	For Issue	OL	JM
C	06/02/2020	For Issue	JM	RJC
D	25/05/2020	For Issue	AM	JM
E	29/06/2020	Final Report	AM	JM

Table of Contents

Appendices

Tables

Figures

1 Introduction

1.1 Background

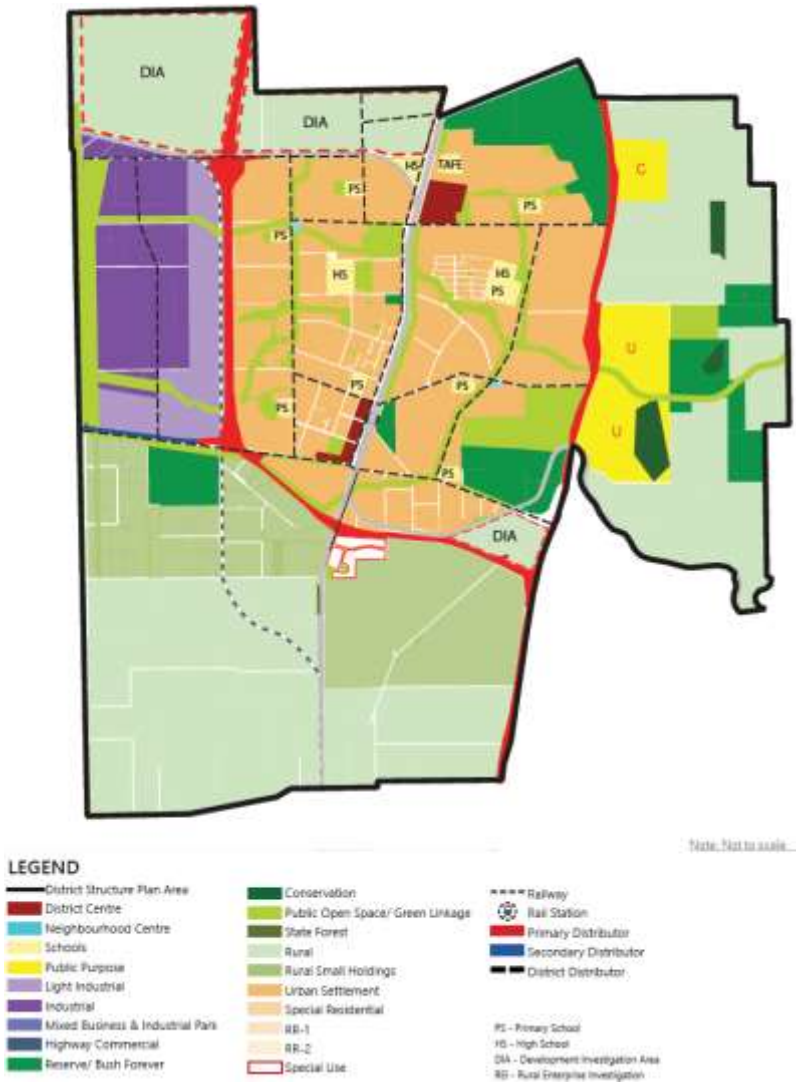
Cardno was commissioned by the Shire of Serpentine to prepare a Transport Impact Assessment for the proposed Mundijong Structure Plan ('the Site' or 'the Structure Plan').

This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines Volume 2 – Planning Schemes, Structure Plans & Activity Centre Plans (2016).* This report will support the detailed structure planning for the locality by evaluating the sufficiency of existing and proposed intersection treatments across the Structure Plan Area.

1.2 Site Location and Description

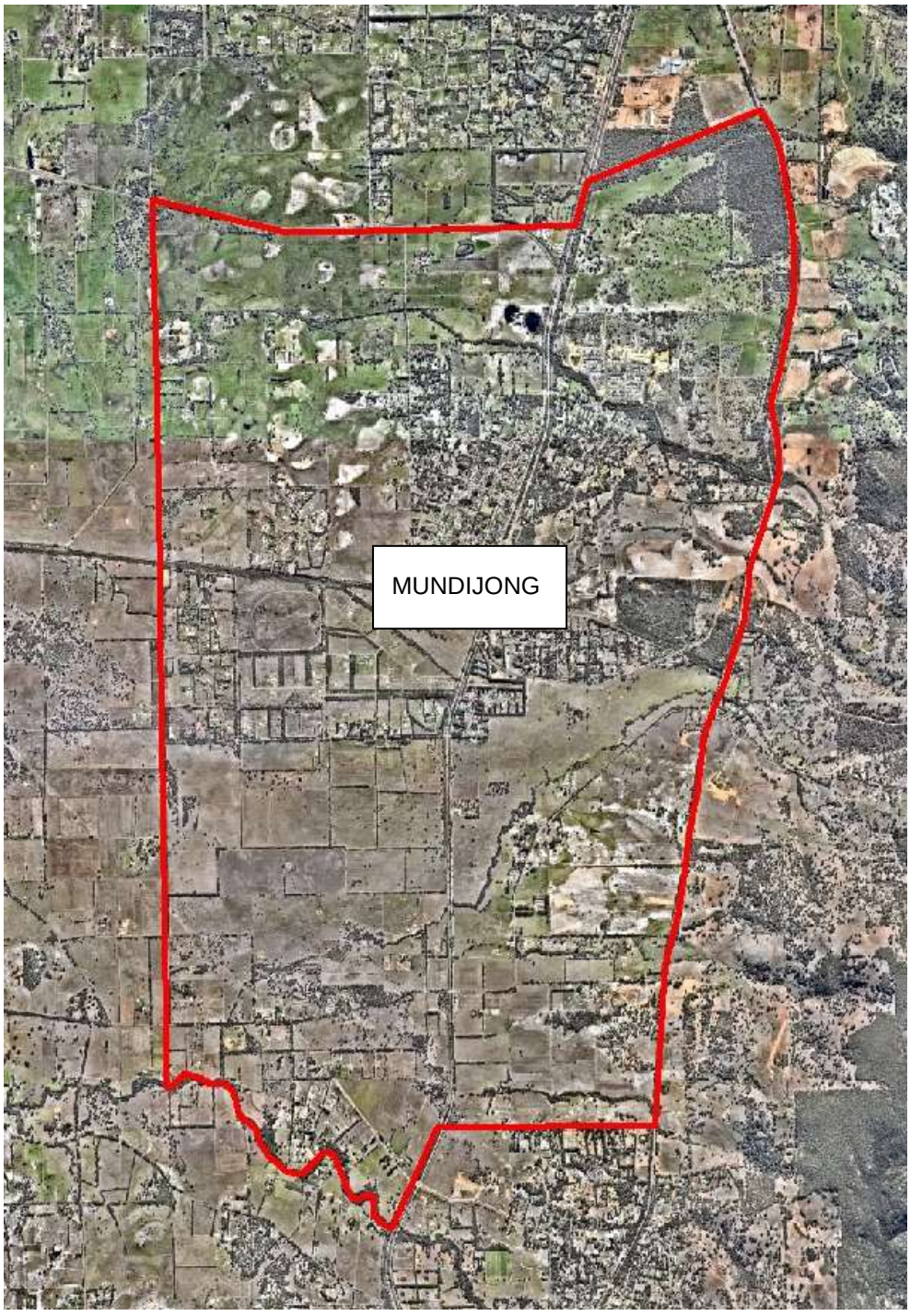
The suburbs in the Shire of Serpentine Jarrahdale include Byford, Mundijong, Serpentine, Jarrahdale and Keysbrook. The Site covers Mundijong, in the Shire of Serpentine Jarrahdale on the outer south eastern area of Perth with a population of 2,003 as of 2017 and with a density of 0.44 persons per hectare. The land area of Mundijong is 4,502 hectares most of which is classified as rural and rural residential. **Figure 1-1** shows the location of the structure plan and **Figure 1-2** shows the Study Area.

Figure 1-1 Structure Plan Location



Source: MDSP

Figure 1-2 Study Area



Source: Nearmap

1.3 Land Use Proposal

The focus is on the development of land within close proximity of key public transport networks such as development of Mundijong Town Centre as the 'Governance Precinct' and growth of the Whitby town centre as a 'Retail Centre'.

The industrial area is expected to facilitate the increased agriculture related industries including transport and logistics.

