flyt

PINJARRA MOVEMENT NETWORK PLAN

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PROJECT	81113-558 Pinjarra Movement Network Plan			
Revision	**Description**	**Originator**	**Review**	**Date**
0	Draft	AJS/CAS	CAS/SK/SoM	23/11/21
1	Reviewed	AJS	CAS/SoM	22/11/23
2	Issued	AJS	CAS/SoM	02/09/24
3	Final	CAS	SCK	06/01/25

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EXECUTIVE SUMMARY

The Pinjarra Movement Network Plan supports the progression of the Shire of Murray's Pinjarra Town Centre Pinjarra Precinct Structure Plan (PPSP) and the Pinjarra District Structure Plan (PDSP). The DSP was presented to the Shire of Murray in December 2024, with this report providing context for overall movement network issues.

The centre Structure Plans address the residential and commercial growth pressures facing Pinjarra within the context of the Town being identified as a Secondary Activity Centre in Perth & Peel @ 3.5 million. Without a comprehensive plan, it is likely the City will continue to expand along major roads, in a suburban format with a low development intensity, set back from the street and visually dominated by car parking areas.

The centre Structure Plans seeks to shift towards a more compact and sustainable pattern of growth which encourages walking in the centre by providing a safe, connected, and enjoyable pedestrian environment. Specifically for the Movement Network, the centre Structure Plans and Local Planning Policy clearly identify the need to diversify transport options and create a fine grained network of streets to support an intensification of activity and land use within the centre.

The implementation of the centre Structure Plans will allow for an overall movement network to evolve that is reflective of how Pinjarra will change over time. This evolution will see:

- Creation of new networks for streets, pedestrians, cyclists and public transport
- Requirement to place greater emphasis on parking management – both on-street and off-street
- Some existing streets changing to better suit the intensification of the Pinjarra Town Centre – principally Pinjarra Road and George Street
- Removal of heavy vehicle movements from the centre of Pinjarra and activation of areas to the west of the Town to accommodate industrial land uses
- Consideration of more strategic transport connections – both public transport and road network.

The Movement Network Plan makes a series of recommendations that have been based on transport planning assessments and modelling of the forecast year scenarios at a mesoscopic level. The recommendations within the Movement Network plan make some definitive actions for the Shire of Murray, whilst others will require collaboration with other stakeholders. The recommendations are:

- The Shire of Murray, alongside DoT. implement the secondary and primary routes set out in the LTCN in full
- The Shire of Murray implement the proposed cycling network within the centre Structure Plans
- The proposed form of the local network within the centre Structure Plans be used as a basis for developing strategic connections through and to Pinjarra, as well as formulating strategic decisions around land development outcomes
- Upon the completion of the Western Deviation project, progress the declassification of Pinjarra Road from Primary Distributor to District Distributor between the intersection of George Street and the Western Deviation. This would require changes to the PRS and LPS, as well as the Shire of Murray having responsibility for the road
- Upon declassification of Pinjarra Road, complete an application to Main Roads WA Heavy Vehicle Services to progress with the removal of a RAV network classification between the Western Deviation and George Street

- Upon the completion of the Eastern Deviation project (Stage 1), progress the declassification of South Western Highway, McLarty Road and George Street from Primary Distributor to District Distributor between the Eastern Deviation and Greenlands Road. The road would transfer control to the Shire of Murray and RAV network classification of South Western Highway between Greenlands Road and the Pinjarra-Williams Road would be revoked
- Work with Main Roads WA to ensure agreement that both the Western Deviation and Eastern Deviation are classified as Primary Distributors and are under the care and control of Main Roads WA.
- Shire of Murray progress with classifying Paterson Road from the intersection of South Western Highway as a District Distributor, rather than a Local Distributor to recognise the connection north to Nambeelup and potential future increase in traffic volumes
- As planning and delivery of the local road network progress, classify new connections or extensions of Curtis Lane, Moores Road and Lovegrove Street as Local Distributors to reflect spacing in the network and the likelihood that these connections will all form the role that is required of a Local Distributor, linking the higher-level Distributor Roads to land uses
- Shire of Murray to consider supporting RAV classifications of other road connections into the Pinjarra Industrial Estate on an as-needed basis
- New road reserve widths for the network to be based on centre Structure Plans but be subject to detailed design, relevant standards and the use of road reserves for cycling and public transport infrastructure. Any street network cross sections and designs will need to consider the new draft Design WA documents which provide guidance on Activity Centres and Precinct Planning. Outlined in the SPP Draft 4.2 Activity Centres and the “Movement” section of the Precinct Design Guidelines
- The staged implementation of intersection treatments set out in the centre Structure Plans be reviewed and assessed on an as-needed basis to conform to relevant standards and procedures
- The Shire of Murray review the intent of Pinjarra Road Streetscape Landscape Concept Masterplan for the movement network including parking, bus infrastructure and cycling infrastructure
- The Shire of Murray engage with Transperth on the potential for longer term planning for a more appropriate bus network within and around Pinjarra
- During the course of planning for implementation and delivery of the street network within the centre Structure Plans, design road network infrastructure where bus routes would be a feature to accommodate bus stop infrastructure as per the PTA Design Guidelines manual
- The Shire of Murray instigate examination of the future strategic public transport network into and through Pinjarra alongside PTA, DoT and DPLH based on the extension of the urban rail network as a means of activating potential for the corridor between Mandurah and Pinjarra
- The Shire of Murray examine potential for longer term reconfiguration of Freeway interchange access with Main Roads WA
- On the basis of the DoT Activity Centre Guidelines, develop a Parking Supply and Management Plan for the centre Structure Plans
- As required by changes to the Planning and Development (Local Planning Schemes) Regulations 2015, the Shire of Murray complete a Payment in Lieu of Parking Plan for the centre Structure Plans

- The Shire of Murray establish on-street parking policies and warrants to support staged introduction of appropriate parking management in Pinjarra
- As a result of more contemporary assessment of requirements relating to residential development, the Shire of Murray revise residential parking requirements within Local Planning Policy to reflect the outcomes in SPP 7.3
- The Shire of Murray include appropriate EoT provisions within the Local Planning Policy to establish minimum requirements for non-residential land uses.

1. INTRODUCTION

1.1 Background

This Movement Network Plan has been completed by Flyt for the centre Structure Plans for the Shire of Murray. Input for the plan has been provided from a range of organisations and stakeholders associated with the centre Structure Plans.

Boundaries of the District Structure Plan (DSP) from December 2024 and Activity Centre Plan (ACP) are shown in Figure 1. Together, these are referred to as the "centre Structure Plans" throughout this report.

The centre Structure Plans covers the entirety of the existing Pinjarra townsite, as well as areas to the west and north that have been highlighted through planning processes which would be subject to development in the future. The boundaries of the DSP area were finalised in 2024 and have been altered to expand into areas around North Pinjarra and existing townsite blocks within West Pinjarra. Some elements of this report also utilise information that has been developed prior to the finalisation of the DSP boundaries, with this being noted in the report where required.

The Activity Centre Plan Vision is shown below:

> "*For the Pinjarra Town Centre to be a distinct and important place and destination within the Peel Region, a place where people want to live, work, meet, relax, and visit. It is a town that is known for its culture of innovative thinking and its business, employment, and community networking opportunities. The Town Centre's historic, country character and strong connection to the Murray River is reflected in landscaping, street art and building design. Contemporary development creates a buzzing, yet relaxed atmosphere and access around the town and along the riverfront is easy, convenient and supported by a high quality pedestrian path network and public transport that frequently connects Pinjarra with Mandurah and other key destinations within and outside the region*".

The ACP area is bounded by the Murray River, Moore Road and Sutton Street to the north, Paterson Road and Pinjarra – Williams Road to the east, Padbury Road and Paceway Court and other local roads to the south and Pollard Street to the west.

Some of the assessment and images within this report also extend outside of the boundaries of the centre Structure Plans given the overall regional context of Pinjarra and the surrounding network. This is particularly the case for the road network, whilst pedestrian and cycling outcomes are discussed in more detail in the relevant sections.

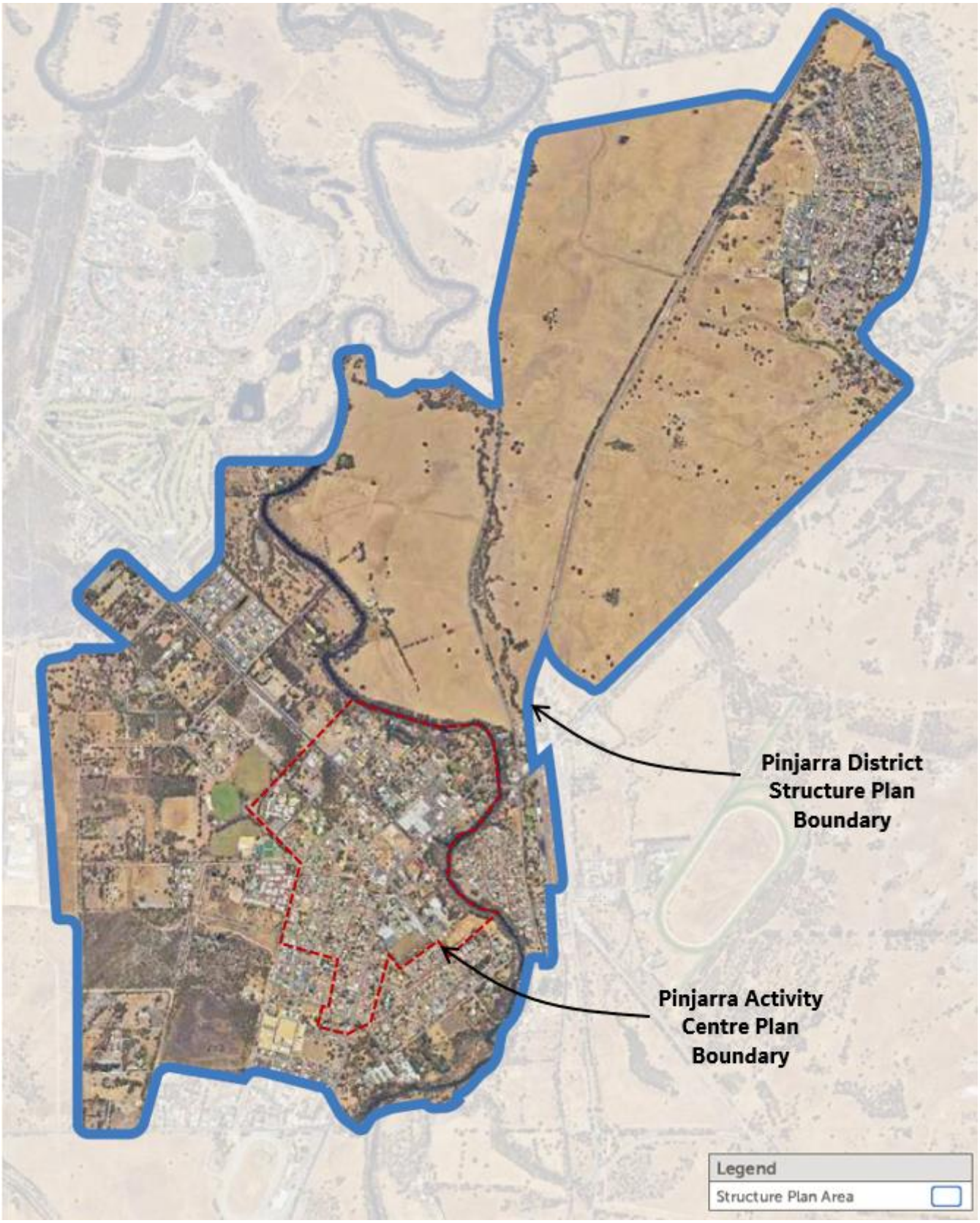

Figure 1 Boundaries of DSP and Activity Centre Plan (source: SoM)

1.2 District Structure Plan and Activity Centre Plan

The broader centre Structure Plans are shown in Figure 2 and are comprised of the following land uses and reserves:

- Pinjarra Activity Centre
- Residential
- Mixed use
- Public purposes (Pinjarra Primary School and Pinjarra High School)
- Proposed new school
- Recreational
- Pinjarra Road and South Western Highway Primary Regional Road reserve
- Local road reserves
- New local road connections
- New bridge
- Regional open space
- Commercial
- Service commercial
- Rural.

For the movement network, the key elements are the existing Primary Regional Road Reserves and the future potential network connections. As set out previously, the assessment within this Movement Network Plan also considers the implications of some of the wider network elements as they are key to unlocking the alterations envisaged within the centre Structure Plans and the Activity Centre planning process.

The centre Structure Plan area is located in Pinjarra, which is in the Peel Region. Pinjarra is approximately 17km by road east from Mandurah, 83km south from Perth, 24km west from Dwellingup and 91 km north from Bunbury. It is located along the South Western Highway which runs north / south and Pinjarra Road which runs from the north west and into Pinjarra where it intersects and terminates at the George Street / South Western Highway intersection.

The Town Centre has a mix of established buildings exhibiting a low level of intensity, including commercial offices, Shire of Murray administrative and civic buildings, retail shopping (both individual shop front and larger complexes), the Murray Districts Hospital, Ross McLarty Oval, Murray Leisure Centre and a range of locally owned and franchise businesses.

A range of established residential areas, undeveloped land parcels identified for residential development and rural land on the periphery of the centre plan area with the capacity to provide for future residential development are also encompassed within the activity centre area and are expected to significantly contribute to an increase in the number and range of residential dwellings within the catchment of the Pinjarra Town Centre.

The centre Structure Plan (spatial plan shown in Figure 3) has been developed with the specific intent to facilitate development within the Pinjarra Town Centre in alignment with its designation as a Secondary Activity Centre, where development of a range of services, facilities, employment and housing options are structured around a compact town centre core to encourage walkability and enable high frequency public transport. Accordingly, the proposed development

quantum is focussed around higher density main street style development outcomes and centralisation of activity and services in the town centre to reduce vehicle trips and increase walking trips.

The actual outcomes achieved through the centre Structure Plans will be dependent on a site by site delivery of land uses within the framework of the associated Activity Centre Local Planning Policy.

The areas per land use are shown in Table 1 which captures the land use and reserve classes shown in the Indicative Land Use Plan in Figure 3. The overall volume of potential residential units at full build out ranges from around 11,700 dwellings. Based on current trend inputs, development within the town centre is estimated to generate 2,026 jobs by 2036 and 6,422 jobs by 2051 (not including employment generated by education, health and associated services). At the ultimate stage of development, Pinjarra will require seven primary school and two high schools.

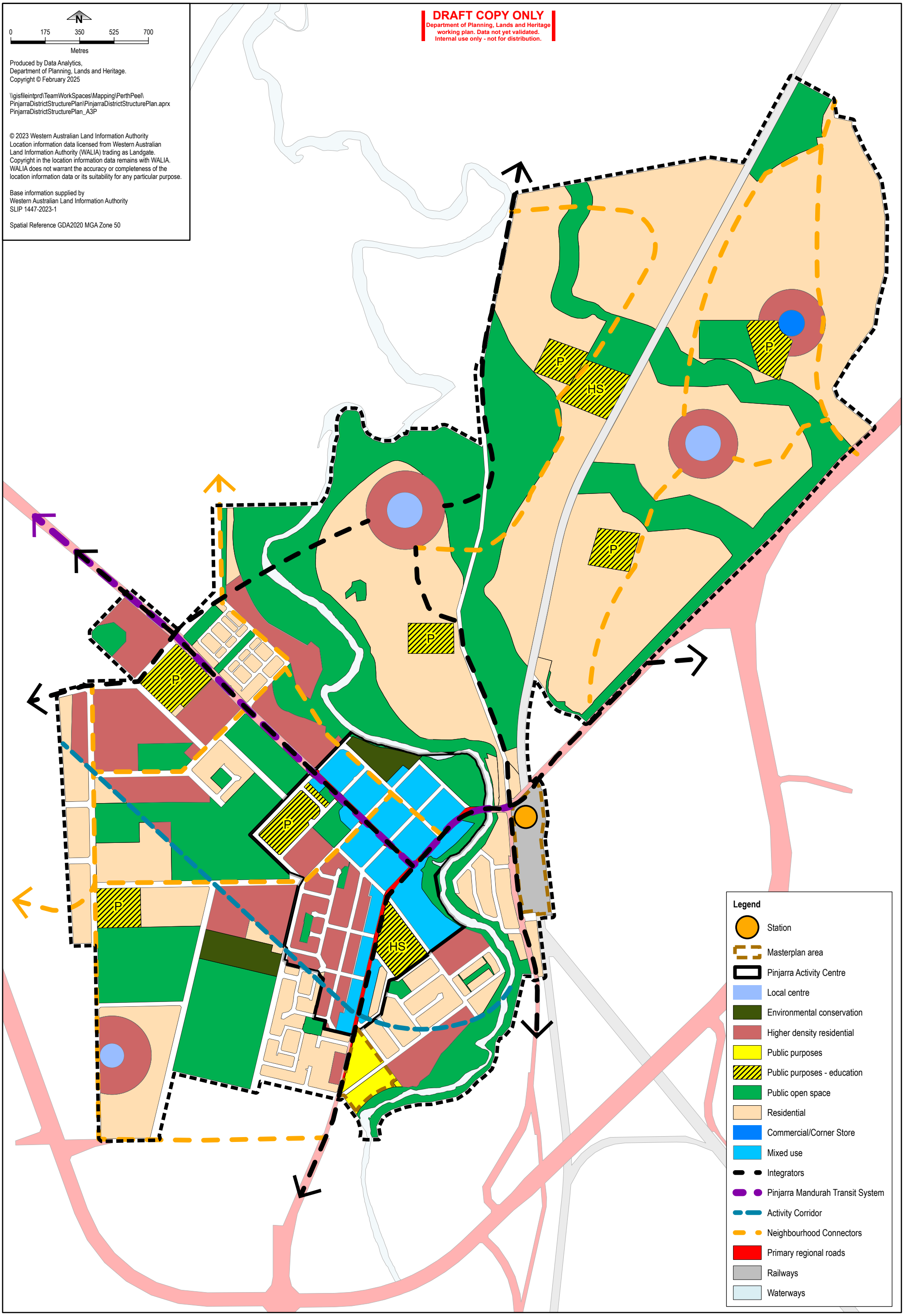

Figure 2 - Pinjarra District Structure Plan

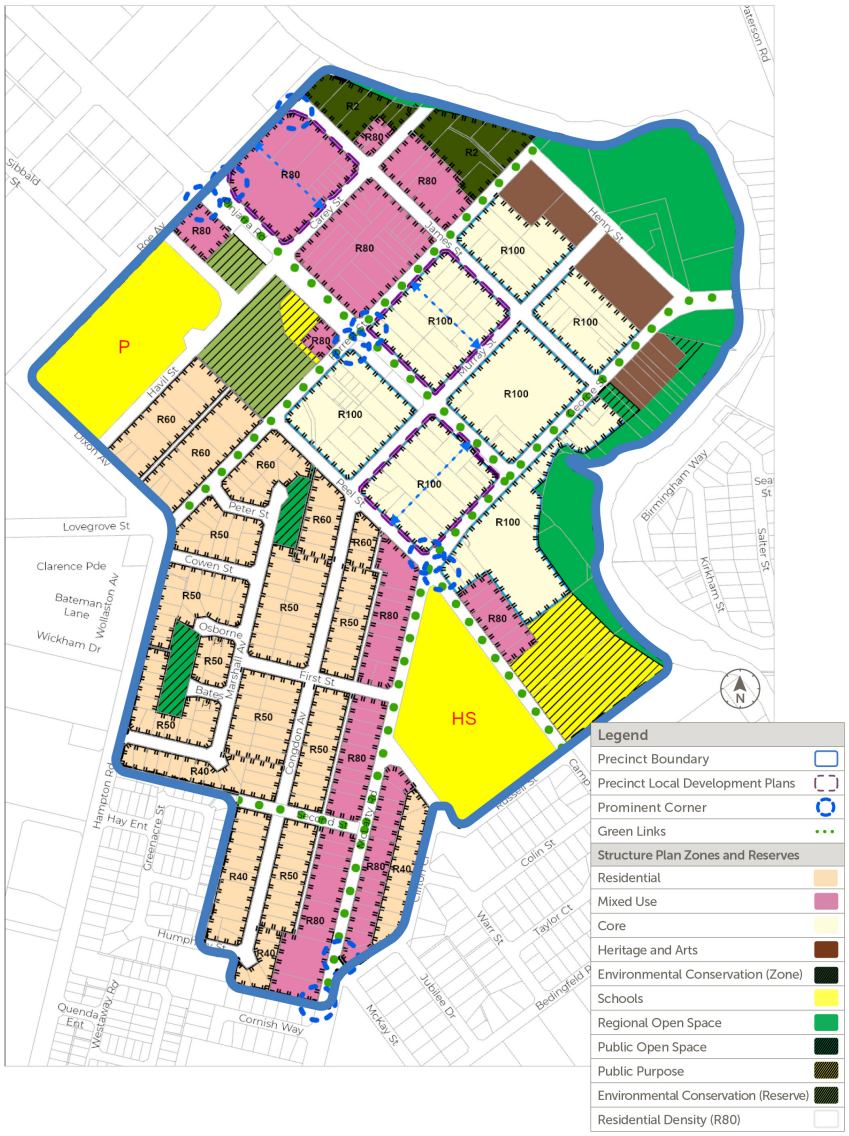

Figure 3 Pinjarra Structure Plan

Table 1 Pinjarra Structure Plan land uses

Land Use	Area – hectares (ha)
Core Precinct	17.36 ha
Mixed Use	32.35 ha
Health	18.86 ha
Heritage and Arts	13.16 ha
Residential	296.18 ha