Assessment of the impacts of development growth both within and beyond the Mundijong Structure Plan area has been facilitated through Main Roads' ROM24 strategic model. This model relies on land use projections provided by Local and State Government agencies to generate vehicle trips across the network. Cardno has endeavoured to ensure that the land uses defined in ROM24 within the Study Area are consistent with the Shire's anticipated development horizon.

It is acknowledged that full build-out of this land area may not be achieved within the 2031 horizon, which is the only ROM24 time scale currently supplied by Main Roads WA. As such, the ROM24 outputs used as the basis of this TIA have been used to establish an anticipated development and traffic scenario at the point when build-out of the Shire's development planning is achieved.

1.3.1 Key Issues

Some of the main issues and constraints identified are as follows:

- Lack of housing
- The railway line acts as a barrier, limiting connectivity between the eastern and western sections.
- Limited connectivity through rail line
- Traffic issues that do not assist active transport modes.
- Lack of public transport between activity centres and regional destinations.

2 Existing Situation

2.1 Existing Land Uses

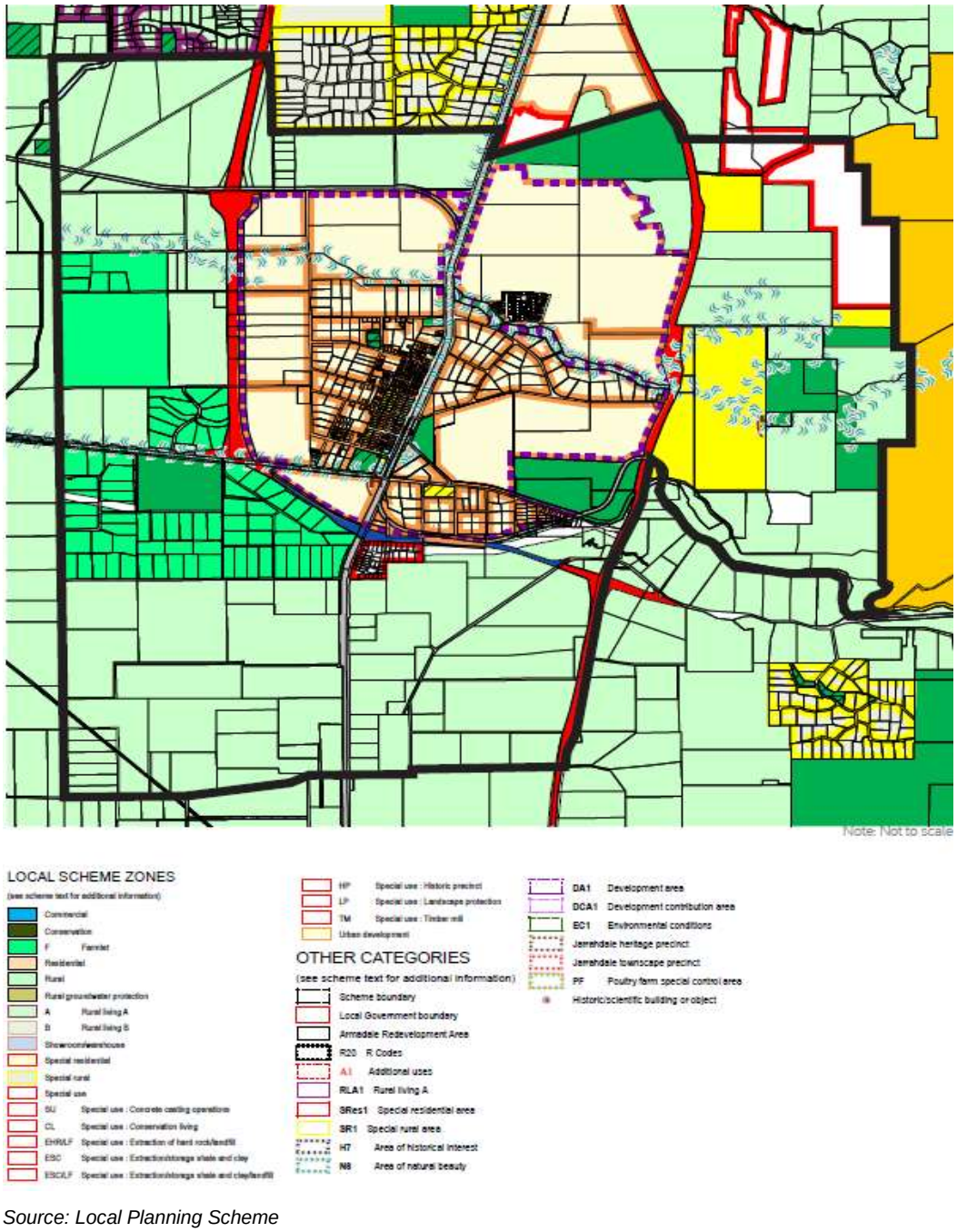
Currently neighbourhood centres are located in the Mundijong town centre and a significant portion of the shire contains rural areas which are in many of the undeveloped areas.

The industrial area lies on the western side of Mundijong and is zoned as 'Industrial Development', this area consists of approximately 440 hectares and is intended for up to 880 industrial lots.

The Mundijong District Structure Plan covers 5,461 hectares of area of which predominant area is zoned for future urban development.

Figure 2-1 shows the existing zoning under the town planning scheme, evidently the main core of Mundijong consists mainly of urban development and the surrounding area consist largely of rural and farmlet areas with some commercial areas along Mundijong Road.

Figure 2-1 Existing Zoning



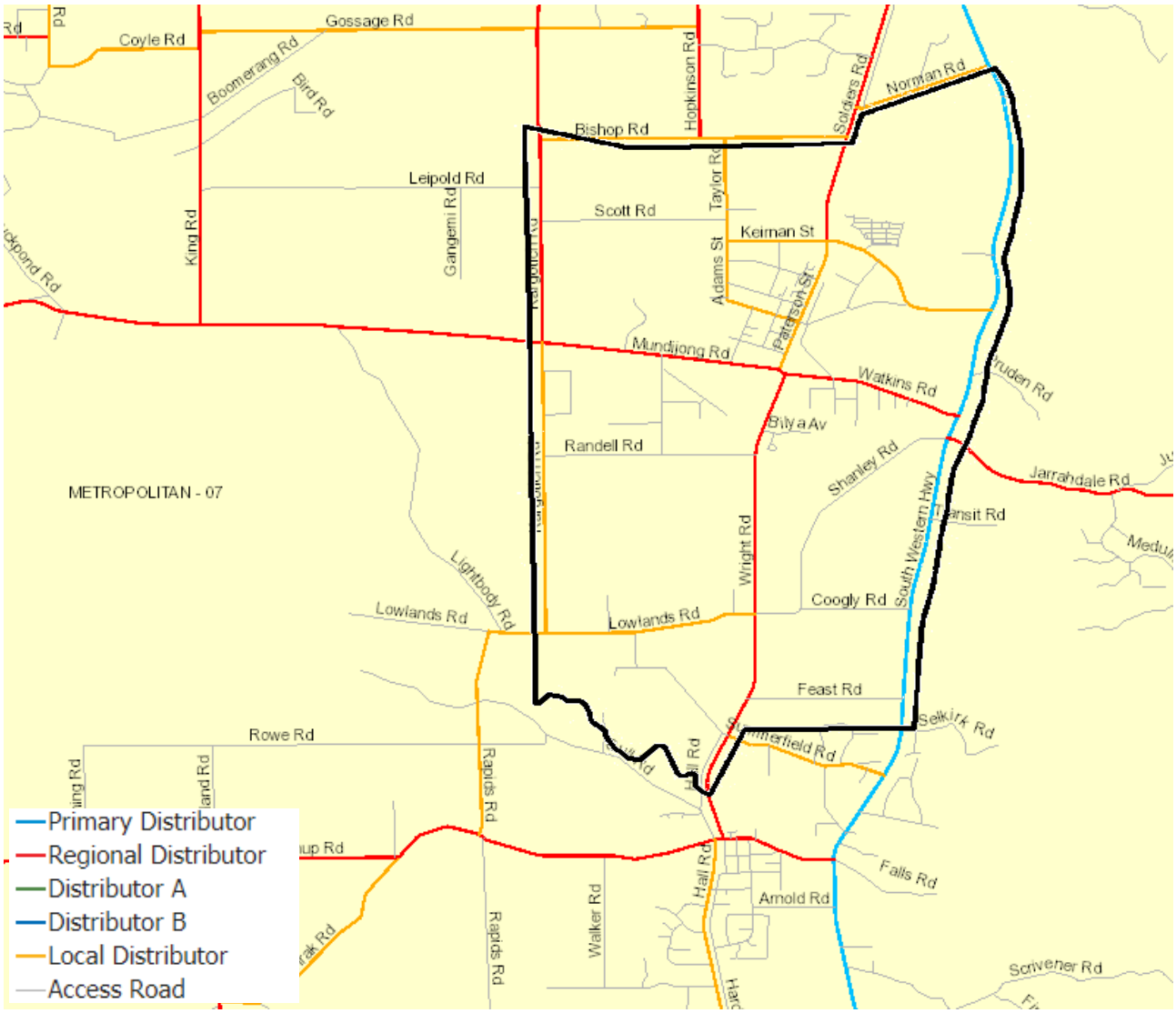
Source: Local Planning Scheme

2.2 Existing Road Network

The existing road network surrounding and within the LSP is shown in **Figure 2-2**. Road classifications are defined in the Main Roads Functional Hierarchy as follows:

- **Primary Distributors (light blue):** Form the regional and inter-regional grid of MRWA traffic routes and carry large volumes of fast-moving traffic. Some are strategic freight routes, and all are National or State roads. They are managed by Main Roads.
- **Regional Distributors (red):** Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by Local Government.
- **District Distributor A (green):** These carry traffic between industrial, commercial, and residential areas and connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by Local Government.
- **District Distributor B (dark blue):** Perform a similar function to "District Distributor A" but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and not through them, forming a grid that would ideally be around 1.5 kilometres apart. They are managed by Local Government.
- **Local Distributors (orange):** Carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. They are managed by Local government.
- **Access Roads (grey):** Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by Local government

Figure 2-2 Existing Road Network



Source: Main Roads WA

The following discusses the characteristics of the road network surrounding the Structure Plan.

- **South Western Highway** is classified as *Primary Distributor* with a posted speed limit that varies from 70 km/h from Hobbs Dr to Rails Crescent, to 90 km/h from Mitchell Street to Thomas Rd then to 60 km/h from Thomas Road to Abernethy Road. This road lies to the east of the study area.
- **Mundijong Road/ Watkins Road** is classified as a Regional Distributor with a posted speed limit of 100km/h.
- **Bishop Road/Norman Road** is classified as a Local Distributor with a posted speed limit of 50km/h.
- **Kargotich Road** is classified as a Regional Distributor with a posted speed limit of 90km/h up to Mundijong Road after which it is classified as a Local Distributor with a posted speed limit of 100km/h.

2.3 Existing Traffic Volumes

Traffic surveys were conducted on numerous locations within the Mundijong area. The results of these traffic counts are provided in **Appendix B**.

2.4 Existing Pedestrian / Cycle Network

Existing pedestrian and cycle network is very limited due to the rural nature of the area. Active modes of transport such as walking and cycling are currently available for short distance journeys within the urban areas. There are several opportunities for network improvements to address existing issues of disconnected streets, lack of footpaths, unsafe routes and long distances.

Figure 2-3 shows the existing pedestrian and cycle facilities within the Study Area.

Figure 2-3 Pedestrian/Cycling Network

Source: DSP

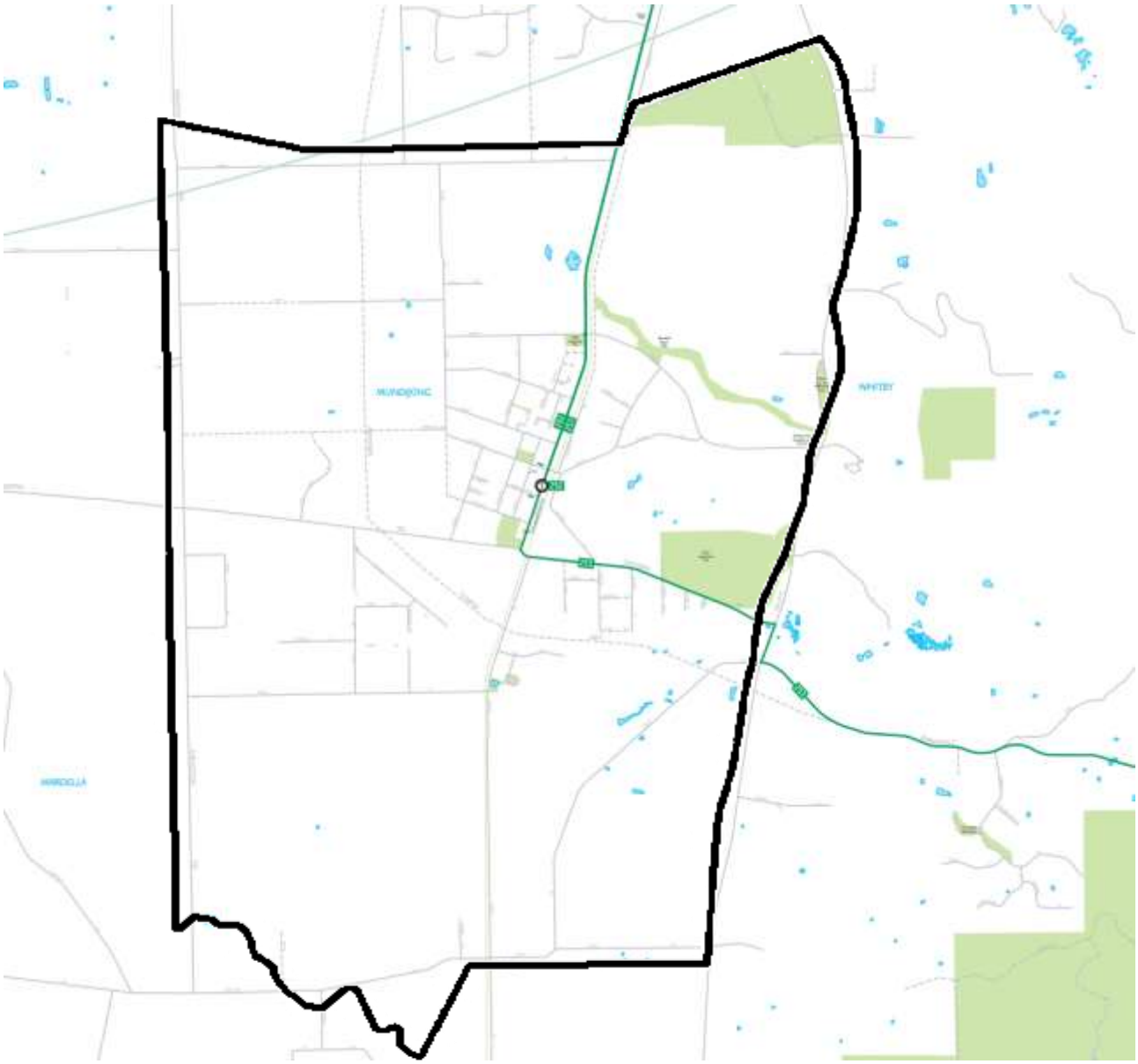
2.5 Existing Public Transport Services

The existing public transport services are shown below in **Figure 2-4**. A railway line runs alongside the Soldiers Road; however, standard commuter rail services currently terminate at Armadale.

The rail line south of Armadale is used primarily for freight, with a regional rail service provided by the Australind to Perth and Bunbury twice daily.

Through the shire runs the Perth to Bunbury railway line along the South Western Highway however, currently commuter rail services terminate at Armadale, with south of Armadale line used for freight only and the Australind for between Perth and Bunbury which runs twice daily. Current railway station for Mundijong Australind service is located at the intersection of Whitby Street and Paterson Street.