2. PINJARRA MOVEMENT NETWORK PLAN

2.1 Assessment – Movement Network Plan

This Movement Network Plan for the centre Structure Plans has been completed based on the requirements of the Western Australia Planning Commission (WAPC) Transport Impact Assessment Guidelines – Volume 2 Planning Schemes, Structure Plan and Activity Centre Plans.

As set out in Section 7 of the Guidelines, the key objectives of this assessment are:

- "assess the proposed internal transport networks with respect to accessibility, circulation and safety for all modes, that is, vehicles, public transport, pedestrians and cyclists;
- assess the level of transport integration between the structure plan area and the surrounding land uses;
- determine the impacts of the traffic generated by the structure plan area on the surrounding land uses; and
- determine the impacts of the traffic generated by the structure plan area on the surrounding transport networks".

This Movement Network Plan has been set out using the structure established in Section 9.3 of Volume 2 of the WAPC Guidelines. For completeness, in addition to the assessment requirements with the WAPC TIA guidelines, an additional assessment on the Activity Centre, as per section 7.7 'Movement and Access" of the Draft SPP 4.2 Activity Centre requirements, has been included in this report.

This report is a combination of defining network connections and then assessment of the implications of the proposed network. It is designed to inform the overall planning process for the centre Structure Plans and be the basis for future processes related to more detailed network and land use planning.

2.2 Pinjarra Heavy Haulage Deviations

One of the key transport drivers of the Movement Network Plan has been the progression of the Pinjarra Heavy Haulage Deviation project being delivered by Main Roads WA. The first stage of the project, which would link the existing intersection of Greenlands Road and South Western Highway with the Pinjarra-Williams Road, is currently being planned. The project has Federal Government funding and is being driven by the need to divert heavy vehicle traffic around Pinjarra.

Stage One of the project is being progressed at present, with a number of additional stages being considered. The overall plan of the Shire of Murray to support heavy vehicle movements around Pinjarra is shown in Figure 4.

For the purposes of this report, the connection between Pinjarra Road and Greenlands Road is called the Western Deviation, whilst the section between Greenlands Road in the south and South Western Highway in the north is referred to as the Eastern Deviation.

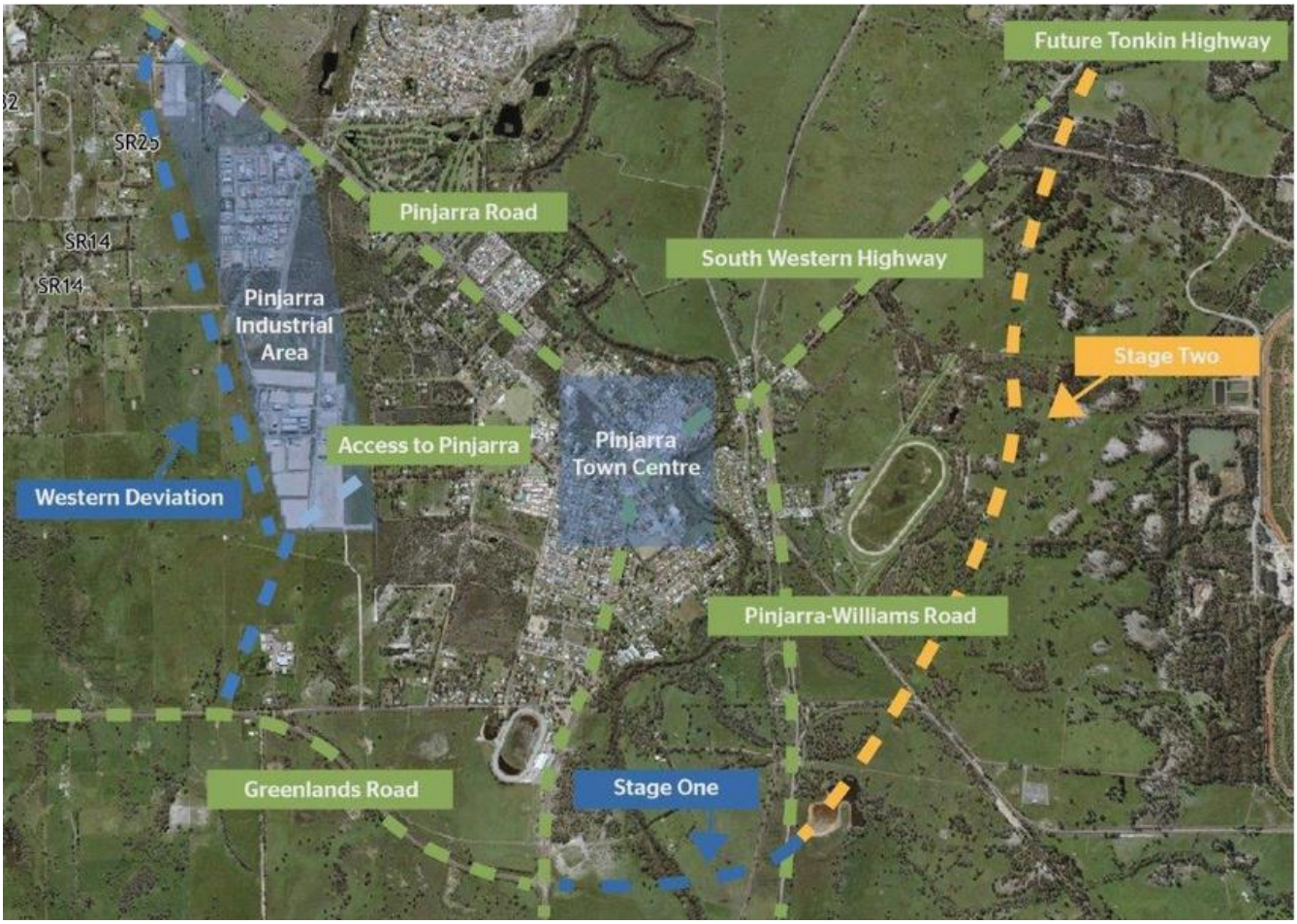

Figure 4 Staged approach to delivery of heavy haulage bypasses of Pinjarra (source: Shire of Murray)

3. EXISTING SITUATION

3.1 Land Uses

The centre Structure Plans area is comprised of a mixture of low density commercial and residential land uses. A number of lots remain vacant and undeveloped but are coded as R-ACO for higher density development. The Shire of Murray Town Planning Scheme (LPS) No.4 Zone Maps are shown in Figure 5 and the Peel Region Scheme (PRS) map is shown in Figure 6.

Residential land within the area is zoned as R15 with some pockets of R25 and R30 under the Residential Planning Codes (R-Codes). Existing areas of the Town Centre zoned sites within the Activity Centre Plan area include commercial premises fronting George Street, Pinjarra Road and James Street which are comprised of:

- Town hall
- Shopping centre with various franchise and chain stores
- Church
- Cafes
- Takeaway food
- Clothing retail and opportunity shop
- Policy Station
- Post office
- Court house
- Hardware
- Community resources.

According to the Shire's LPS No. 4, the south east section of Pinjarra Road approaching the intersection of George Street is zoned Major Highway. It is likely this parcel of land will no longer be required as the freight route will be deviated via the Western and Eastern Deviations to avoid Pinjarra Town Centre.

3.2 Land Uses Within 800m

The area around the centre Structure Plans boundaries are broadly split between the following characteristics:

- Low density residential land use surrounding the Town Centre
- Three lots zoned Public Recreation / Conservation
- Two Civic and Cultural zones
- Approximately one third of the area is currently zoned Rural
- Industrial zoned land uses are outside the centre Structure Plans area with access from Pinjarra Road to the north of the area.

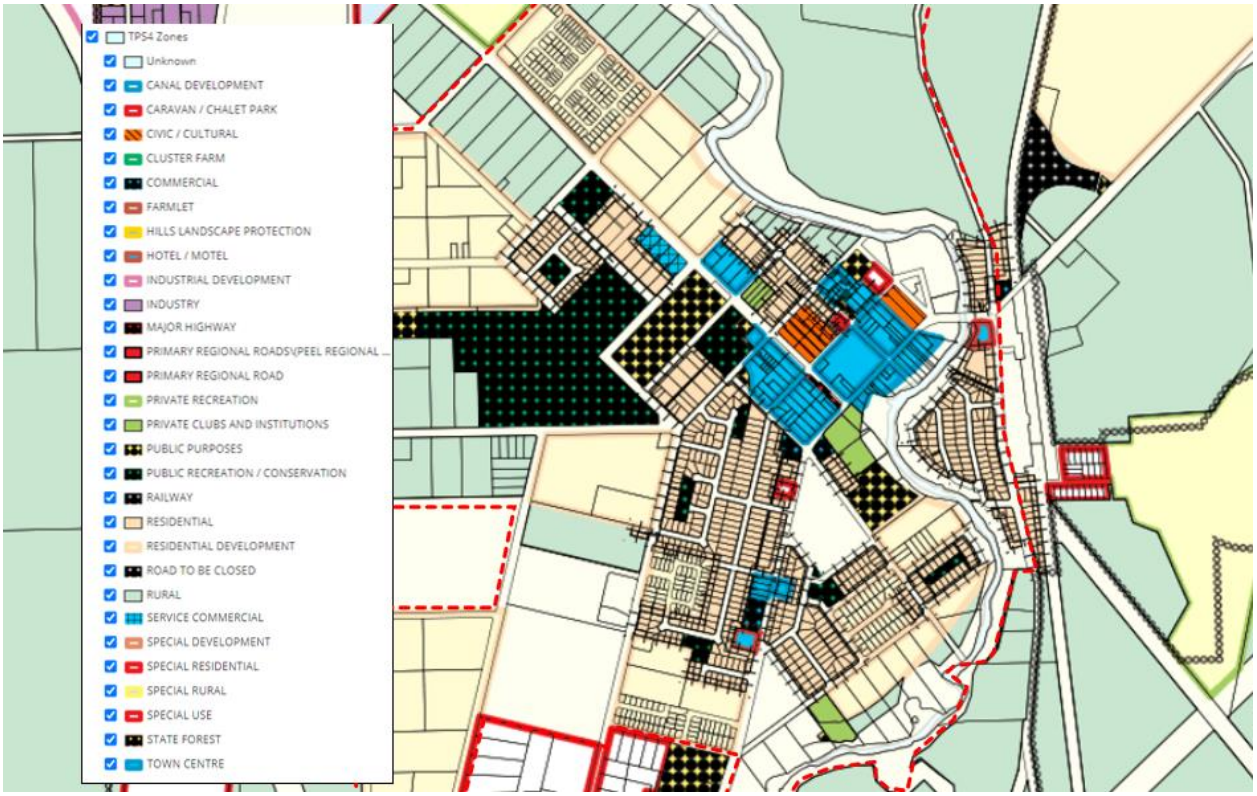

Figure 5 Shire of Murray Town Planning Scheme No. 4 (source: Shire of Murray)

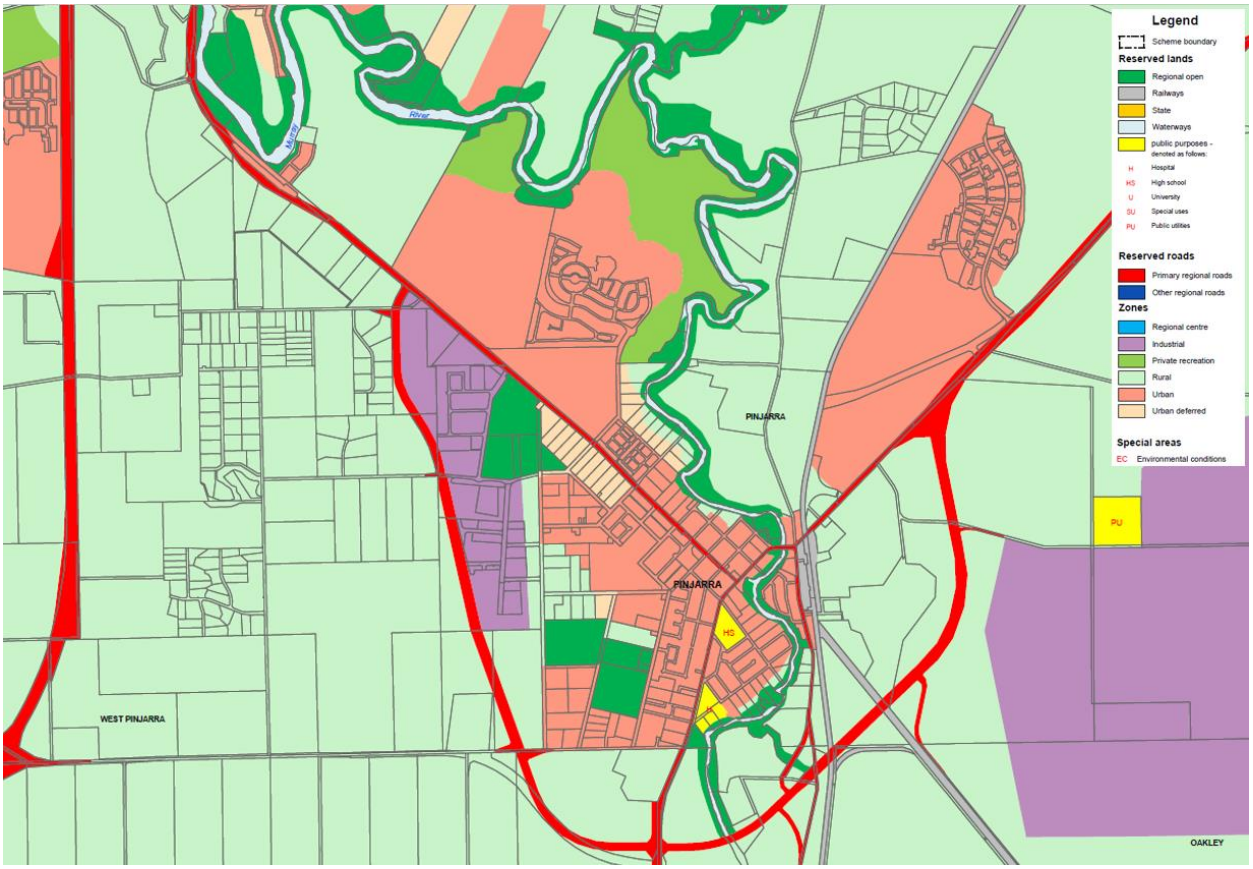

Figure 6 Peel Region Scheme (source: Shire of Murray)

3.3 Existing Population

Population data was sourced from id Community for the Shire of Murray. In 2016, the population for the Shire of Murray recorded a population of 17,122 people which is anticipated to increase to 70,913 by 2051. Within the Peel Region, the Pinjarra Town Centre is identified as a Secondary Activity Centre with Mandurah as the Primary Activity Centre. Pinjarra recorded a population of 5,021 people in 2016 which is anticipated to increase to 12,354 people by 2051.

Within Pinjarra and Pinjarra West, 85.1% of people live in a separate house, 10% live in medium density, none are recorded within high density dwellings, and 3.8% of people live in a caravan or cabin. The average number of people per household is 2.51. Projected population growth for Pinjarra is shown in Figure 7.

From these forecasts, there are a number of factors to consider:

- The general average household size is not projected to vary from present conditions. This would indicate a lack of diversity in housing product or a homogenous demographic profile that would likely embed existing travel behaviours.
- The overall volume of population over a 30-year period is an effective doubling. The profile of demographics would influence travel patterns, so whilst the population may more than double, the impact of a specific demographic group may have on travel patterns may be limited in this instance.