Figure 2-4 Existing Public Transport Routes



Source: Transperth

Transperth bus Routes 252 and 253 provide connections to Armadale Station,

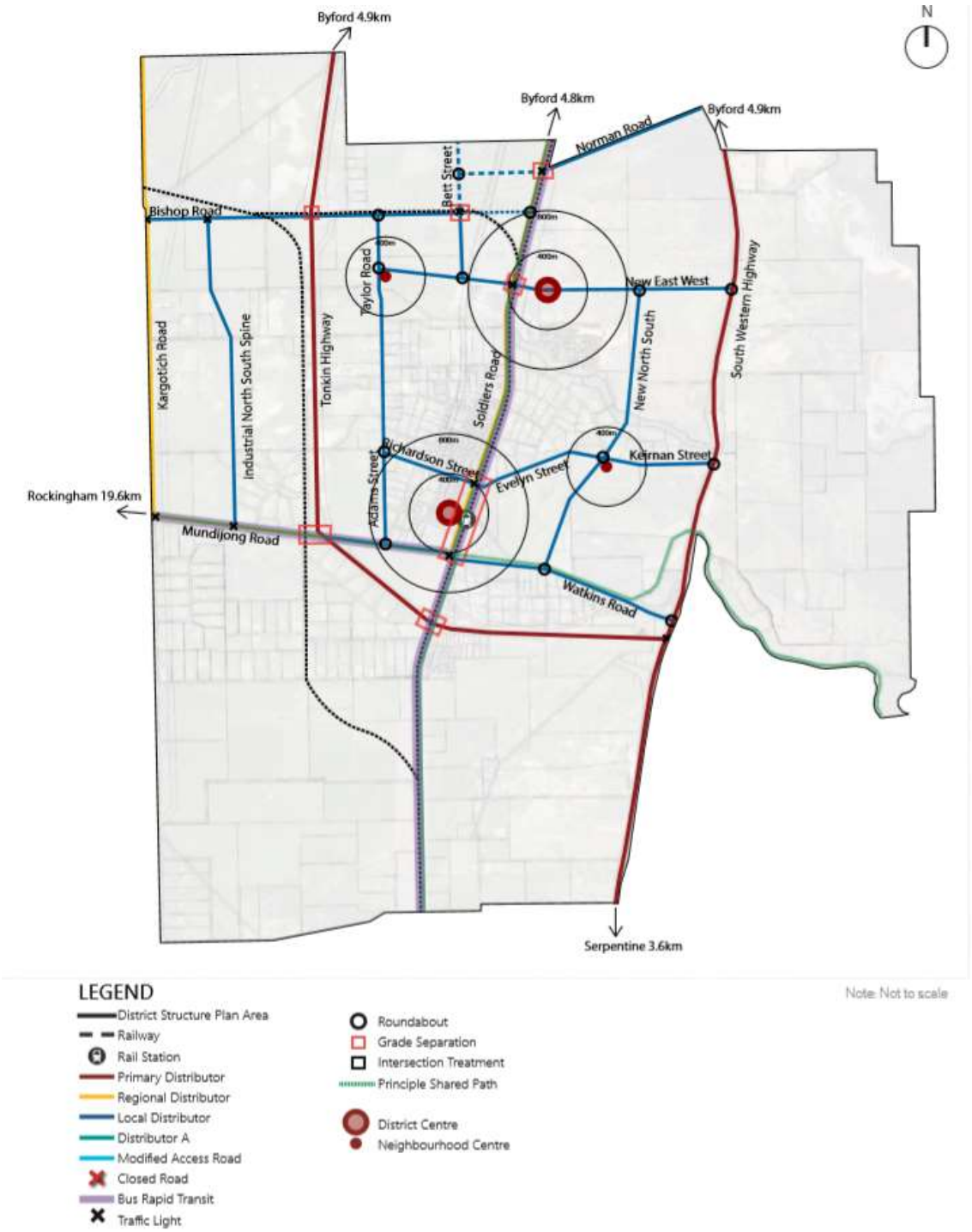
3 Proposed Changes to Transport Networks

3.1 Road Network Changes

The current structure plan provides a list of changes that are proposed for the existing roads as per **Figure 3-1**. These upgrades have been evaluated through Aimsun mesoscopic modelling and modifications applied to reflect recommended amendments to the network, as shown in **Figure 5-3** and **Figure 5-4**.

It is understood that intersection controls will continue to be interrogated and modified to suit the changing needs of the network.

Figure 3-1 Road Network Changes



Original Source: Shire of Serpentine Jarrahdale

The following changes are proposed to the existing road network along with the proposed new roads:

- Extension of Tonkin Highway southward to connect through to Mundijong Road.
- Intersection connection treatments onto Tonkin Highway at Bishop Road and Mundijong Road.
- Upgrade of Mundijong Road
- Extension of Norman Road to connect to Bishop Road.
- Extension of Doley Road connecting through to Bishop Road.
- Additional crossing south of Kiernan Street to relink Richardson Street and Evelyn Street.
- Relocation of Kiernan Street and South Western Highway cross point

3.2 Pedestrian and Cycle Network Changes

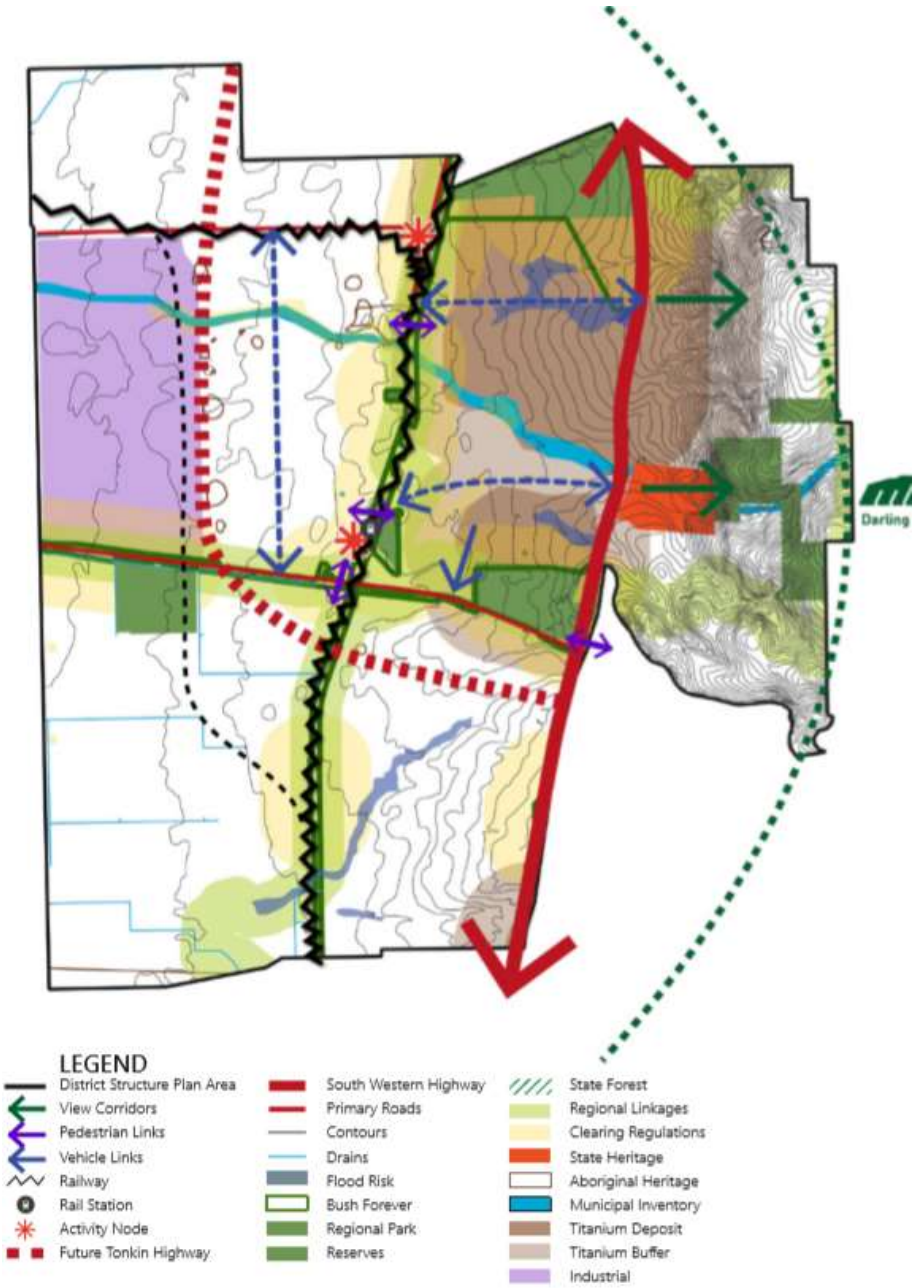
The strategies and opportunities to improve the pedestrian and cycle network include:

> The extension of cycle/pedestrian shared path network.

> Improvements of walking and cycling links to the town centre and railway station.

As such, the opportunities and constraints map is explained on **Figure 3-2**.

Figure 3-2 Opportunities and Constraints Map



Source: MDSP

3.3 Public Transport Network Changes

Within the Sub-regional Planning Framework, the proposed public transport includes a network of passenger rail lines and transit corridors. A proposal for the extension of the Armadale line to Byford exists within the BDSP area. This railway facility is also proposed to have a High Frequency Transit Corridor (HFTC) providing public transport connections between activity centres, population catchments, train stations and local bus services.

3.4 Projected Daily Traffic Volumes

Assessment of the impacts of development growth both within and beyond the Byford Structure Plan area has been facilitated through Main Roads' ROM24 strategic model. This model relies on land use projections provided by Local and State Government agencies to generate vehicle trips across the network. Cardno has endeavoured to ensure that the land uses defined in ROM24 within the Study Area are consistent with the Shire's anticipated development horizon.

It is acknowledged that full build-out of this land area may not be achieved within the 2031 horizon, which is the only ROM24 time scale currently supplied by Main Roads WA. As such, the ROM24 outputs used as the basis of this TIA have been used to establish an anticipated development and traffic scenario at the point when build-out of the Shire's development planning has been achieved.

Figure 3-3 shows the 2031 daily vehicle volume output from 2031 ROM24 model as provided by Main Roads WA.

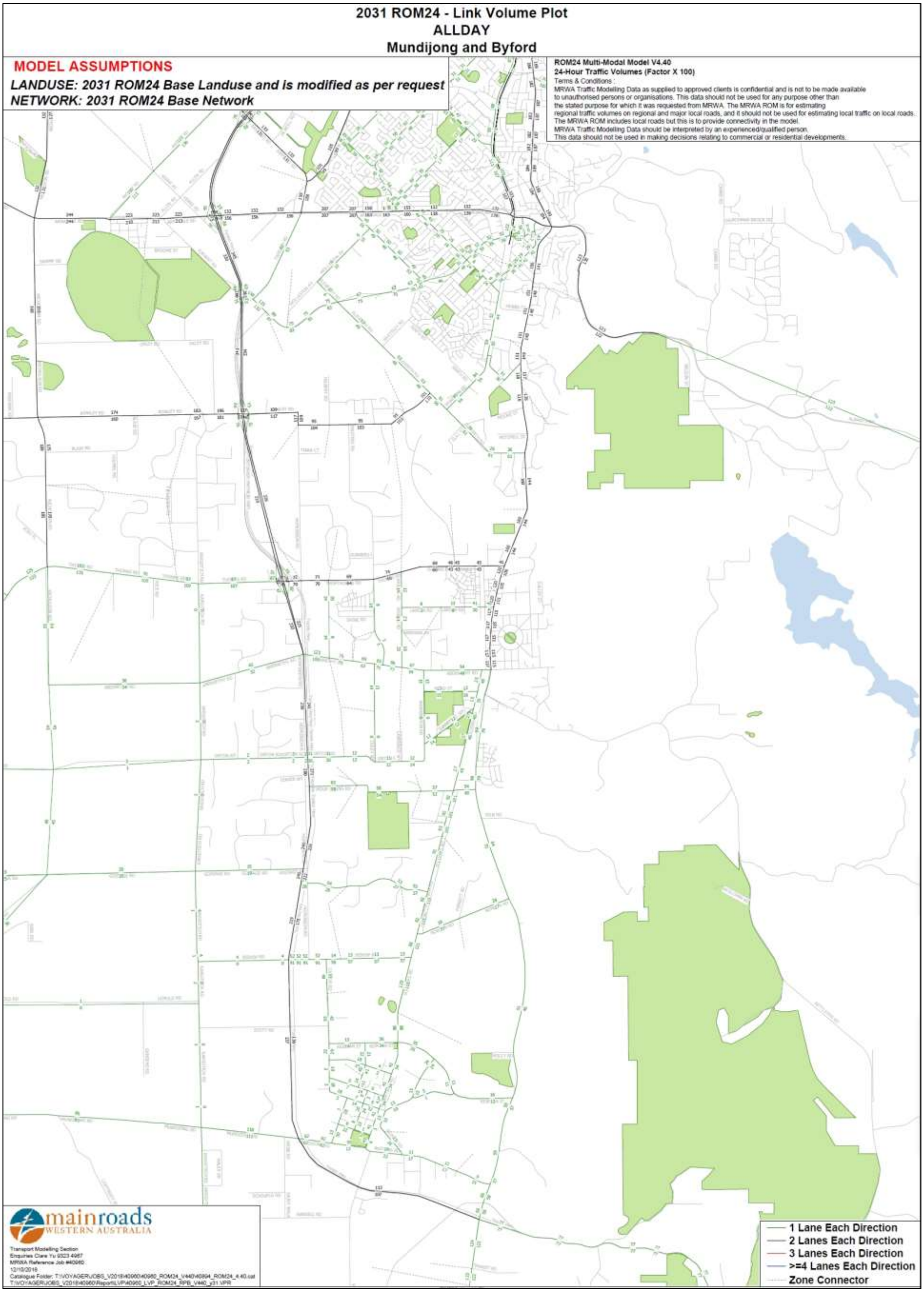
Table 3-1 shows a summary of 2031 daily vehicle volumes from the AIMSUN model.

Table 3-1 Forecast Traffic Volumes from AIMSUN Model (2031 horizon)

Road	Forecast Traffic Volume 2031 (vpd)	Recommended Road Hierarchy	Recommended Road Reserve (m)
Mundijong Road	12,381	Integrator B	30
Watkinson Road	7,462	Integrator B	30
Soldier Road	9,082	Neighbourhood Connector A	20
Kargotich Road	8,103	Integrator B	30
Industrial North south Spine	N/A	Industrial Road	27
Taylor Road	5,962	Integrator B	30
Adam Street	3,682	Integrator B	30
Richardson St	1,345	Access Road	20
Evelyn St	4,417	Integrator B	30
Galvin Road	3,600	Integrator B	30
Keirnan street	13,079	Integrator B	30
New North South Road	6,813	Integrator B	30
New East West Road	4,174	Integrator B	30
Skyline Blvd	N/A	Neighbourhood Connector A	25
Tinspar Ave	12,771	Neighbourhood Connector A	25
Bishop Road	7,983	Integrator B	30
Norman Road	10,518	Integrator B	30
Bett Road/Doley Road	2,935	Integrator B	30

** Reduced verge width shall be considered adjacent public park land*

Figure 3-3 ROM24 Daily traffic Volumes (2031 horizon)



Source: Main Roads WA

4 Integration with Surrounding Area

4.1 Surrounding Attractors/Generators

The major generators within the surrounding area include mostly rural residential dwellings and some industrial land uses.

4.2 Proposed Changes to Surrounding Land uses

The structure plan identifies the requirement for development of areas in close proximity of key public transport networks and new nodes of activities. This encourages the development of the Mundijong town centres as a 'Governance precinct'. The prediction for the area is that it would cater for increased agriculture-related industries comprising transport and logistics.

4.3 Level of Accessibility

The main access to the structure plan area from external attractors is through the connectivity of internal road networks to South Western Highway and Mundijong Road, which are classified as Primary Distributor and Regional Distributor. Access through internal road intersections include:

- South Western Highway and Norman Road
- South Western Highway and Kiernan Street
- South Western Highway and Watkins Road
- South Western Highway and Feast Road
- Kargotich Road and Mundijong Road
- Kargotich Road and Lawlands Road

When the access is through public transport, bus route 252 travels along South Western Highway and towards Armadale Station.

A Bridle trail runs from Soldiers Road and Mundijong Road and a shared path exists along South Western Highway.

The proposed Train Station in Mundijong Town Centre and the associated walking and cycling catchment will further improve accessibility and match the desire lines.

It is expected that the existing road network will be able to cater for the travel desire lines between the structure plan are and the surrounding land uses.

5 Analysis of Transport Network

5.1 Assessment Years and Time Periods

The assessment period is based on the future mesoscopic modelling results which was conducted for 2031.