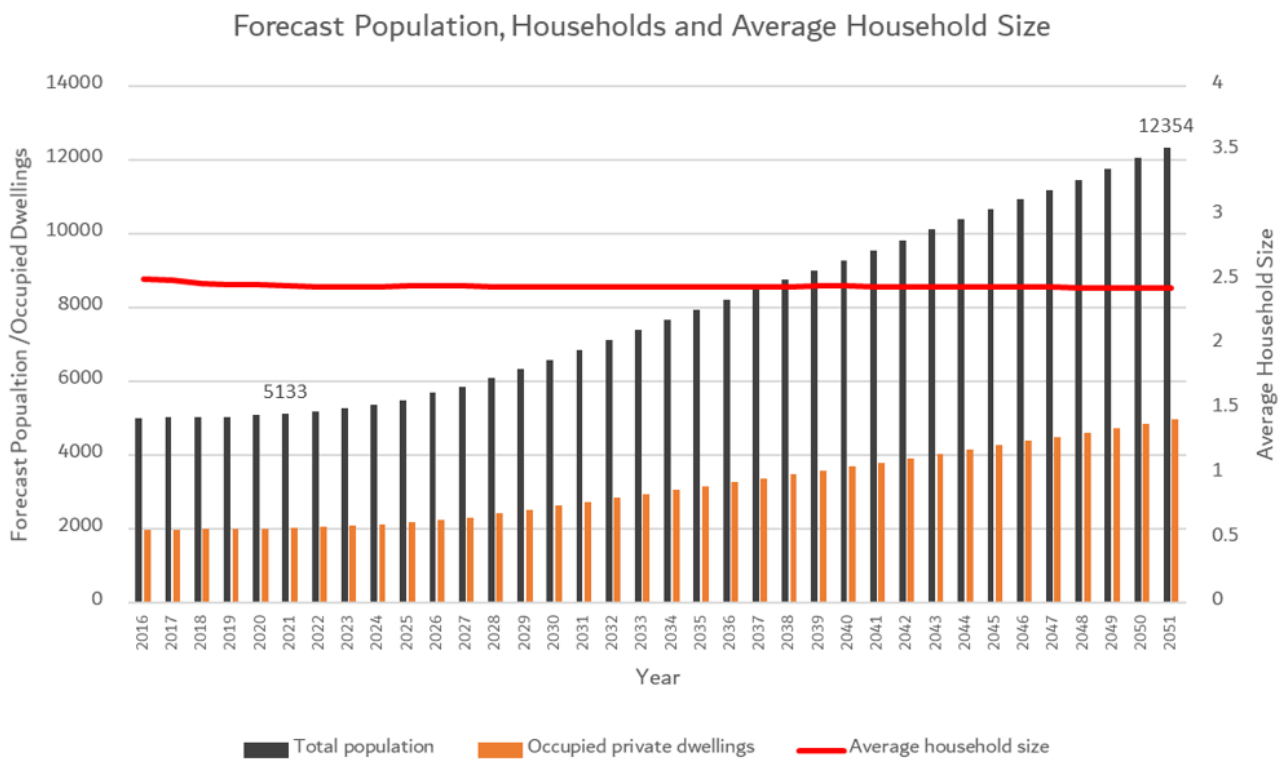

Figure 7 Population forecast for Pinjarra (source: Id Forecast)

The population of the project area is ageing and is generally older than the general profile of Western Australia. The median age of the Western Australian population in 2016 was 36 years of age. For the SA1 level profile of the project area, the

majority of the zones had an average age in both the 2011 and 2016 Census of between 40 and 49, as seen in Figure 8. The overall median age for the Shire of Murray SA2 was 40 in 2016.

The older profile of median age tends to reflect those locations that are stable and have established populations. Typically, outer suburban growth areas have a much lower median age (such as the coastal strip between Mandurah and Rockingham) whilst communities with established retirement industries (such as Mandurah) have much higher median age profiles. Given the general upward trend in median age between 2011 and 2016, it reflects the type of population in in the project area and their likely travel patterns.

Figure 8 Census median age 2016 (source: Planwisely)

3.4 Road Transport Network

The centre Structure Plans is dominated by two major primary distributor roads running through the centre of Pinjarra and bisecting the study area, as shown in the PRS extract shown in Figure 6. The road network is shown in Figure 9 and the posted speed limits in Figure 10.

Within the Road Classification hierarchy, the remainder of streets in the project area are classified as local Access Roads under the control of the Shire of Murray with Paterson Road the only local distributor. Local roads are predominantly in a traditional grid network and revert to the default speed limit of 50km/hr. Some roads within the Pinjarra Industrial Estate are classified as Industrial Access Roads.

There are a range of speed zones on the network external to the Pinjarra town site, with speed zone changes evident on approach to the town along Pinjarra Road, South Western Highway and the Pinjarra-Williams Road.

There are a number of school zones, including one on George Street that is not reflected in Main Roads WA mapping.

The various elements related to the different road classifications relevant to the existing network are set out by Main Roads WA as follows:

"**Primary Distributors** :

Provide for major regional and inter-regional traffic movement and carry large volumes of generally fast moving traffic. Some are strategic freight routes and all are State Roads. They are managed by Main Roads Western Australia.

District Distributor A : Urban area roads - (Built Up Area)

Carry traffic between industrial, commercial and residential areas and generally 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 : Urban area roads - (Built Up Area)

Perform a similar function to type A District Distributors but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with a traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and generally not through them, forming a grid which would ideally space them around 1.5 kilometres apart. They are managed by local government.

Regional Distributor : Rural - (Non Built Up Area)

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.

Local Distributor

Urban - (Built Up Area)

Roads that carry traffic within a cell and link District Distributors or Regional Distributors at the boundary, to access roads. The route of Local Distributors should discourage 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.

Rural - (Non Built Up Area)

Connect to other Rural Distributors and to Rural Access Roads. Not Regional Distributors, but which are designed for efficient movement of people and goods within regional areas. Urban and Rural Local Distributor roads are managed by local government.

Access Roads

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.".

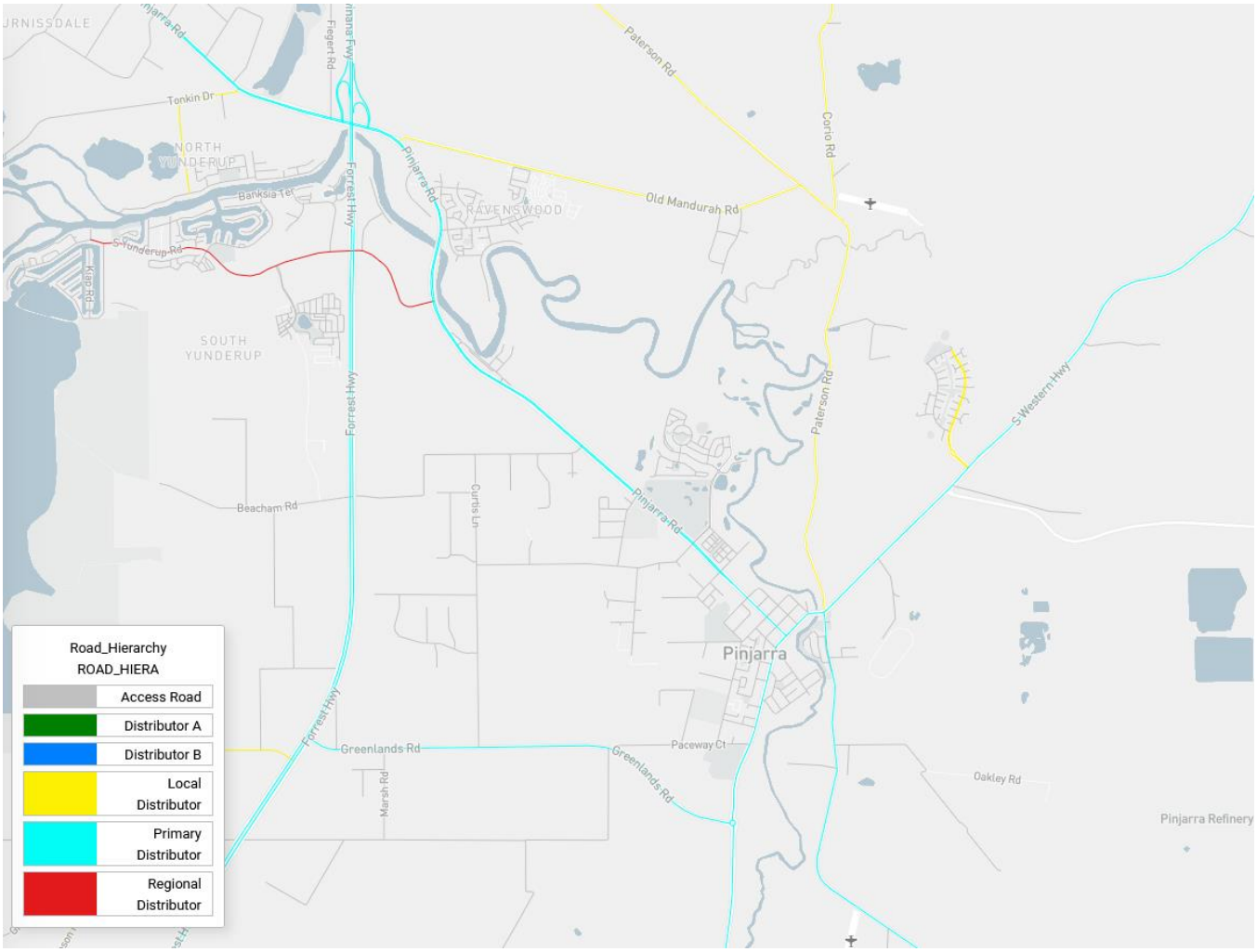

Figure 9 Road network

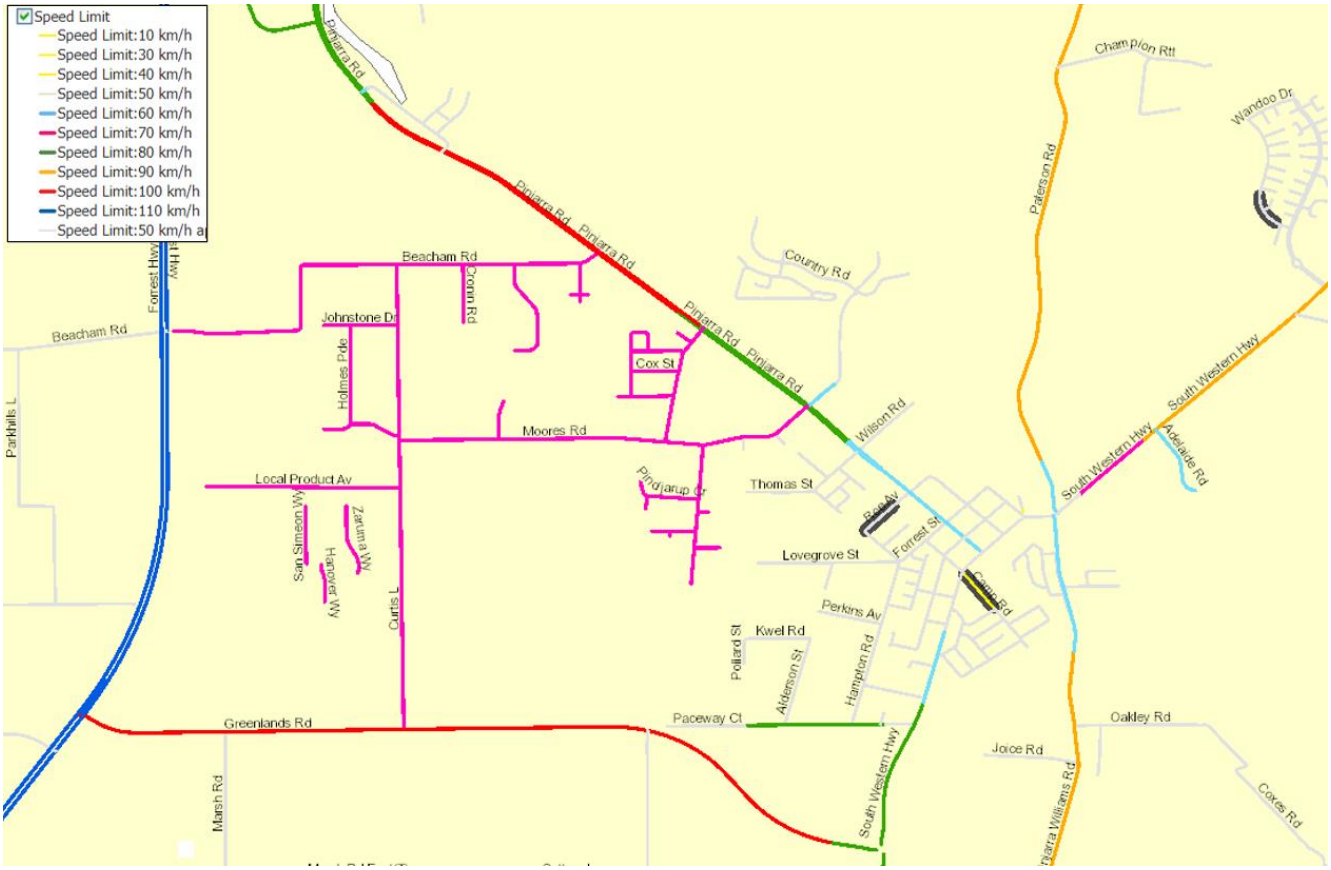

Figure 10 Posted speed limit

3.4.1 Pinjarra Road

Pinjarra Road is a primary distributor under the control of Main Roads WA and is the major connecting route between Mandurah and Pinjarra. Main Roads WA Trafficmap for Pinjarra Road 2020/2021 (north of Wilson Road) carried an average of 13,700 vehicles Monday to Friday. Pinjarra Road is single carriageway with two lanes in each direction with a variable posted speed limit which reduces to 60km/hr in the study area. The 85th percentile is consistently 15-20kms over the posted speed limit.

On street parking is not permitted along Pinjarra Road, however there are a number of bus stops within the study area.

It is constructed to a width of 13.5m, within a 20m road reserve south-east of Murray Street and a 40m road reserve north-west of Murray Street. There is an 2m path on the west and a 1m wide path on the east. Closer to the George Street intersection, the verge on the east side is built to a width of 3.5m.

3.4.2 South Western Highway

South Western Highway runs north to Armadale and south to Bunbury, however the function of the highway changes when passing through the Pinjarra Town Centre. This section of the highway becomes George Street south of Paterson Road and then McLarty Road south of Pinjarra Road, reverting back to the South Western Highway south of Paceway Court. Speeds are reduced to 60km/hr and increase back to 110km/hr south of the intersection of Greenlands Road.

South Western Highway is a primary distributor under the control of Main Roads WA and is the major connecting route between Armadale and Bunbury providing an alternative route to the Forrest Highway. According to Main Roads WA Trafficmap, in 2020/2021 South Western Highway (north of Greenlands Road) carried 4,772 vehicles Monday to Friday with 12.5% being heavy vehicle classes. South Western Highway is predominantly single carriageway with one lane in each direction.

3.4.3 Greenlands Road

Greenlands Road acts as a connection between South Western Highway and Forrest Highway. It was designed to accommodate a bypass function and support freight movements associated with agri-business and other primary or secondary industries. It has a carriageway width of around 7m and supports RAC Network 4 vehicles, as set out in section 3.4.7. In 2021, it carried an average weekday volume of over 2,800 vehicles of which over 18% were heavy vehicle classes.

3.4.4 Pinjarra – Williams Road

Pinjarra-Williams Road connects the towns of Pinjarra, Dwellingup and Williams and carried around 1,900 vehicles on an average weekday in 2021, of which around 15.7% were classified as heavy vehicles. Within the project area, Pinjarra-Williams Road connects into the South Western Highway at a staggered T-intersection with Paterson Road to the north. It is classified as a RAV Network 4.

3.4.5 George Street

George Street is a primary distributor that has a speed limit of 60km/hr which reduces to 40km/hr school zone during the school year. It is a single carriageway with one lane in each direction. On street parallel parking is permitted along its length and it is constructed to a width of 14m including on street parking, within an 18.5m road reserve. There are two speed tables between George Street and Murray Street and footpaths range from 2-3m in width.

3.4.6 James Street

James Street is a local access road with a speed limit of 50km/hr. It is a single carriageway with one lane in each direction. It is constructed to a width of 9.5m including parallel on street bay within a 20m road reserve. Some sections have angled parking built into the verge. The section of James Street between Murray Street and George Street primarily acts as storage and access for vehicles associated with the adjacent retail and commercial land uses.

3.4.7 Restricted Access Vehicle Network

The Main Roads WA mandated Restricted Access Vehicle (RAV) network allows for RAV Network 4 vehicles to operate on a number of roads in and around the project area, as shown in Figure 16. Roads with either a RAV 4 or RAV 4 with conditions include Pinjarra Road, George Street, McLarty Road, South Western Highway, Greenlands Road and Pinjarra-Williams Road. There are a number of other roads within the Pinjarra Industrial Centre off Phillips Road that are also classified as RAV 4 network roads.

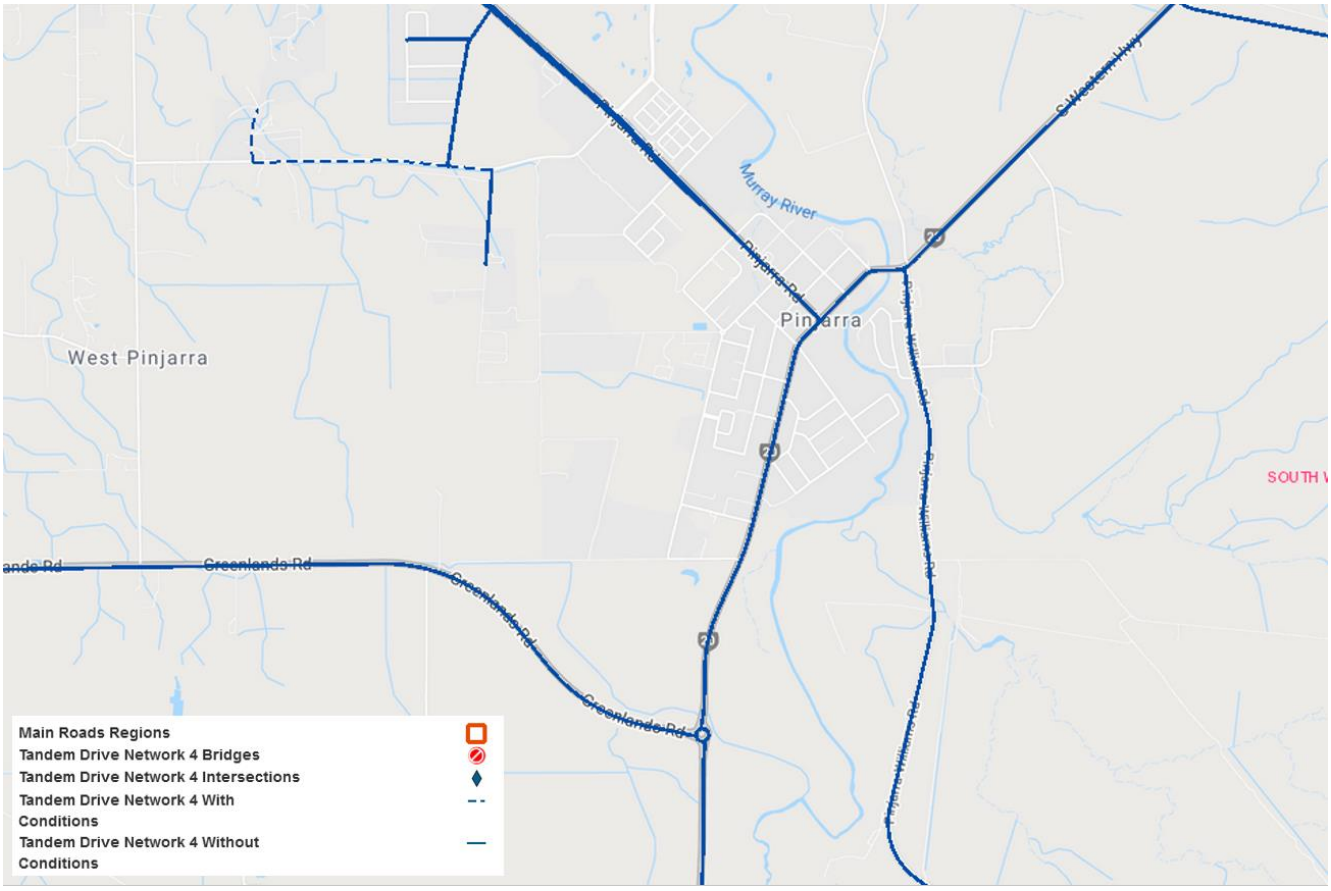

Figure 11 RAV Network (source: Main Roads WA)

3.5 Public Transport Network

Public transport coverage in the centre Structure Plans is limited and focused on connections to two separate rail services. The most immediate for the Pinjarra townsite is the Australind train service that connects Perth and Bunbury daily with one service in each direction.