5.2 Background and Future Traffic Generation Estimation

A mesoscopic traffic model was developed to model the current traffic situation and provide a base to determine the likely future traffic impacts.

A number of data sources were used in the formulation of the mesoscopic model which included traffic, surveys, census data and information provided by local authorities.

The future-year models are based on the traffic growth scenario derived from information provided by the Shire of Serpentine-Jarrahdale and Main Roads (ROM24 outputs) for the 2031 scenario years.

5.3 Intersection Assessment

Based on the results provided by the mesoscopic model, the network for the area of Mundijong is operating at an acceptable level of service with sufficient capacity to accommodate traffic for the 2018 scenario.

With respect to the 2031 scenario, the mesoscopic model identified no intersections which exhibited significantly capacity or delay issues.

All other intersections assessed through the mesoscopic model were considered to operate at an acceptable level of service for the 2031 scenario.

The following density maps identify locations where peak period demand may create localised capacity constraints, and where upgrades to the network may be required.

Figure 5-1 Simulated 2031 Density Map (AM Peak)

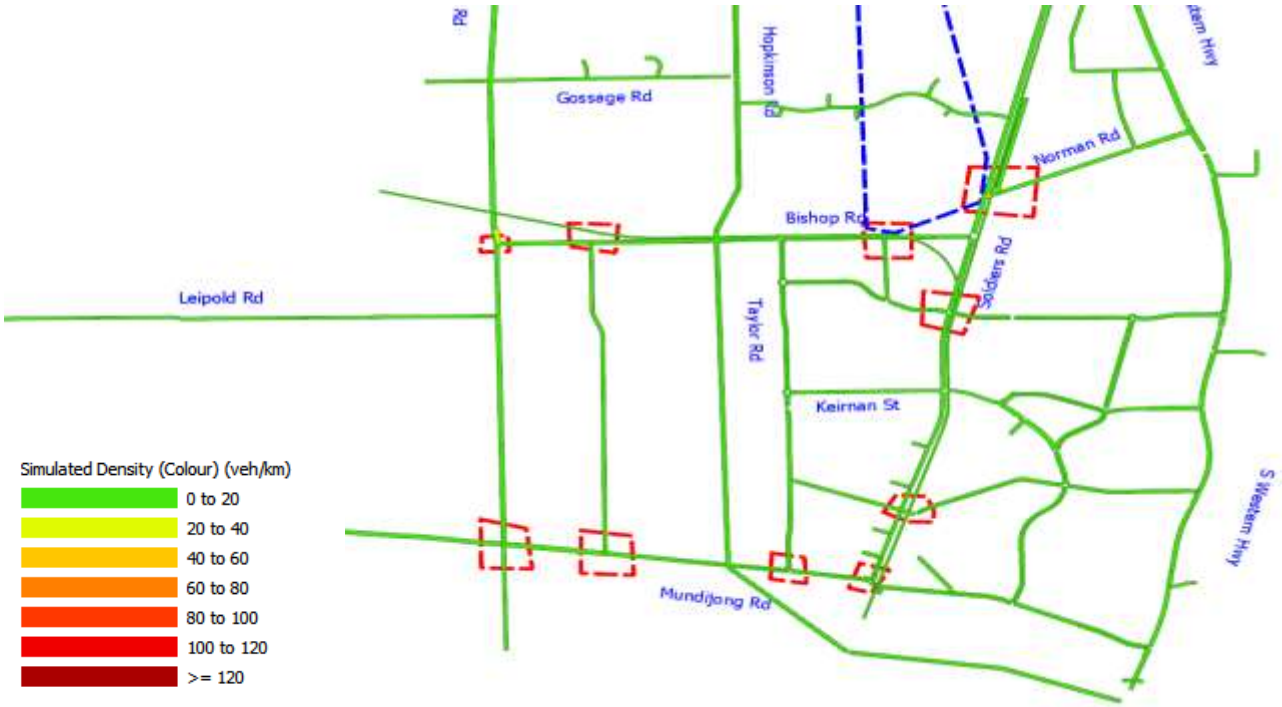


Figure 5-2 Simulated 2031 Density Map (PM Peak)

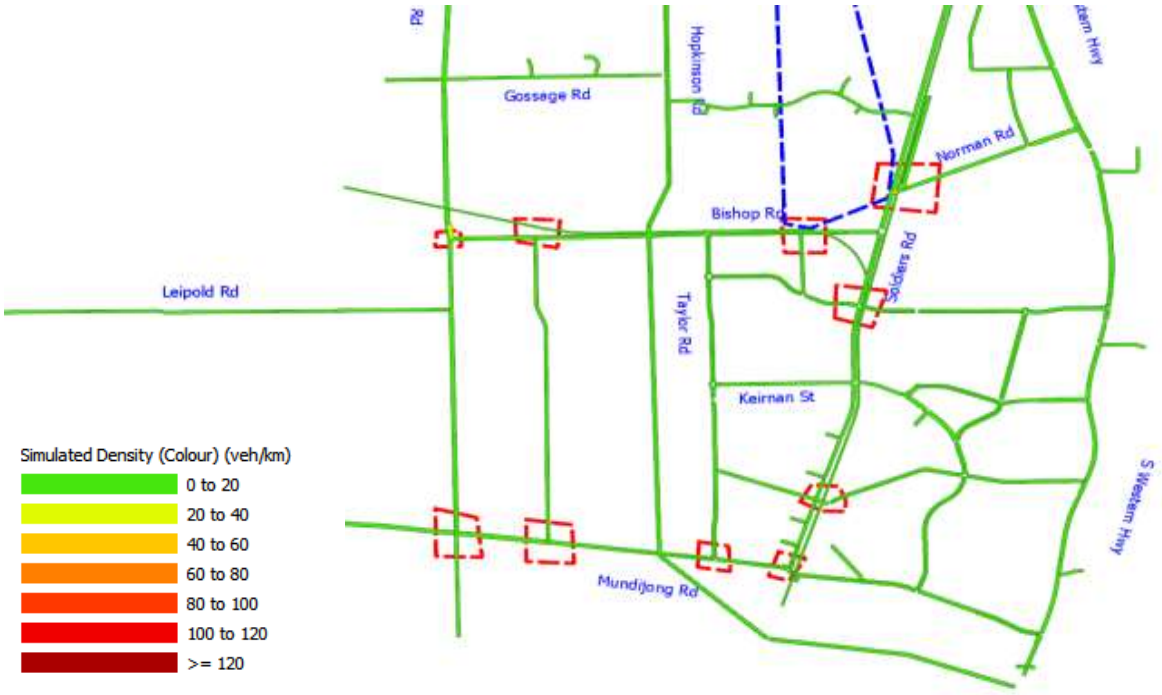


Figure 5-3 indicates the new road locations and the locations of the assessed intersections within the Mundijong Area.