Pinjarra Station is located on the eastern side of the Murray River and is accessed off the Pinjarra – Williams Road, as shown in Figure 12. The timetabled services running through Pinjarra are designed to accommodate commuting movements, with trains arriving and departing Perth to allow for weekday commuting movements, as shown in the current timetable replicated in Figure 13.

Access to the station from the Town Centre is provided via the local street network or pedestrian paths that extend over the existing traffic bridge crossing the Murray River along the South Western Highway.

Figure 12 Location of Pinjarra Station

Perth to Bunbury — Australind

From Perth		B03	B55	From Bunbury		B02	B56
		Daily AM	Daily **PM**			Daily AM	Daily **PM**
Perth Station	Dep	9:30	**5:55**	**Bunbury Passenger Terminal**	Dep	6:00	**2:45**
Armadale Station	Dep	9:56	**6:25**	Brunswick Junction*	Dep	6:15	**3:02**
Byford*	Dep	10:07	**6:36**	Harvey*	Dep	6:31	**3:17**
Mundijong*	Dep	10:14	**6:43**	Cookernup*	Dep	6:39	**3:24**
Serpentine*	Dep	10:21	**6:50**	Yarloop*	Dep	6:44	**3:29**
North Dandalup*	Dep	10:32	**7:01**	Waroona*	Dep	6:54	**3:38**
Pinjarra*	Dep	10:42	**7:11**	Pinjarra*	Dep	7:10	**3:55**
Waroona*	Dep	11:00	**7:29**	North Dandalup*	Dep	7:22	**4:07**
Yarloop*	Dep	11:11	**7:40**	Serpentine*	Dep	7:34	**4:18**
Cookernup*	Dep	11:15	**7:44**	Mundijong*	Dep	7:40	**4:24**
Harvey*	Dep	11:21	**7:50**	Byford*	Dep	7:46	**4:32**
Brunswick Junction*	Dep	11:36	**8:05**	**Armadale Station**	Arr	7:52	**4:39**
Bunbury Passenger Terminal	Arr	11:55	**8:25**	**Perth Station**	Arr	8:30	**5:15**

Figure 13 Australind timetable (source: Transwa)

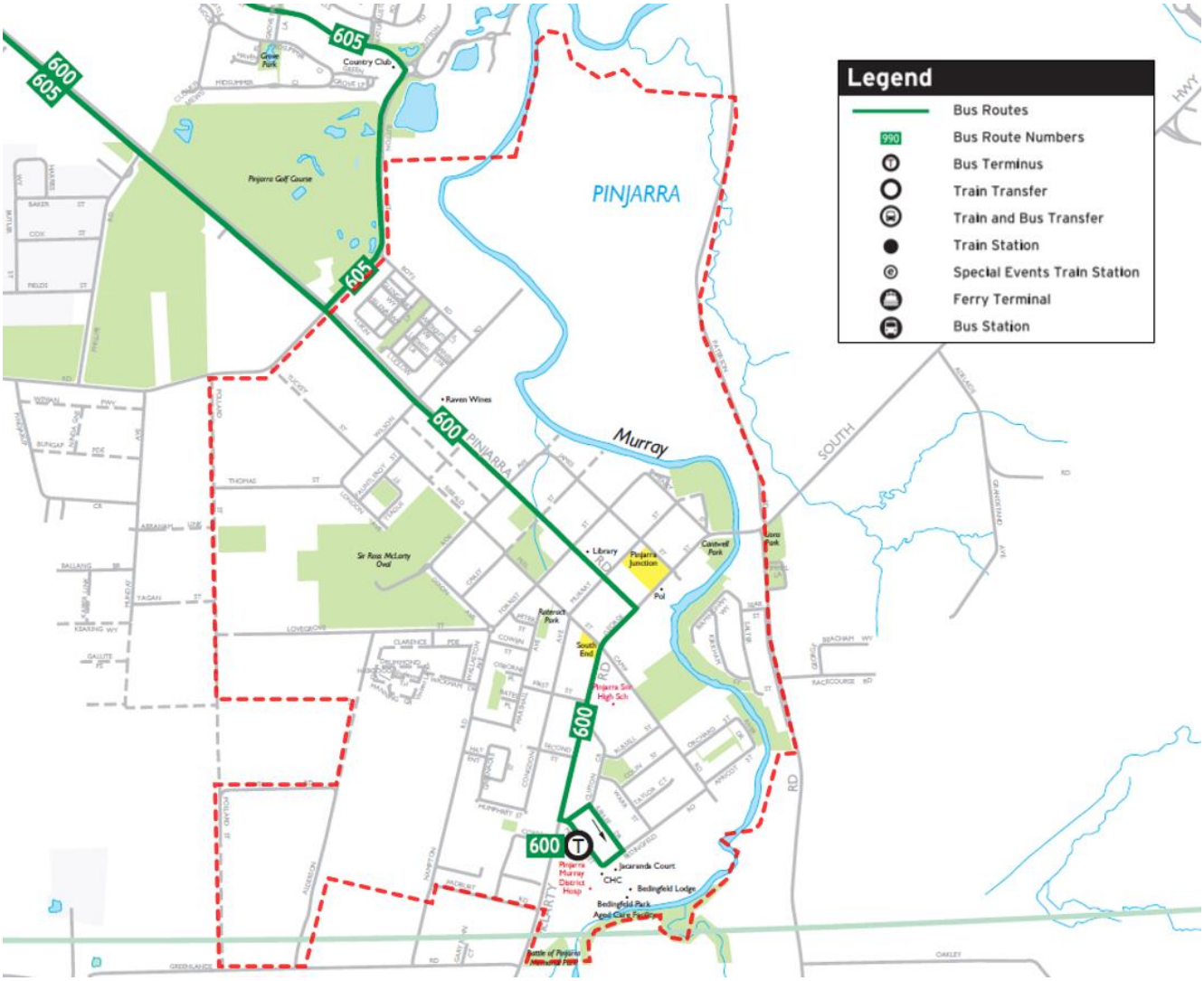

Figure 14 Existing public transport network (source: PTA)

To illustrate the limitations and relative attractiveness of the existing network, a 30 minute catchment analysis was undertaken from the middle of Pinjarra for a typical Tuesday morning during peak hour. The outcome is shown in Figure 15.

This sets out the purpose of the existing network to connect to Mandurah. When the Activity Centre was assessed for a transit score using Walkscore, there were no results – indicating that public transport is not an option for the vast majority of trips into or out of the area.

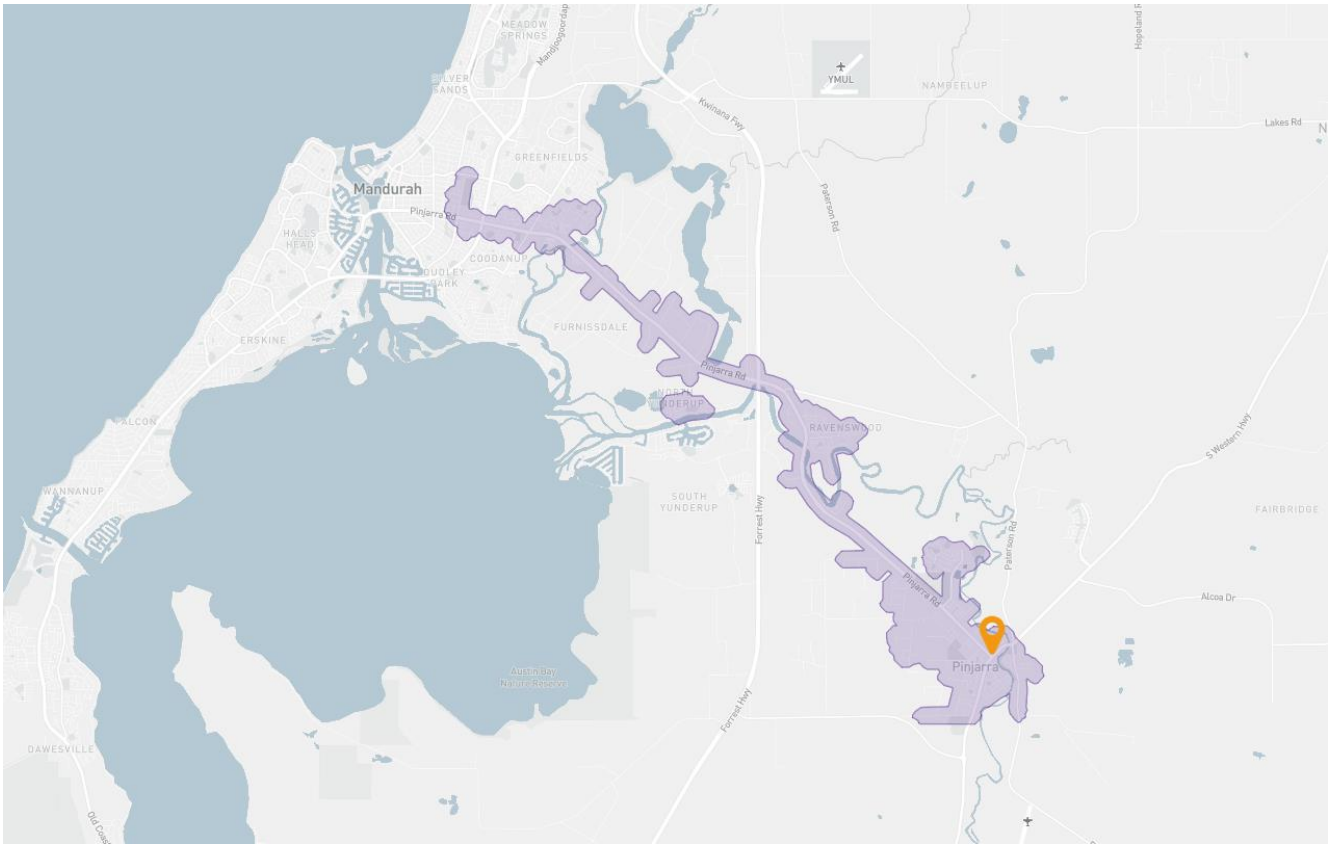

Figure 15 30 minute bus catchment - Tuesday 8.00am (source: Planwisely)

3.6 Pedestrian Network

The existing pedestrian network is generally poor in nature with many streets only having a path on one side of the street and some not having paths at all. While the grid layout of the streets facilitate good permeability, block sizes are large and there are some no through roads. Some paths are narrow and most are back of kerb to the carriageway, which is a less optimal outcome for pedestrians and vulnerable street users. There are no existing shared paths identified within the study area.

3.6.1 Pinjarra Road

Along Pinjarra Road, the pedestrian environment is hostile with no dedicated infrastructure to assist pedestrians cross safely with the exception of some basic crossovers and refuges west of Forrest Road. Given the 85th percentile speeds are typically 15-20kms above the 60km/hr speed limit, this creates a dangerous environment for people walking.

Within the centre of Pinjarra, most paths are at least 2-3m wide which facilitates pedestrian movements, allowing people to pass, stop and rest although there are no shade trees and the pedestrian crossing at the signalised intersection is poor. West of Murray Street, paths along Pinjarra Road appear to be minimum standard paths on the southern side of the reserve, whilst on the northern side, recent upgrades to the existing path are evident and it is marked as a shared path which connects to residential estates in West Pinjarra.

3.6.2 George Street and McLarty Road

George Street has paved paths on both sides with a width of at least 2-3m. The placement of bins and advertising signs sometimes reduces the width to less than 1.5m which does not allow people to pass comfortably. Driveways dissect the pedestrian path formalising vehicle priority in the area.

There is one zebra crossing at the north-east end of George Street which facilitates safe crossing and slow driver speeds. There are no other formalised or safe pedestrian crossing points on George Street given the only dropped curbs are at crossovers which is not safe or practical for people using mobility assist devices / prams. There is on street parking on both sides along the length of George Street and speeds reduce to 40km/hr during school times. All lots have been developed and with a mix of heritage and commercial buildings.

Crossing facilities for pedestrians along McLarty Road is generally a standard, narrow concrete path along the western side of the road reserve with a manned crossing point at the High School entrance.

3.6.3 James Street

James Street is a key pedestrian connecting route between the residential areas and the Town Centre and provides vehicles access to many commercial businesses. While there is an existing mid-block raised table for traffic calming, the footpaths are regularly dissected by driveways, most of which have been constructed to provide vehicle priority, not pedestrian priority. At the entrance and exit points to the shopping centre car park, non-standard zebra crossing markings have been put in place. At the intersection of Murray Street, pedestrian crossings have been offset to provide for vehicle swept paths.

Shade trees are at a minimum and in many instances verge parking has been provided within the reserve whilst tree planting is within development lots.

3.7 Cycle Network

There are no identified or dedicated bicycle paths in Pinjarra, and no strategic plan by the Shire of Murray.

The Long Term Cycle Network (LTCN) developed for the DoT shows the long term cycle plan for Pinjarra and identifies a primary route along Pinjarra Road and the proposed bypass along the Pinjarra Heavy Haulage Deviation route. A secondary route is proposed along the South Western Highway / George Street corridor with local routes along the Murray River and Moores Road to the north of the centre Structure Plans area.

Primary routes are intended for longer distance commutes, training and tourism whereas secondary and local routes are used by all types of bike riders including children and novices. For that reason, the secondary and local routes must ensure adequate protection for children is provided from cars and heavy vehicles especially on route to schools.

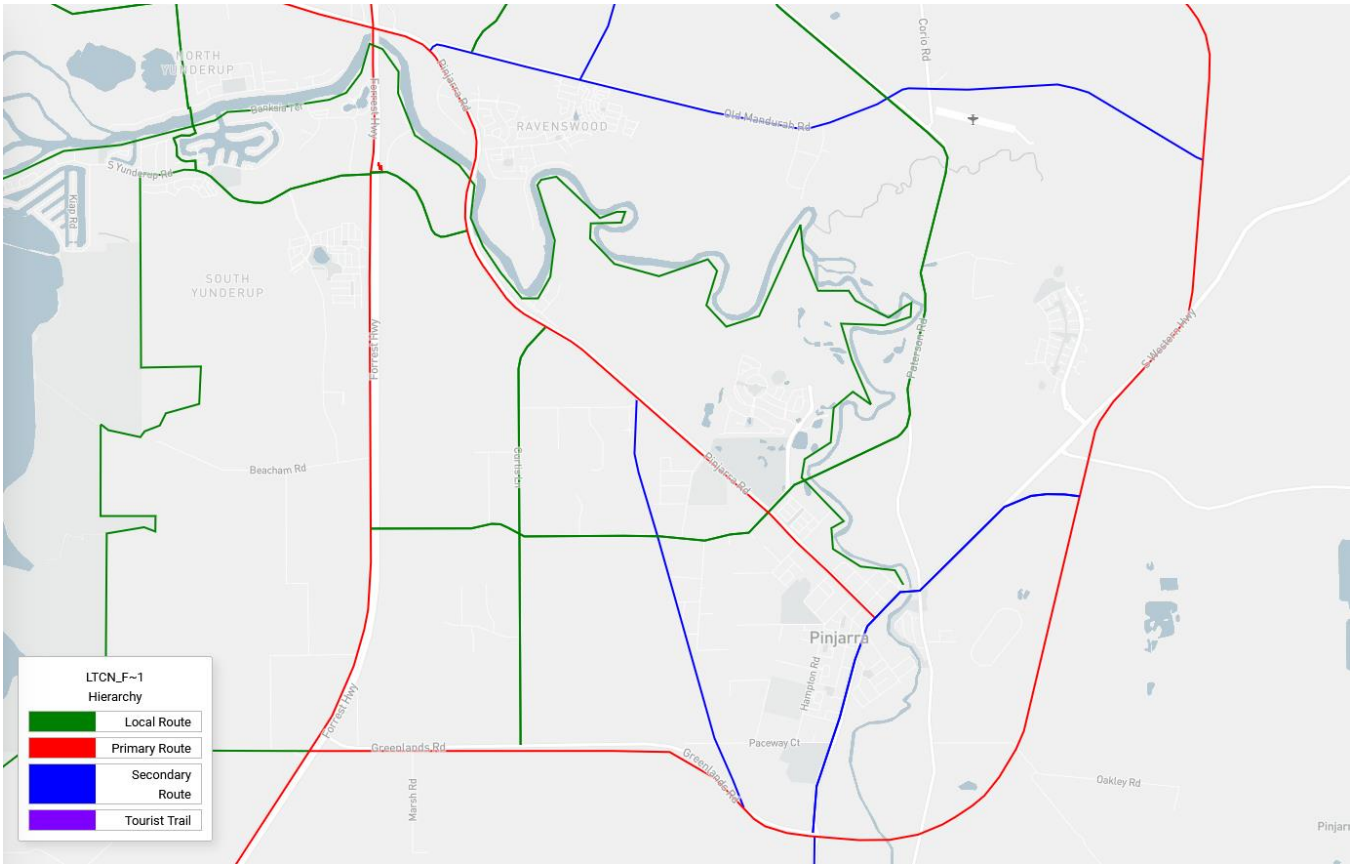

Figure 16 Long Term Cycle Network (source: Department of Transport)

3.8 Traffic Data

Recorded daily and hourly traffic data available within 2km of the centre Structure Plans area is shown on the extract from the Main Roads WA mapping system in Figure 17. The most relevant of these are the major primary distributor connections radiating from the centre Structure Plans area being:

1. Pinjarra Road (west of Wilson Road) average weekday counts 2020/2021, 13,700 vehicles (8.1% heavy vehicles)
2. South Western Highway (south of Alcoa Road) average weekday counts 2020/2021, 6,677 vehicles (6.6% heavy vehicles)
3. South Western Highway (north of Greenlands Road) average weekday counts 2020/2021, 4,772 vehicles (10.9% heavy vehicles)
4. Paterson Road (north of South Western Highway) average weekday counts 2020/2021, 1,774 vehicles (6.2% heavy vehicles).

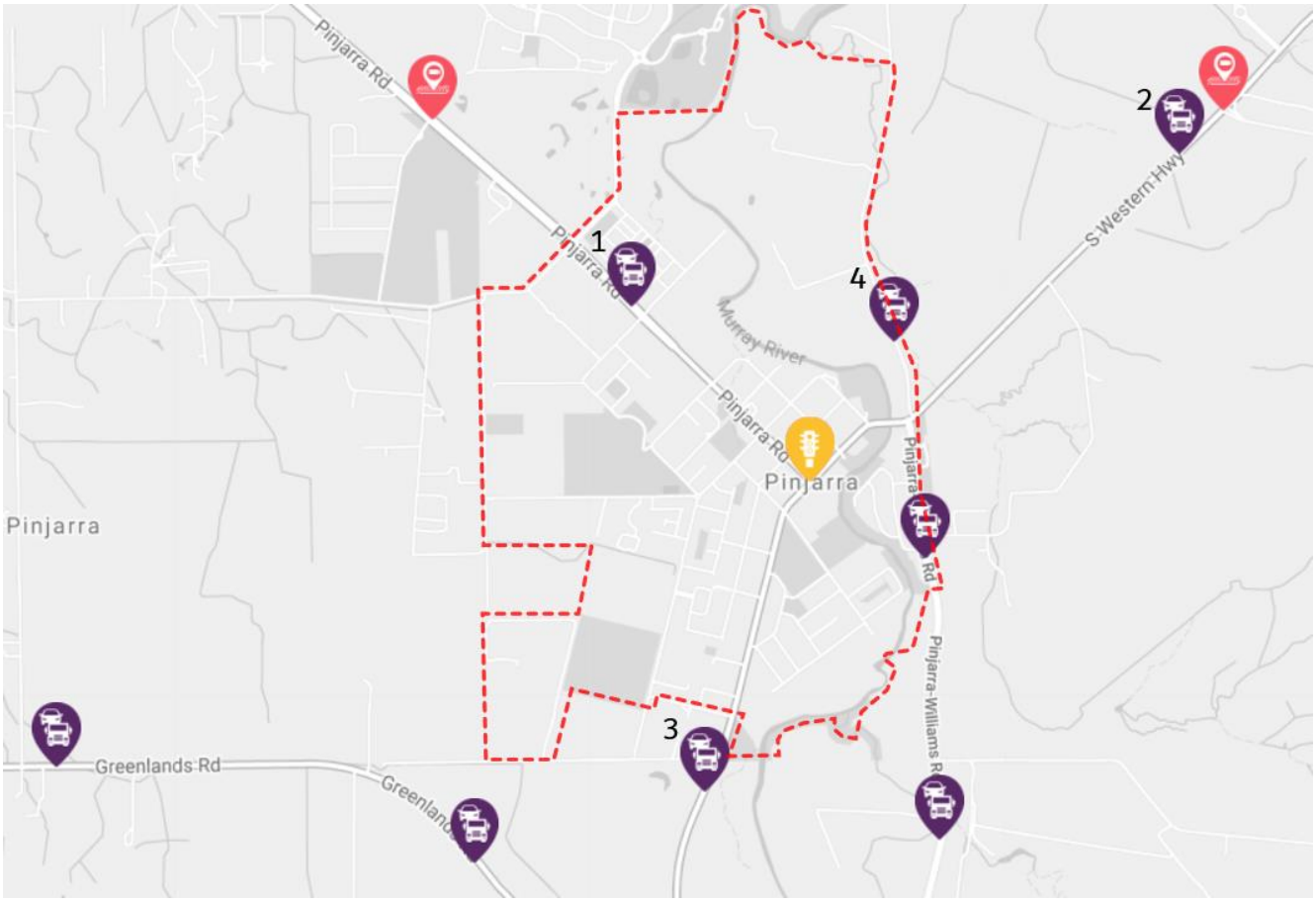

Figure 17 Trafficmap data (source: Main Roads WA)

The nature of vehicle movements on main roads into and out of Pinjarra are reflected in the hourly vehicle type volumes for average weekday conditions shown in Figure 18 to Figure 23. The role of the main freight and heavy vehicle access routes along South Western Highway, Pinjarra Road, Greenlands Road and Pinjarra-Williams Road is evident when examining the proportion and profile of the heavy vehicle classes.

Many of these key routes facilitate high proportions of heavy vehicles at all times of the average day which would mean mixing with light vehicles, traversing key routes during school periods and contributing to poor quality pedestrian environments in the centre of Pinjarra.

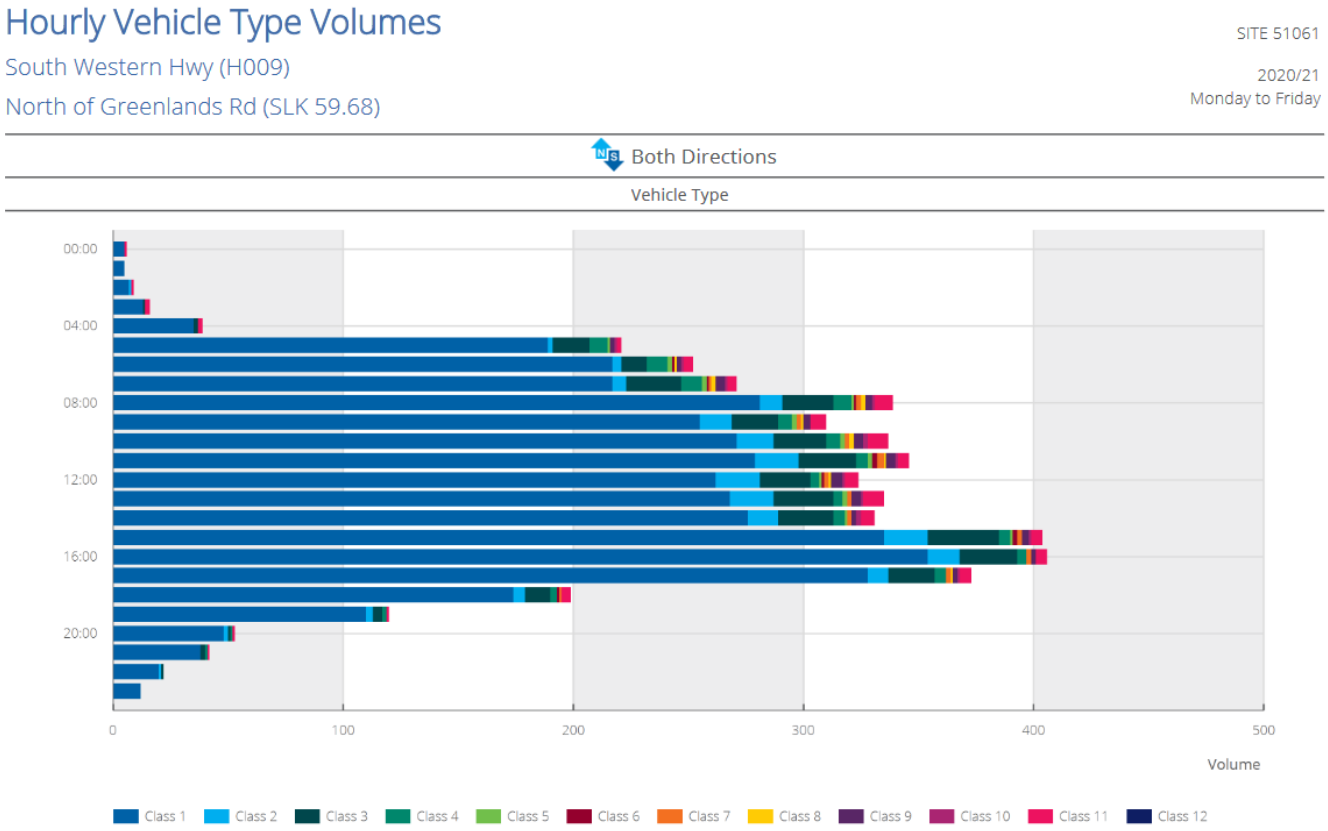

Figure 18 Hourly vehicle type volumes - South Western Highway north of Greenlands Road (source: Main Roads WA)

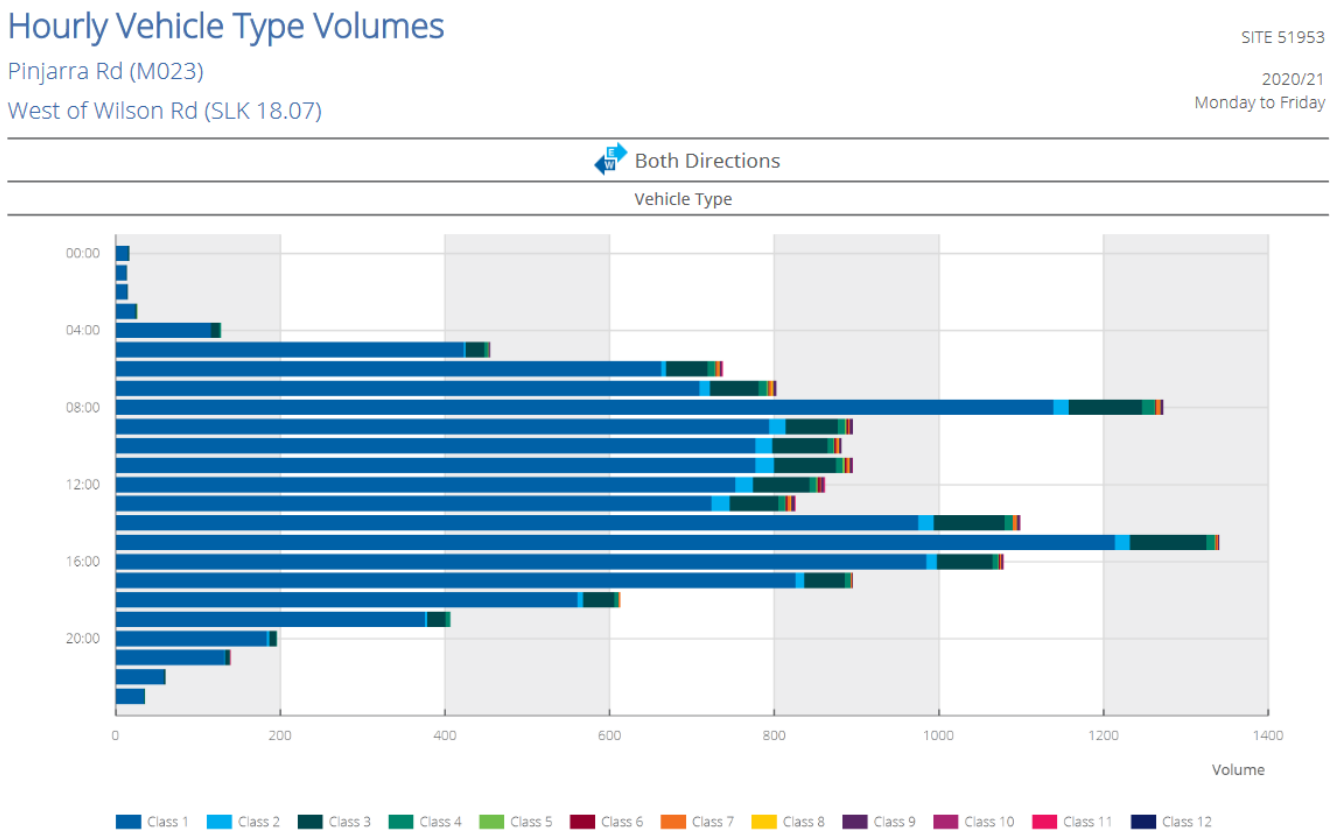

Figure 19 Hourly vehicle type volumes – Pinjarra Road west of Wilson Road (source: Main Roads WA)

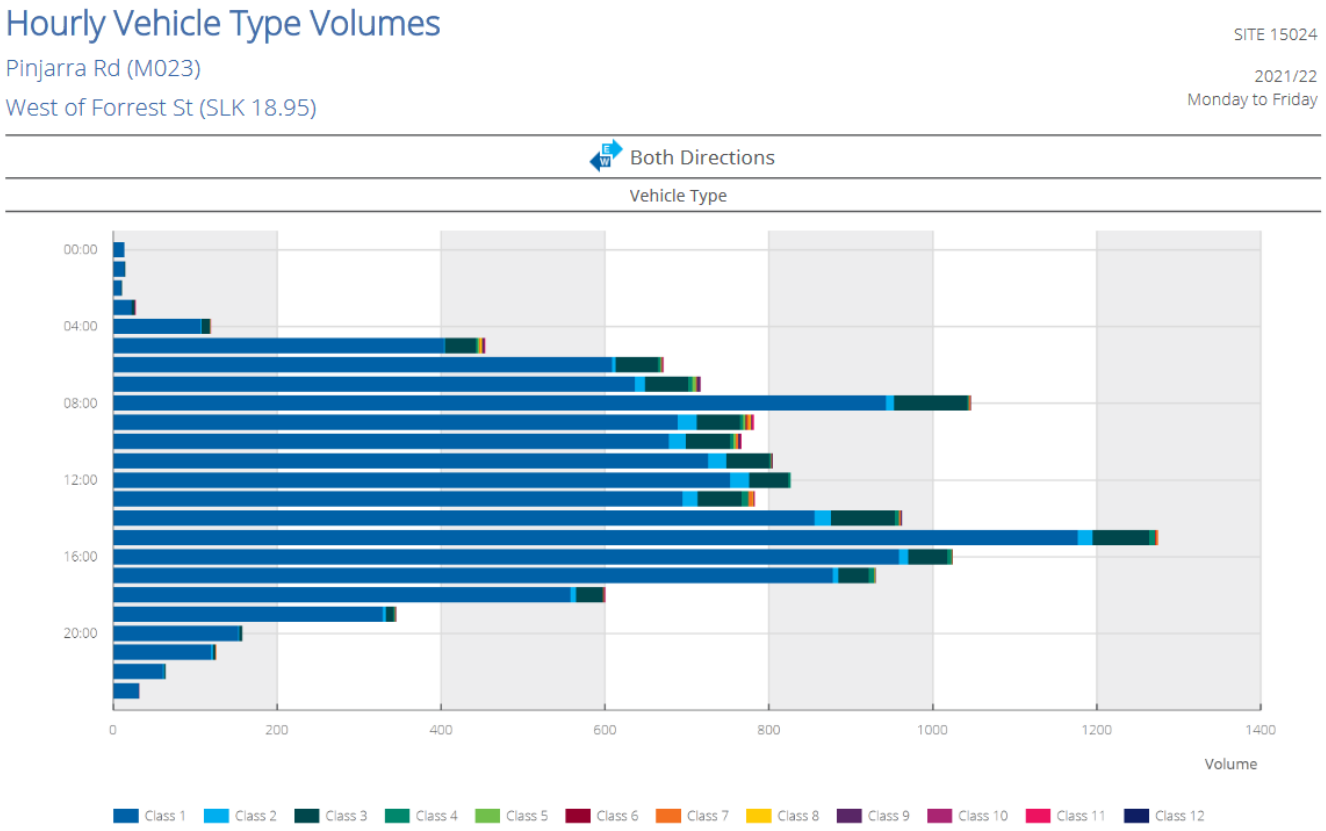

Figure 20 Hourly vehicle type volumes – Pinjarra Road west of Forrest Street (source: Main Roads WA)

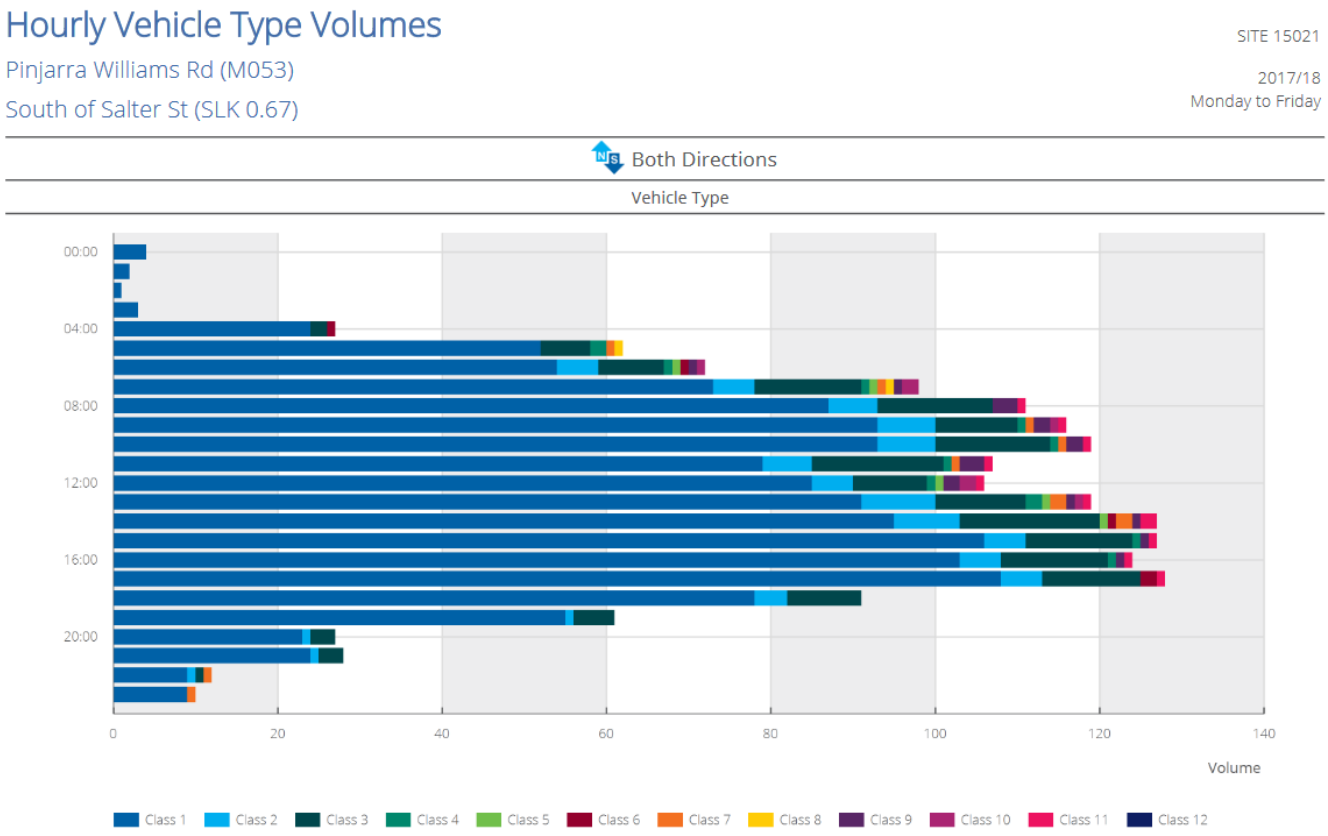

Figure 21 Hourly vehicle type volumes – Pinjarra-Williams Road south of Salter Street (source: Main Roads WA)