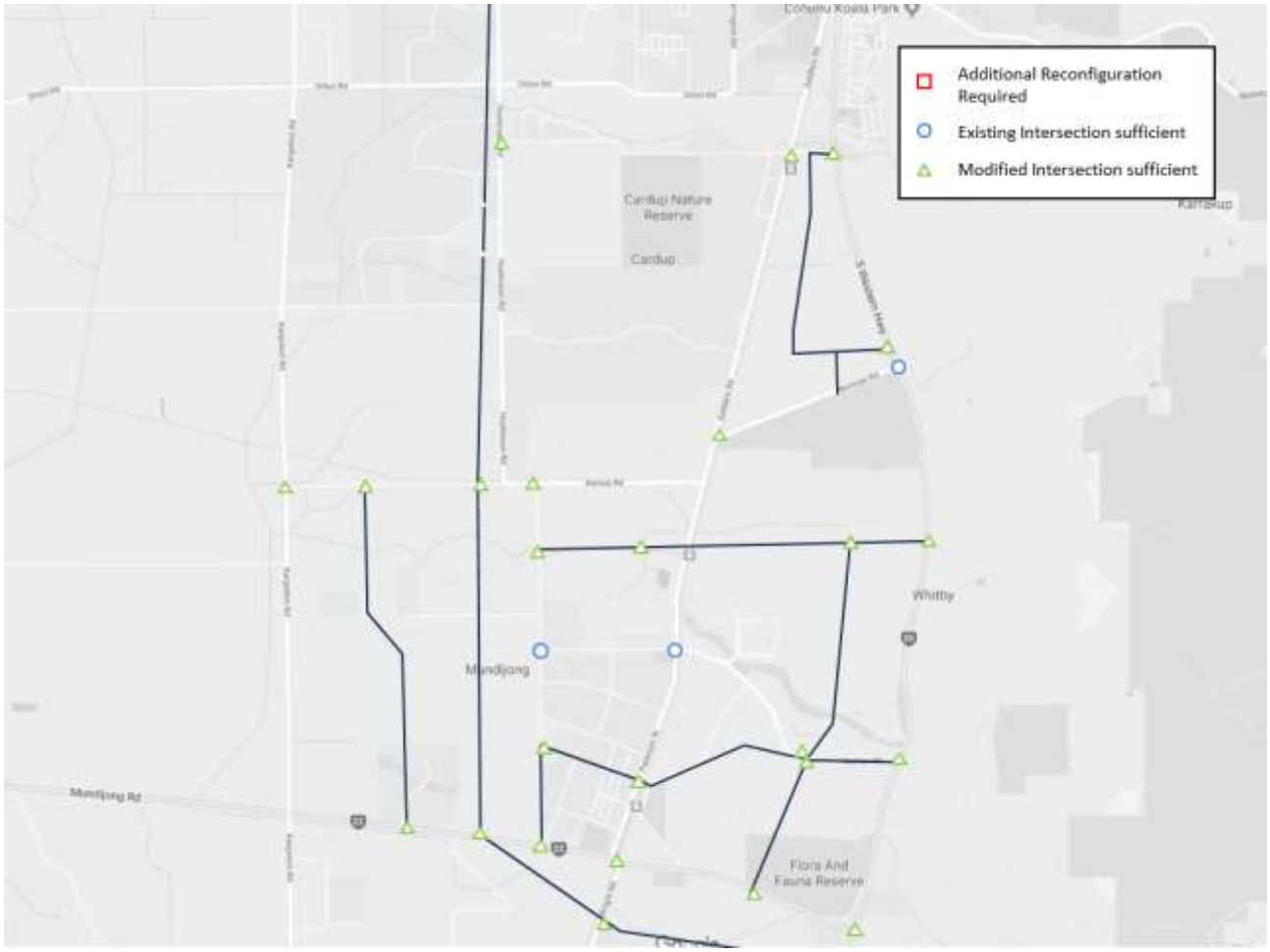
Figure 5-3 Location of Assessed Intersections and New Links

5.4 Summary of Results

The following map identifies the results of intersection evaluation across the Mundijong area. Intersections have been classified into 3 groups and shown in **Figure 5-4** below:

1. **Existing Intersection Sufficient:** the existing (2018) geometry has been evaluated through the Aimsun mesoscopic model and shown to be sufficient to accommodate future traffic growth.
2. **Modified Intersection Sufficient:** the Shire's proposed modifications have been evaluated through the Aimsun mesoscopic model and shown to be sufficient to accommodate future traffic growth.
3. **Additional Reconfiguration Required:** The existing and/or proposed intersection form has been evaluated through the Aimsun mesoscopic model and found to experience excessive congestion or delay. These intersections have been re-evaluated in SIDRA and changes identified to improve operation.

Figure 5-4 Intersection Sufficiency Map



6 Conclusion

Cardno was commissioned by the Shire of Serpentine to prepare a Transport Impact Assessment for the proposed Mundijong Structure Plan ('the Site' or 'the Structure Plan').

The traffic impacts from this Structure Plan have been evaluated in a mesoscopic modelling framework, which classified the network into three categories based on operational performance:

1. The existing intersection forms are considered sufficient to accommodate future growth. These include:
   - South West Highway/Norman Road
   - Soldiers Road/Keirnan Street
   - Adams Street/Keirnan Street
2. The proposed intersection forms are considered sufficient to accommodate future growth. These include:
   - South Western Highway/Cardup Siding Road
   - Soldiers Road/Cardup Siding Road
   - Hopkinson Road/Cardup Siding Road
   - Doley Road/Cardup Siding Road
   - South Western Highway/New Road 9
   - Soldiers Road/Norman Road
   - Doley Road/Norman Road
   - Kargotich Road/Bishop Road
   - New Road 10/Bishop Road
   - Hopkinson Road/Bishop Road
   - Taylor Road/Bishop Road
   - Taylor Road/Leopold Road
   - Doley Road/Leopold Road
   - New Road 12/Leopold Road
   - South Western Highway/Leopold Road
   - South Western Highway/Keirnan Street
   - Galvin Road/Keirnan Street
   - New Road 12/Keirnan Street
   - Patterson Street/Richardson Street
   - Adams Street/Richardson Street
   - New Road 10/Mundijong Road
   - Hopkinson Road/Mundijong Road
   - Adams Street/Mundijong Road
   - Patterson Street/Mundijong Road
   - New Road 12/Mundijong Road
   - South Western Highway/Mundijong Road
   - Wright Road/Lampiter Drive

- Doley Road/Bishop Road
- Kargotich Road/Mundijong Road

The minimum intersection forms required to accommodate future traffic growth is shown in **Section 3**. It is anticipated that additional works will be required to ensure intersection geometry meets Austroads and Main Roads WA guidelines.

Overall, with the reconfigured intersection forms the SP network is considered to operate satisfactorily in the 2031 future scenario.

Mundijong Structure Plan

APPENDIX A

WAPC CHECKLIST

Item	Provided	Comments/Proposals
Summary		
Introduction/Background	Included in Section 1	
Structure plan proposal	Included in Section 1	
▪ regional context	Included in Section 1	
▪ proposed land uses	Included in Section 1	
▪ table of land uses and quantities	Included in Section 1	
▪ major attractors/generators	Included in Section 4	
▪ specific issues	N/A	
Existing situation		
▪ existing land uses within structure plan	Included in Section 2	
▪ existing land uses within 800 metres of structure plan area	Included in Section 2	
▪ existing road network within structure plan area	Included in Section 2	
▪ existing pedestrian/cycle networks within structure plan area	Included in Section 2	
▪ existing public transport services within structure plan area	Included in Section 2	
▪ existing road network within 2 (or 5) km of structure plan area	Included in Section 2	
▪ traffic flows on roads within structure plan area (PM and/or AM peak hours)	N/A	
▪ traffic flows on roads within 2 (or 5) km of structure plan area (AM and/or PM peak hours)	Included in Section 2	
▪ existing pedestrian/cycle networks within 800m of structure plan area	Included in Section 2	
▪ existing public transport services within 800m of structure plan area	Included in Section 2	
Proposed internal transport networks		
▪ changes/additions to existing road network or proposed new road network	Included in Section 3	
▪ road reservation widths	N/A	
▪ road cross-sections & speed limits	N/A	
▪ intersection controls	Included in Section 3	
▪ pedestrian/cycle networks and crossing facilities	Included in Section 3	
▪ public transport routes	Included in Section 3	
Changes to external transport networks		
▪ road network	Included in Section 3	
▪ intersection controls	Included in Section 3	
▪ pedestrian/cycle networks and crossing facilities	Included in Section 3	
▪ public transport services	Included in Section 3	
Integration with surrounding area		
▪ trip attractors/generators within 800 metres	Included in Section 4	
▪ proposed changes to land uses within 800 metres	Included in Section 4	
▪ travel desire lines from structure plan to these attractors/generators	N/A	
▪ adequacy of external transport networks	N/A	
▪ deficiencies in external transport networks	N/A	