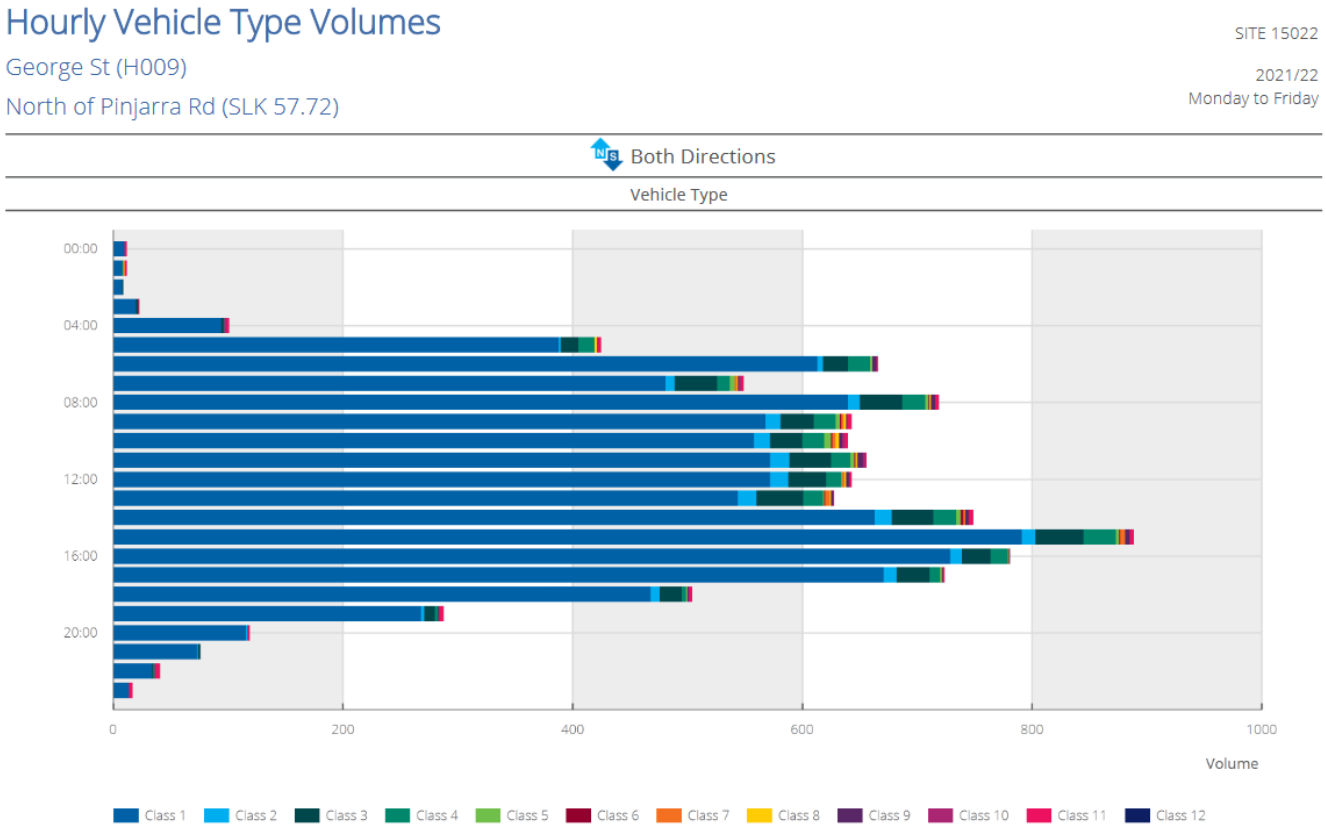

Figure 22 Hourly vehicle type volumes – George Street north of Pinjarra Road (source: Main Roads WA)

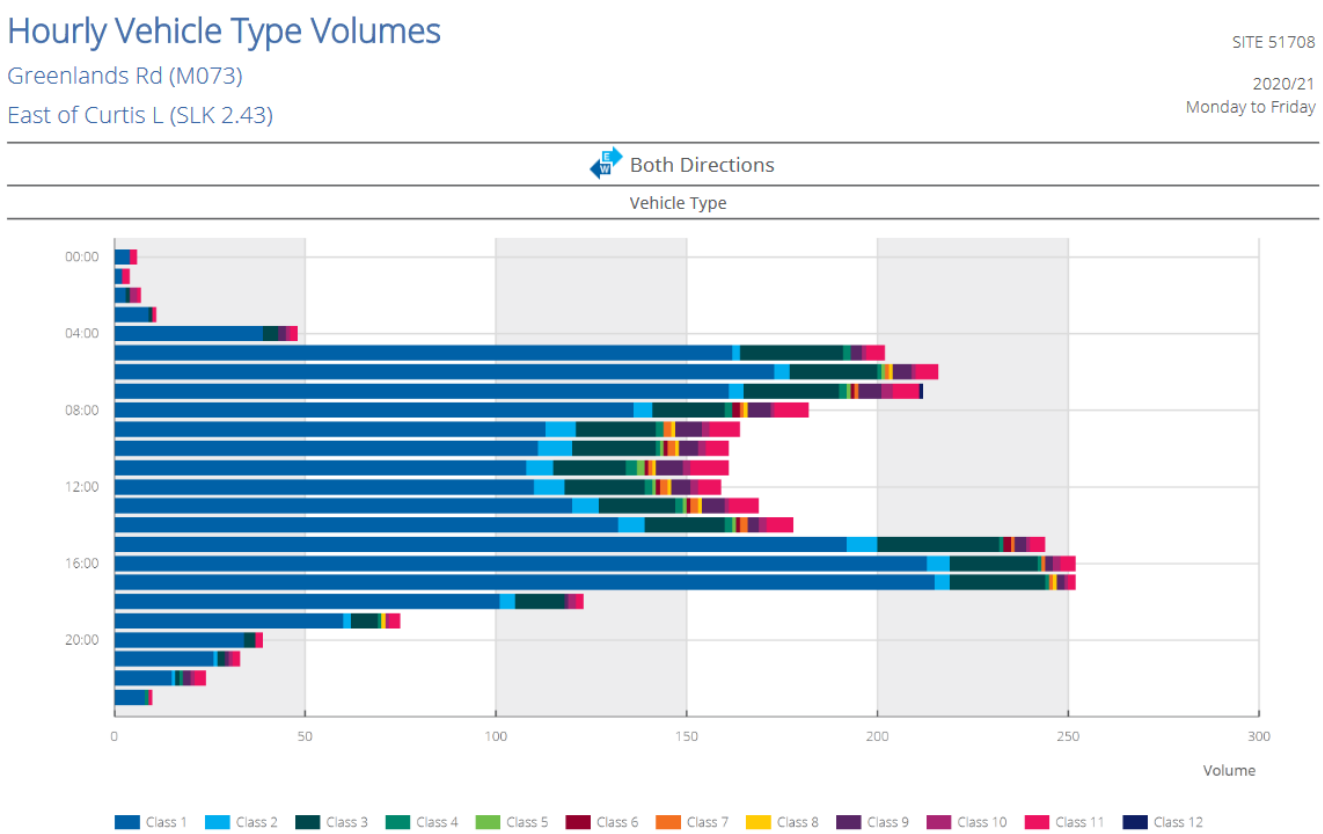

Figure 23 Hourly vehicle type volumes – Greenlands Road east of Curtis Lane (source: Main Roads WA)

4. INTERNAL NETWORKS

4.1 Proposed Network

The majority of the existing network will remain as is and forms the core of the future movement network. The centre Structure Plans propose to create additional road connections throughout the area in order to allow for the reconfiguration of Pinjarra Road and George Street. Distributing existing and future increased volumes of traffic across the network will allow Pinjarra Road and George Street to be reconfigured in a main street style with on street parking, landscaping, traffic management and better connectivity for pedestrians and cyclists via wide paths and some cycle lanes.

The Western Deviation will provide an alternative route for heavy vehicles around Pinjarra which will reduce noise and heavy vehicle volumes through the centre. This will assist to progress the objectives of the centre Structure Plans and enable social and economic development within the Town Centre.

The centre Structure Plans propose a number of additional internal roads to improve vehicle access, connectivity and permeability as shown in Figure 24. The new roads include the extension of unconstructed road reserves, and new local roads and river crossings at Forrest Street and an extension of Sutton Street / Moores Road, creating greater movement options between key destinations, primarily for vehicles. The new cross sections aim to maintain lower traffic speeds, and a safe environment for all users, including pedestrians and cyclists.

The progression of the centre Structure Plans will see the evolution of the local street network that will support the Activity Centre Plan and revitalisation of the town centre. Key priorities are for Pinjarra Road to maintain a maximum of 10,000 vpd and for alternative route opportunities to be developed to safeguard this priority.

The wider area, strategic road links perceived by the SoM that would support the DSP and Activity Centre include:

- Main Roads WA Pinjarra Heavy Haulage Deviation (Western Deviation)
- Extension of Lovegrove Street to the western deviation
- Link between Paterson Road and Sutton Street with a new bridge crossing
- Extension of Forrest Street to Paterson Road
- Extension of James Street through to Boys Road
- New connection of Pollard Street between Moores Road and Paceway Court for north – south movements
- Extension of Alderson Street from Lovegrove Street to Paceway Court to link development
- Sibbald Street link to Roe Avenue
- New connection between Camp Road and Pinjarra-Williams Road
- New road connection north east from South Western Highway.

These alternative routes will allow sections of Pinjarra Road and the South Western Highway which travel through the Town Centre to be removed from the RAV network and ultimately declassified from the PRS.

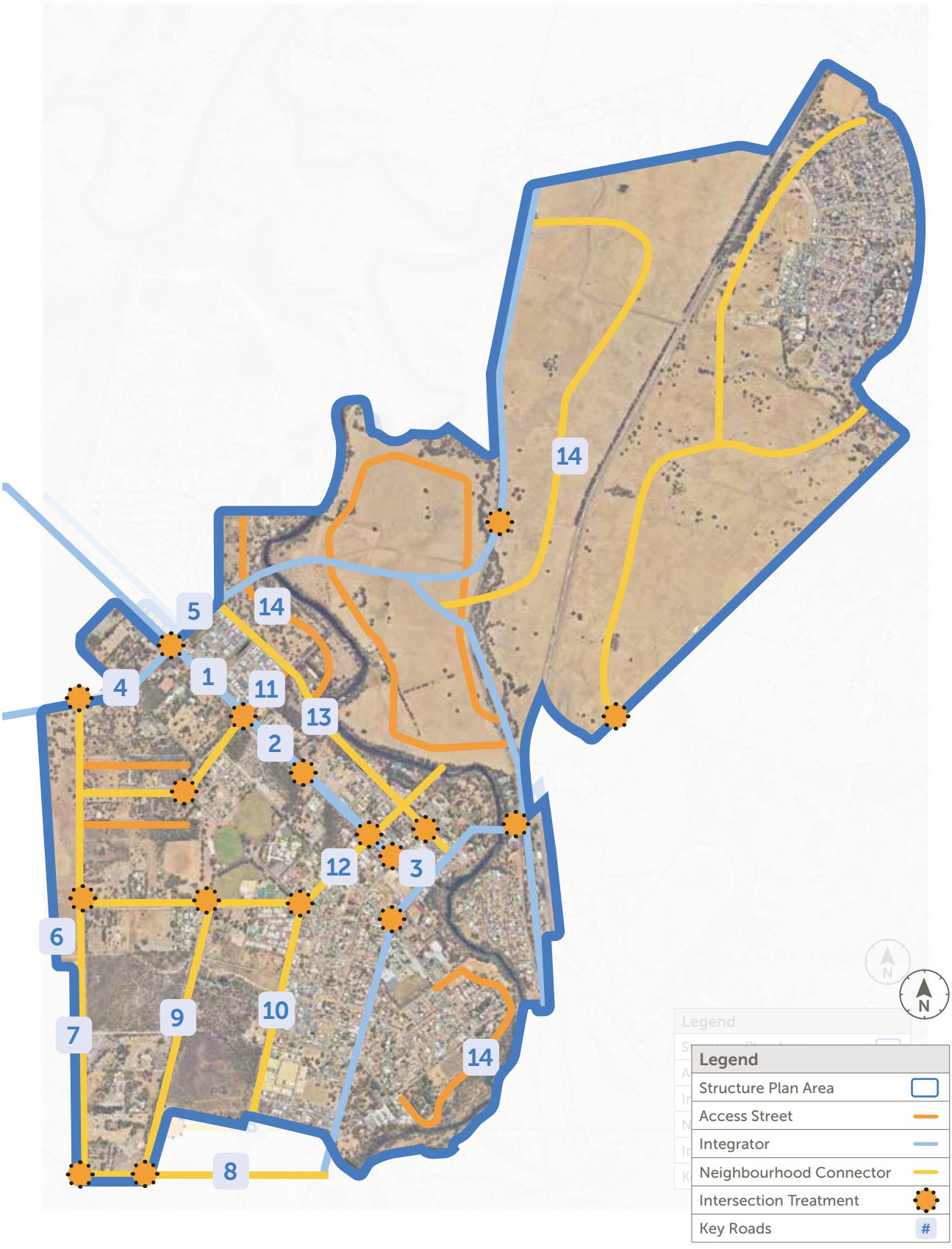

Figure 24 Proposed local movement network (source: Shire of Murray)

4.2 Road Hierarchy

The existing road hierarchy, based on the existing classifications utilised by Main Roads WA, is set out in section 3.4. For the purposes of the Movement Network Plan, the same classifications have been applied for the broader network so that there is a consistency for the Shire of Murray in understanding implications for asset management and planning.

Although the existing Main Roads WA classifications have been applied, the hierarchy within the centre Structure Plans area has been based on the predominance of local streets supporting movement to and from sites within the area rather than prioritising through movements and heavy vehicle movements.

Accordingly, some changes from the existing classifications have been proposed which will require alterations to both how the Shire of Murray manages some roads and also how those reserves are reflected in the Shire of Murray Local Planning Scheme and the Peel Region Scheme. The road types and criteria are shown in Figure 25.

ROAD HIERARCHY FOR WESTERN AUSTRALIA
ROAD TYPES AND CRITERIA (see Note 1)

CRITERIA	PRIMARY DISTRIBUTOR (PD) (see Note 2)	DISTRICT DISTRIBUTOR A (DA)	DISTRICT DISTRIBUTOR B (DB)	REGIONAL DISTRIBUTOR (RD)	LOCAL DISTRIBUTOR (LD)	ACCESS ROAD (A)
Primary Criteria						
1. Location (see Note 3)	All of WA incl. BUA	Only Built Up Area.	Only Built Up Area.	Only Non Built Up Area. (see Note 4)	All of WA incl. BUA	All of WA incl. BUA
2. Responsibility	Main Roads Western Australia.	Local Government.	Local Government.	Local Government.	Local Government.	Local Government.
3. Degree of Connectivity	High. Connects to other Primary and Distributor roads.	High. Connects to Primary and/or other Distributor roads.	High. Connects to Primary and/or other Distributor roads.	High. Connects to Primary and/or other Distributor roads.	Medium. Minor Network Role Connects to Distributors and Access Roads.	Low. Provides mainly for property access.
4. Predominant Purpose	Movement of inter regional and/or cross town/city traffic, e.g. freeways, highways and main roads.	High capacity traffic movements between industrial, commercial and residential areas.	Reduced capacity but high traffic volumes travelling between industrial, commercial and residential areas.	Roads linking significant destinations and designed for efficient movement of people and goods between and within regions.	Movement of traffic within local areas and connect access roads to higher order Distributors.	Provision of vehicle access to abutting properties
Secondary Criteria						
5. Indicative Traffic Volume (AADT)	In accordance with Classification Assessment Guidelines.	Above 8 000 vpd	Above 6 000 vpd.	Greater than 100 vpd	Built Up Area - Maximum desirable volume 6 000 vpd. Non Built Up Area – up to 100 vpd.	Built Up Area - Maximum desirable volume 3 000 vpd. Non Built Up Area – up to 75 vpd.
6. Recommended Operating Speed	60 – 110 km/h (depending on design characteristics).	60 – 80 km/h.	60 – 70 km/h.	50 – 110 km/h (depending on design characteristics).	Built Up Area 50 - 60 km/h (desired speed) Non Built Up Area 60 – 110 km/h (depending on design characteristics).	Built Up Area 50 km/h (desired speed). Non Built Up Area 50 – 110 km/h (depending on design characteristics).
7. Heavy Vehicles permitted	Yes.	Yes.	Yes.	Yes.	Yes, but preferably only to service properties.	Only to service properties.
8. Intersection treatments	Controlled with appropriate measures e.g. high speed traffic management, signing, line marking, grade separation.	Controlled with appropriate measures e.g. traffic signals.	Controlled with appropriate Local Area Traffic Management.	Controlled with measures such as signing and line marking of intersections.	Controlled with minor Local Area Traffic Management or measures such as signing.	Self controlling with minor measures.
9. Frontage Access	None on Controlled Access Roads. On other routes, preferably none, but limited access is acceptable to service individual properties.	Prefer not to have residential access. Limited commercial access, generally via service roads.	Residential and commercial access due to its historic status Prefer to limit when and where possible.	Prefer not to have property access. Limited commercial access, generally via lesser roads.	Yes, for property and commercial access due to its historic status. Prefer to limit whenever possible. Side entry is preferred.	Yes.
10. Pedestrians	Preferably none. Crossing should be controlled where possible.	With positive measures for control and safety e.g. pedestrian signals.	With appropriate measures for control and safety e.g. median/islands refuges.	Measures for control and safety such as careful siteing of school bus stops and rest areas.	Yes, with minor safety measures where necessary.	Yes.
11. Buses	Yes.	Yes.	Yes.	Yes.	Yes.	If necessary (see Note 5)
12. On-Road Parking	No (emergency parking on shoulders only).	Generally no. Clearways where necessary.	Not preferred. Clearways where necessary.	No – emergency parking on shoulders – encourage parking in off road rest areas where possible.	Built Up Area – yes, where sufficient width and sight distance allow safe passing. Non Built Up Area – no. Emergency parking on shoulders.	Yes, where sufficient width and sight distance allow safe passing.
13. Signs & Linemarking	Centrelines, speed signs, guide and service signs to highway standard.	Centrelines, speed signs, guide and service signs.	Centrelines, speed signs, guide and service signs.	Centrelines, speed signs and guide signs.	Speed and guide signs.	Urban areas – generally not applicable. Rural areas - Guide signs.
14. Rest Areas/Parking Bays	In accordance with Main Roads' *Roadside Stopping Places Policy.*	Not Applicable.	Not Applicable.	Parking Bays/Rest Areas. Desired at 60km spacing.	Not Applicable.	Not Applicable.

Figure 25 Road hierarchy classification table (Main Roads WA)

Using the broad categorisations, the following proposed changes are considered within the centre Structure Plans network, as set out in Figure 26:

- Declassification of Pinjarra Road from Primary Distributor to District Distributor between the intersection of George Street and the Western Deviation. This would require changes to the PRS and LPS, as well as the Shire of Murray having responsibility for the road. This would only evolve when both the Western and Eastern Deviations are in place. RAV network classifications would also be revoked.

- Declassification of South Western Highway, McLarty Road and George Street from Primary Distributor to District Distributor between the Eastern Deviation and Greenlands Road. The road would transfer control to the Shire of Murray and RAV network classification of South Western Highway between Greenlands Road and the Pinjarra-Williams Road would be revoked.
- Classifying both the Western Deviation and Eastern Deviation as Primary Distributors – as per the PRS shown in Figure 6.
- Classifying Paterson Road from the intersection of South Western Highway as a District Distributor, rather than a Local Distributor to recognise the connection north to Nambeelup and potential future increase in traffic volumes.
- Classifying the proposed new connections or extensions of Curtis Lane, Moores Road and Lovegrove Street as Local Distributors to reflect spacing in the network and the likelihood that these connections will all form the role that is required of a Local Distributor, linking the higher level Distributor Roads to land uses.

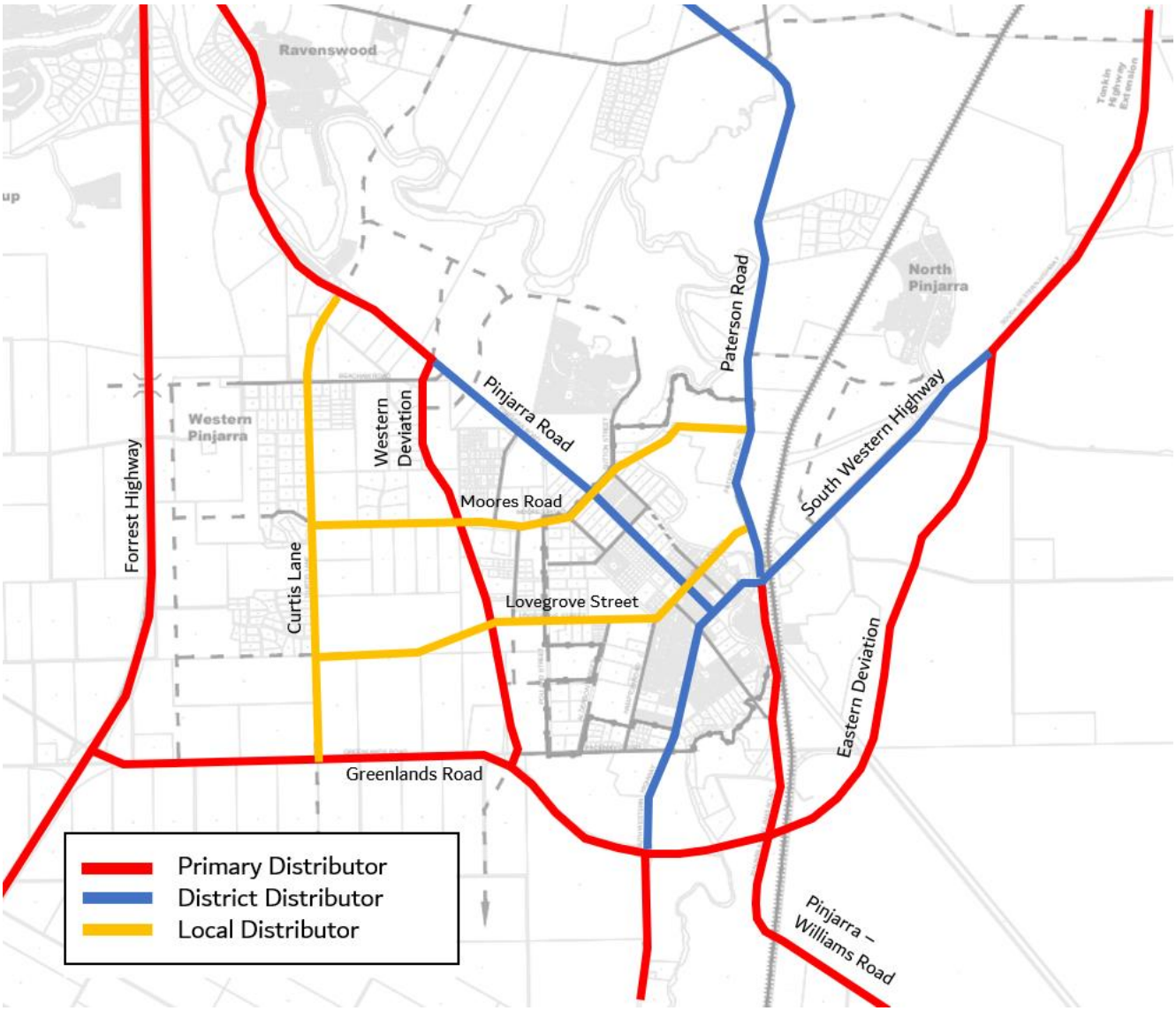

Figure 26 Proposed distributor level road hierarchy classification

The proposed road hierarchy classifications will provide for:

- The ability to reconfigure Pinjarra Road and George Street within the Activity Centre as envisaged by the Shire of Murray and remove barriers to the management and control of access along those roads with control being ceded to the Shire of Murray
- Removal of RAV network status from the key routes through Pinjarra will ensure that the Western Deviation and Eastern Deviation perform the role envisaged – allowing for heavy vehicle movements to be diverted from populated areas
- Providing certainty to the future network form for those road and street extensions proposed east-west through Pinjarra. This also allows for planning around intersection configuration and refinement of networks for pedestrians and cyclists.
- Allows for future network planning of bus routes to be considered at an early stage.

The changes in the classification of the network would also require changes to the RAV network status of a number of distributor roads. The proposed form of RAV network classification is shown in Figure 27. The majority of the existing Tandem Drive 4 network would be retained, with the exception of parts of Pinjarra Road and South Western Highway / George Street / McLarty Road being declassified upon opening of the Western and Eastern Deviations. The new connections would be also classified as Tandem Drive 4 Network, with the potential for other connections into the Pinjarra Industrial Estate being considered on an as-needed basis.

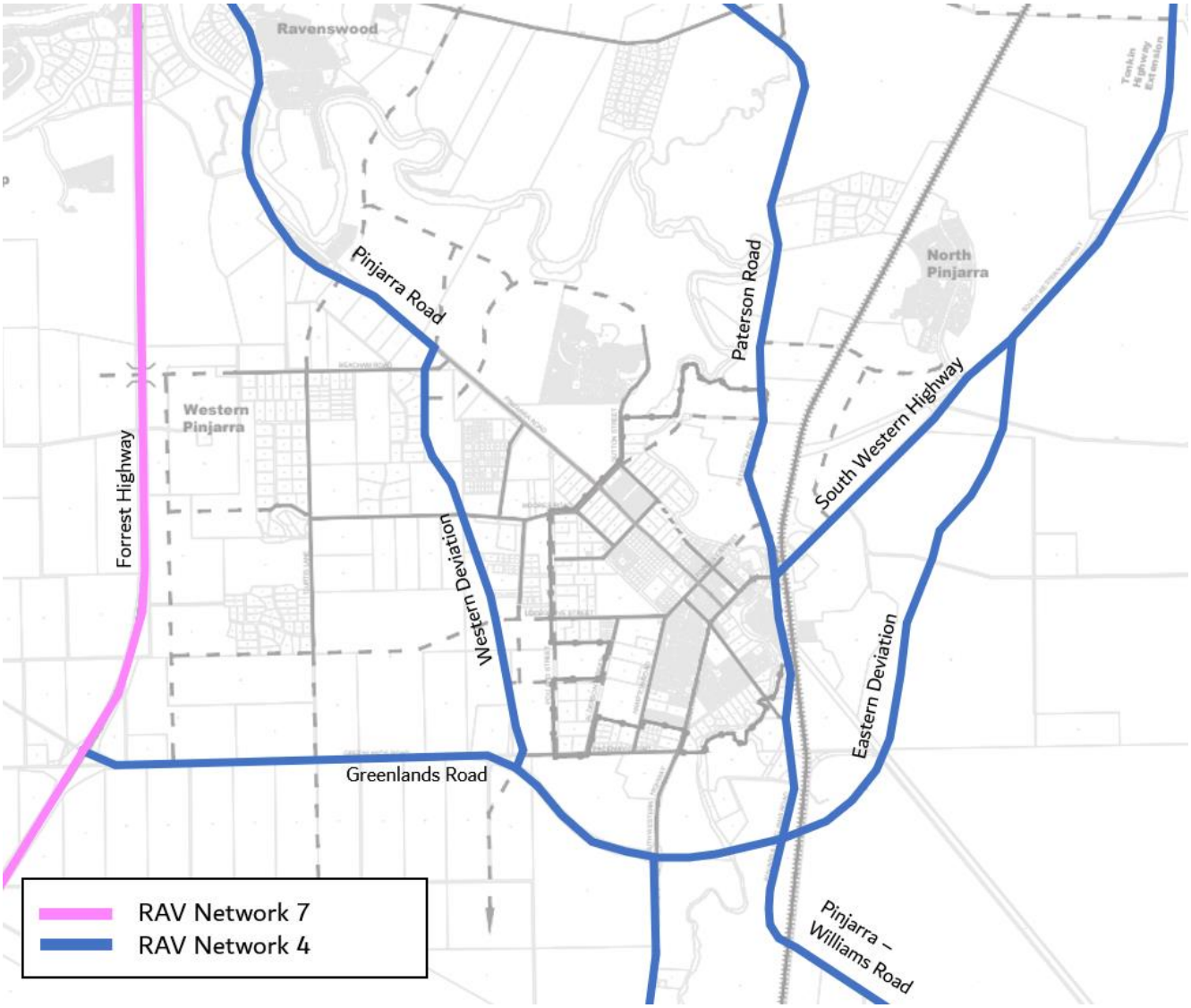

Figure 27 Proposed RAV network classification

The general changes to the road network are set out in Table 2, with a description of the road reserves identified in the TIA in the centre Structure Plans discussed in section 4.3.

Table 2 Proposed changes to Road Network within Pinjarra District Structure Plan

			Existing		Proposed	
Road	**From**	**To**	**Hierarchy**	**Width**	**Hierarchy**	**Width**
Lovegrove Street	Dixon Avenue	Extents	Access Road	30m	Local Distributor	30m
Moores Road	Pinjarra Rd	Curtis Lane	Access Road	20m	Integrator A	38m
George Street	First Street	Paterson Road	Primary Distributor	20m	District Distributor	20m
McLarty Road	Paceway Court	First Street	Primary Distributor	20m	District Distributor	20m
Pinjarra Road	George Street	Murray Street	Primary Distributor	20m	Neighbourhood Connector (Type B)	20m
Pinjarra Road	Roe Avenue	Murray Street	Primary Distributor	20m	Integrator Type B	29m
Pinjarra Road	Western Deviation	Roe Avenue	Primary Distributor	40m	District Distributor	40m
James Street	George Street	Roe Avenue	Access Road	20m	Local Distributor	20m
Sutton Street	Pinjarra Road	Extents	Access Road	30m	Local Distributor	30m
Pollard Street	Extents		Access Road	20m	Integrator Type B	39m
Western Deviation	Extents		n/a	n/a	Primary Distributor	TBD
Eastern Deviation	Extents		n/a	n/a	Primary Distributor	TBD
Curtis Lane	Extents		Access Road	20m	Local Distributor	30m
Paterson Road	South Western Highway	Extents	Local Distributor	20m	District Distributor	20-30m where possible

4.3 Road Reserves

Many of the existing roads within the centre Structure Plans area are contained within road reserves that are already defined. In general, those road reserves would remain as is and the centre Structure Plans would only propose recommended reserves for those new connections that are set out in Figure 24. These connections are:

- Pollard Street (Paceway Court to Moores Road)
- Alderson Street (north from Kwel Road)
- Forrest Street (Henry Street to Paterson Road)
- Sutton Street (Boys Road to Paterson Road)
- James Street (from Roe Avenue to Wilson Road)
- Lovegrove Street (connecting through to Pollard Street).

The local road network as identified in the TIA in the centre Structure Plans is summarised below.

- 20m reserve: Pinjarra Road, George Street to Murray Street (Neighbourhood Connector B)
    - No central median, 4m wide shared path, on street parking
- 29m reserve: Pinjarra Road, Murray Street to Roe Avenue (Integrator B town centre – with additional bike lane protection)
    - 3m central median, 1.5m bike lane + 0.5m separation island, 5m paths, on street parking
- 30m reserve: Lovegrove Street, Wilson Street, Hampton Road, Alderson Street (Integrator B outside centres)
    - 3m central median, 1.5m on road bike lane, 6m verge, on street parking
- 38m reserve: Moores Road (Integrator A town centre – with additional protected bike lane)
    - 6m central median, 1.5m bike lanes + 1m separated island, 4m paths, on street parking
- 39m reserve: Pollard Street (Integrator B)
    - 14m central drainage median, 1.5m on road bike lane, 5m verge, on street parking

The cross sections and designs will need to consider the new draft Design WA documents which provide guidance on Activity Centres and Precinct Planning. Outlined in the SPP Draft 4.2 Activity Centres and the "Movement" section of the Precinct Design Guidelines is guidance on incorporating Safe Systems Principles into the design of transport infrastructure, where the "street design and operation (are to) ensure that safe vehicle speeds are achieved".

The Road Safety Commission advises that when people and vehicles interact, safe speeds of 30kmn/hr are preferred, noting that this reduction in speed creates a negligible impact on travel times while ensuring that collisions between cars and people do not cause serious injury or death.

In addition, the form of cycling infrastructure along these corridors will need to reflect the guidelines and standards associated with the LTCN shown in Figure 16 and the ability to accommodate future bus services on distributor level roads. Examples of the cross sections being considered for the centre Structure plans areas, as set out in Table 2, are shown in Figure 28 to Figure 33.

Pinjarra Road (Roe Avenue to Sutton Street)

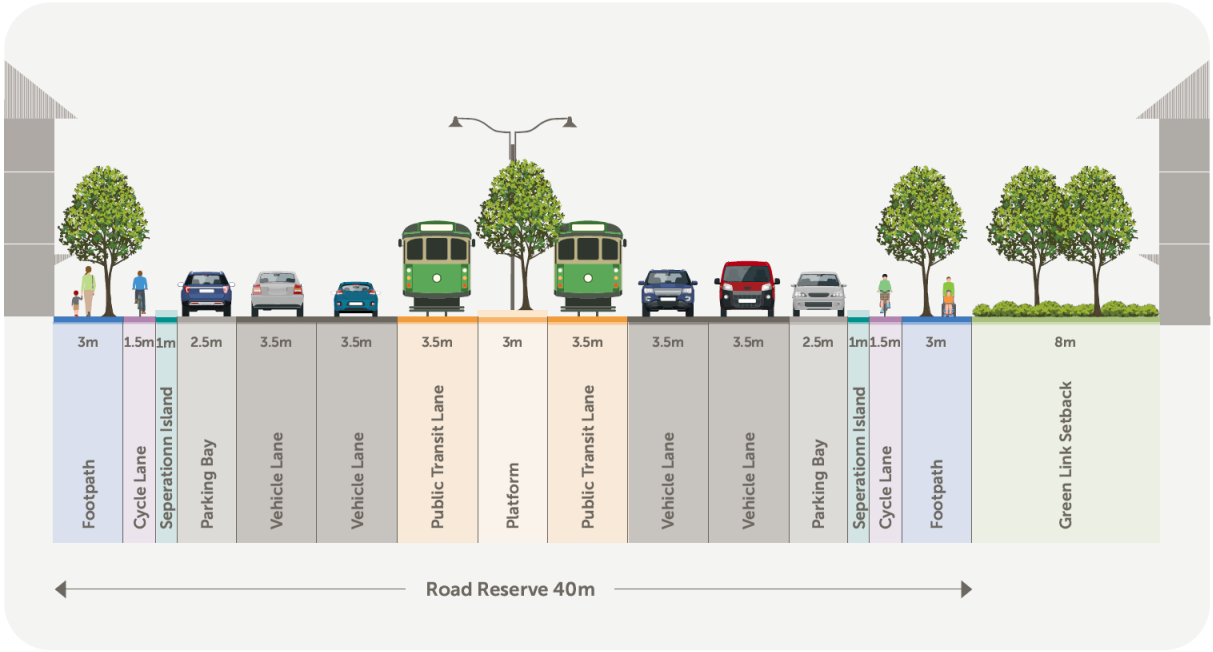

Figure 28 Indicative cross section - Pinjarra Road (40m Reserve)

Pinjarra Road (Murray Street to Roe Avenue)

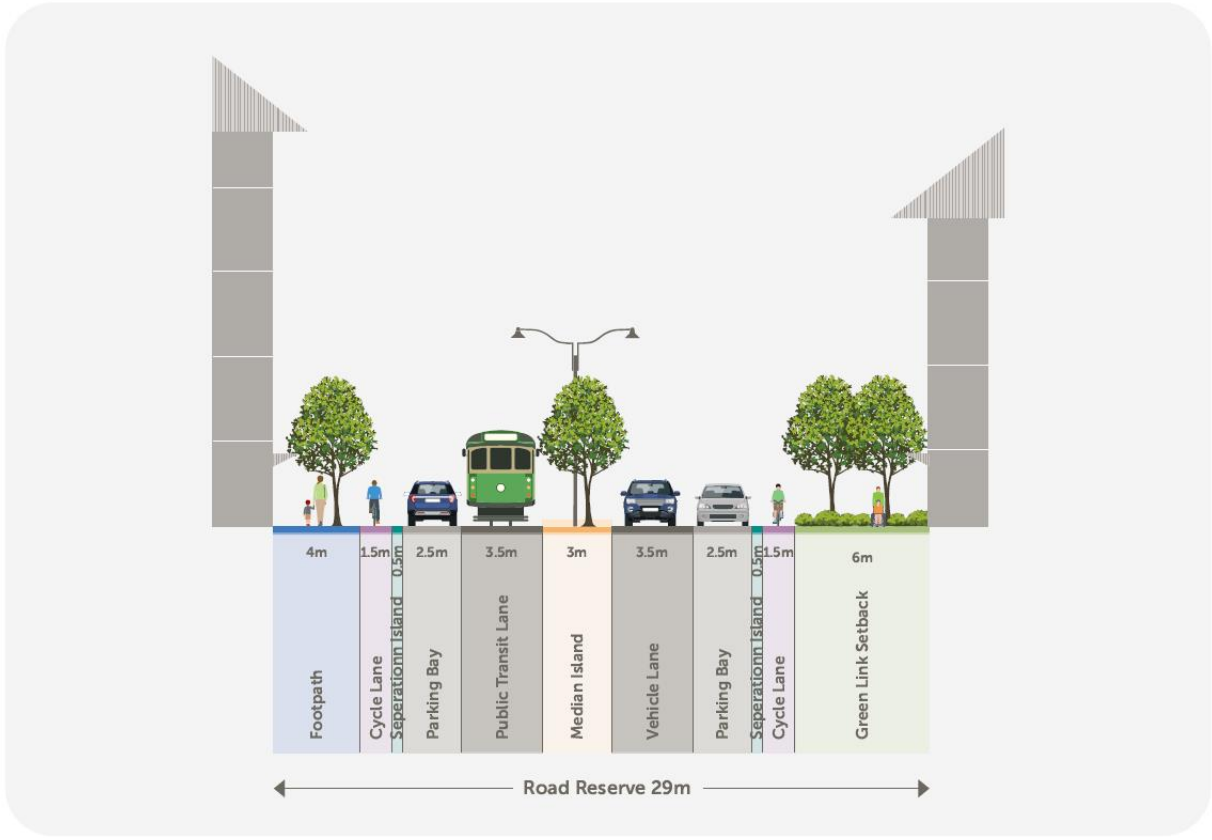

Figure 29 Indicative cross section - Pinjarra Road (29m Reserve)