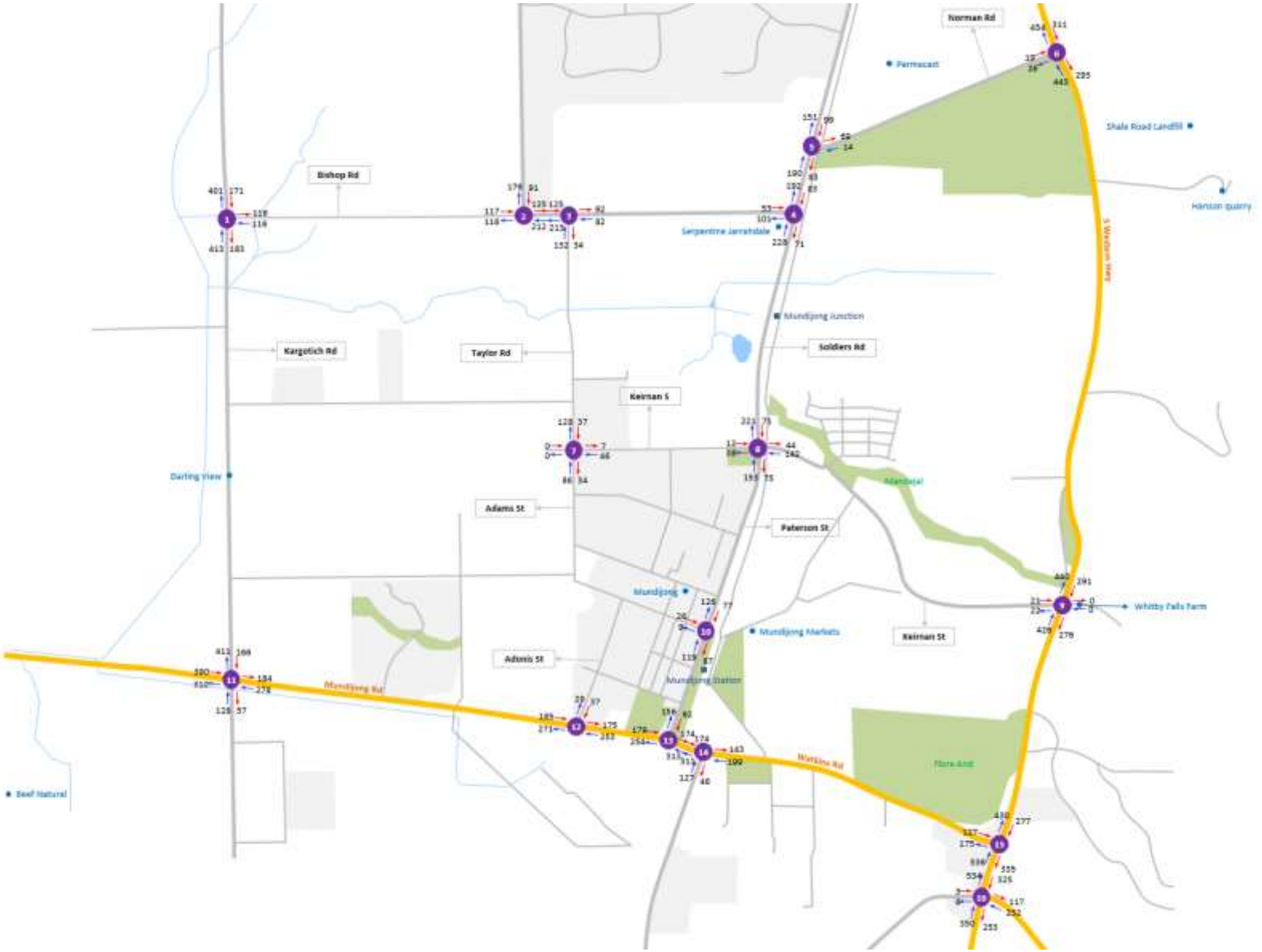
▪ remedial measures to address deficiencies	N/A	
Analysis of internal transport networks		
▪ assessment year(s) and time period(s)	Included in Section 5	
▪ structure plan generated traffic	Included in Section 5	
▪ extraneous (through) traffic	Included in Section 5	
▪ design traffic flows (ie. total traffic)	Included in Section 5	
▪ road cross-sections	N/A	
▪ intersection controls	Included in Section 5	
▪ access strategy	N/A	
▪ pedestrian / cycle networks	Included in Section 3	
▪ safe routes to schools	N/A	
▪ pedestrian permeability & efficiency	Included in Section 3	
▪ access to public transport	Included in Section 3	
Analysis of external transport networks		
▪ extent of analysis	Included in Section 5	
▪ base flows for assessment year(s)	Included in Section 5	
▪ total traffic flows	Included in Section 5	
▪ road cross-sections	N/A	
▪ intersection layouts & controls	Included in Section 5	
▪ pedestrian/cycle networks	Included in Section 3	
Conclusions	Included in Section 6	

Mundijong Structure Plan

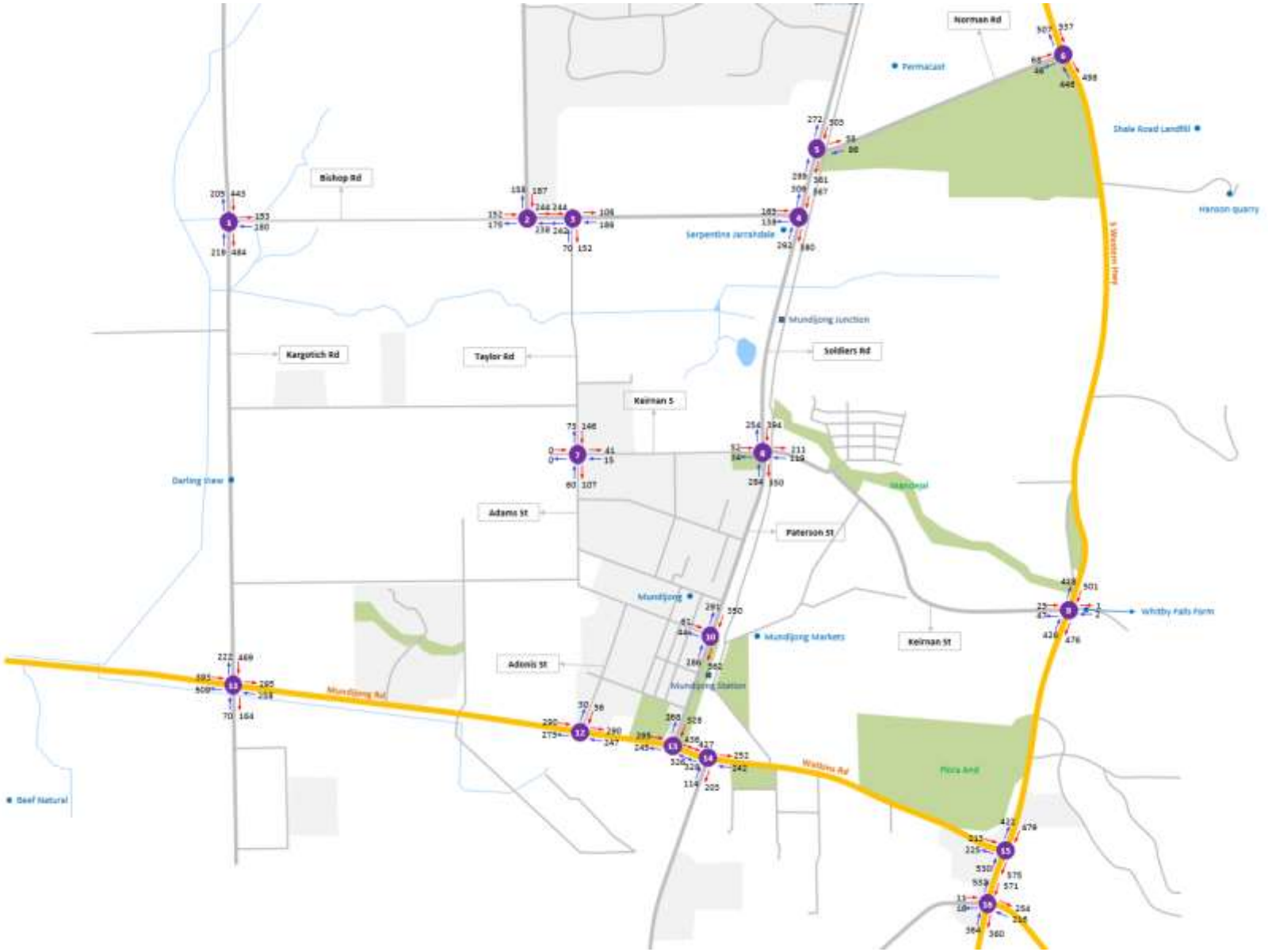
APPENDIX B

EXISTING TRAFFIC VOLUMES

Observed Traffic Volumes – 2018 AM Peak



Observed Traffic Volumes – 2018 PM Peak



Mundijong Structure Plan

APPENDIX C

FUTURE MODELLED TRAFFIC

2031 AM Peak – Mundijong Area

2031 AM Peak – Mundijong Area