Moores Road / Sutton Street / Lovegrove Street and Pollard Street

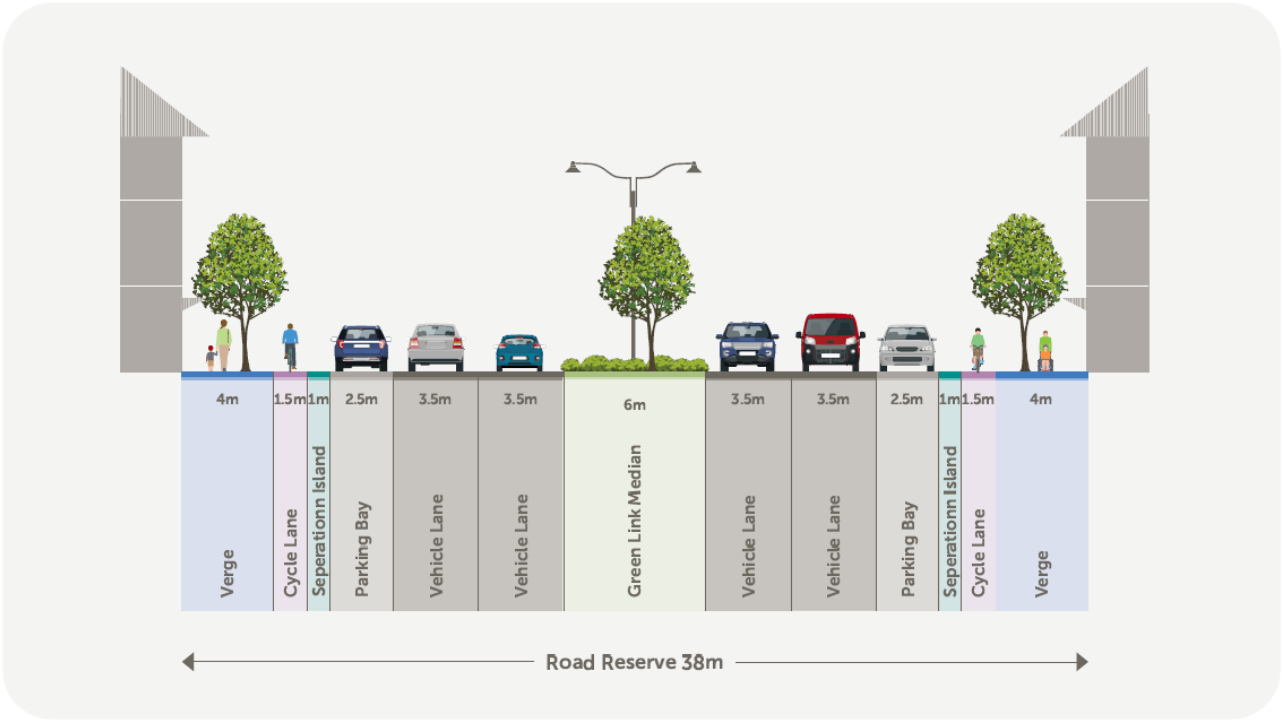

Figure 30 Indicative cross section - various (38m Reserve)

Pollard Street / Wilson Street /Hampton Road and Alderson Street

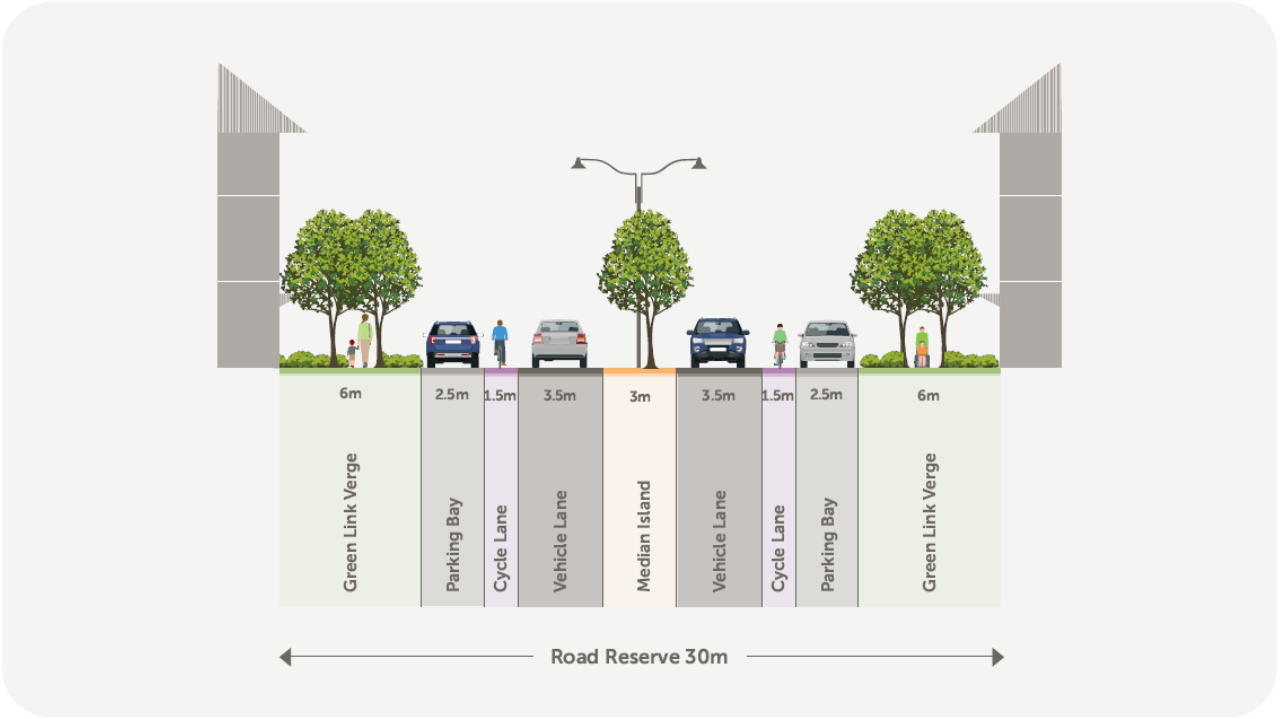

Figure 31 Indicative cross section - various (30m Reserve)

Forrest Street and James Street

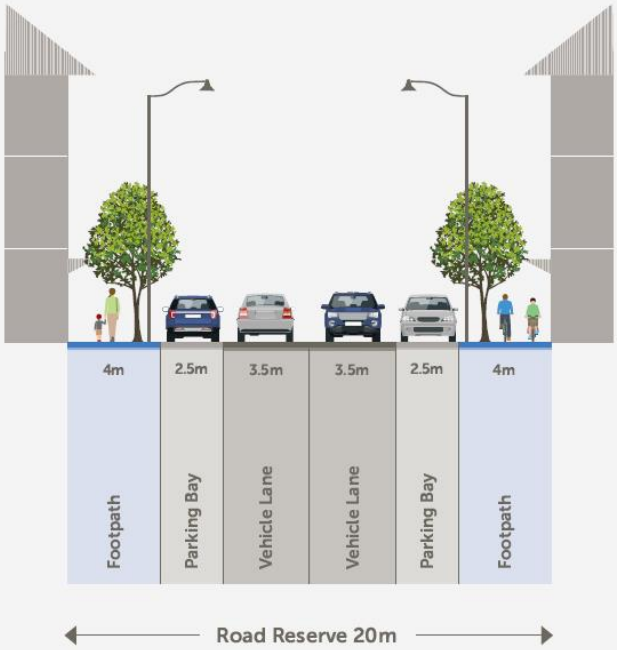

Figure 32 Indicative cross section – Forrest and James Streets (20m Reserve)

New Foreshore Interface Roads

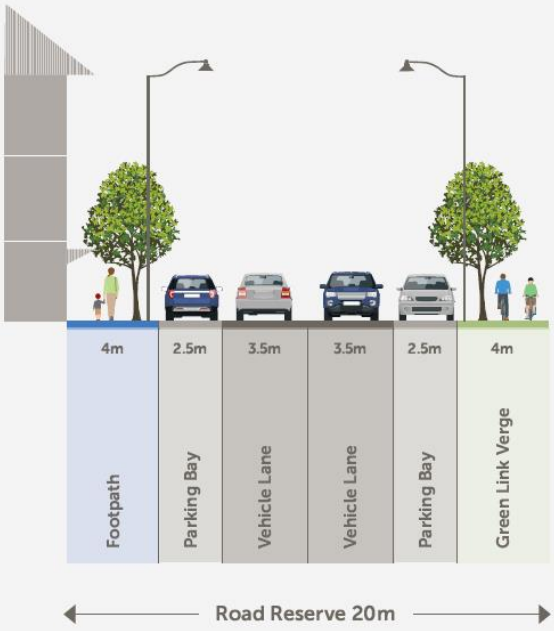

Figure 33 Indicative cross section – Foreshore Interface (20m Reserve)

4.4 Pinjarra Road Streetscape Landscape Concept Masterplan

The Pinjarra Road Streetscape Concept Masterplan identifies a number of new treatments along Pinjarra Road (Figure 34). These have been reflected in the network assessment reported on in section 7.

- Three new roundabouts at the intersection of Pinjarra Road with Murray Street, Forrest Street and Roe Avenue
- Carey Street will become left in and left out only
- On street parking will be introduced in some sections
- Two new wombat crossings, one at the entrance to the Shire of Murray offices across to the public open space, and another connecting the existing shopping centre and proposed development south-east of Murray Street
- Addition of public open space and relocation of bus stop on the western side
- Extensive planting of street trees and shrubs
- New central median.

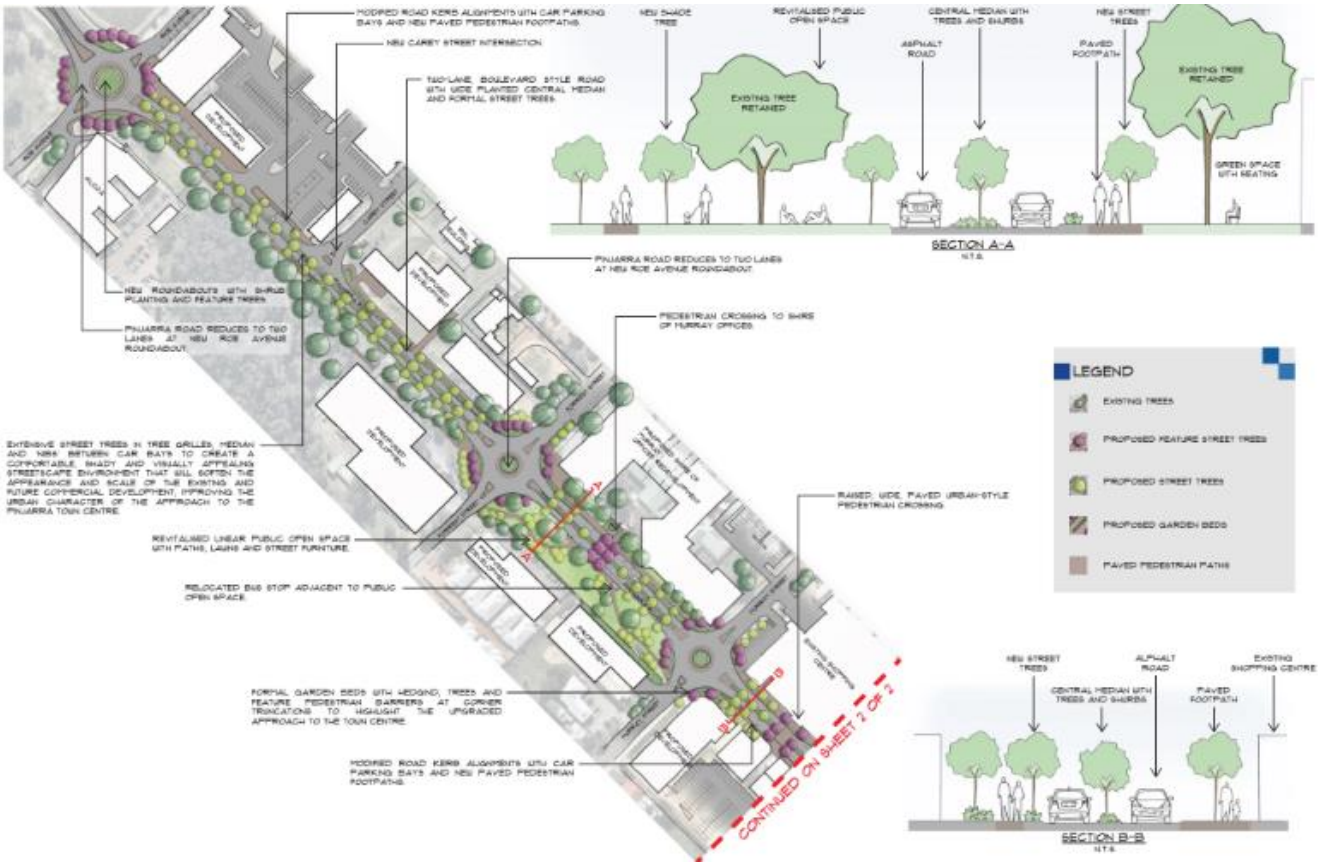

Figure 34 Pinjarra Road Streetscape Landscape Concept Masterplan – Pinjarra Road (source: Shire of Murray)

George Street (Figure 35) will generally maintain its existing form and includes the following treatments:

- Replacement of pedestrian paths to be continuous across driveways
- New Town Square at the end of James Street on George Street
- Shared space at the James Street / George Street intersection
- Potential reconfiguration of South Western Highway and Pinjarra – Williams Road combined with Paterson Road and South Western Highway

- Extensive planting of trees and shrubs
- Garden beds and bollards used to create safe pedestrian zones.

The proposals within the streetscape landscape concept plan are based on the Shire of Murray being able to control the reserve and implement proposed changes. Given the timeframes involved, revisions to the concept plan as it progresses towards more detailed design are likely to reflect contemporary practice and outcomes of this assessment.

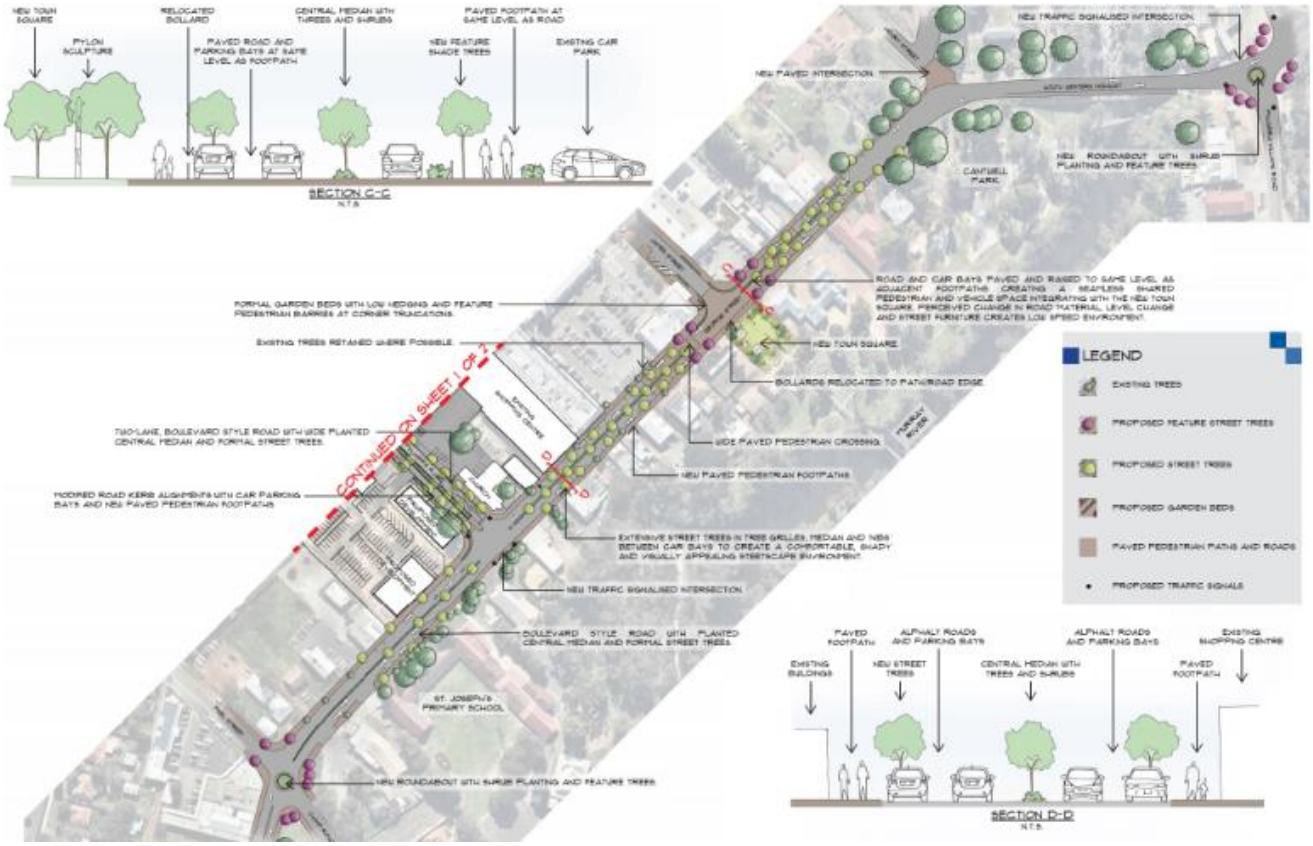

Figure 35 Pinjarra Road Streetscape Landscape Concept Masterplan – George Street (source: Shire of Murray)

4.5 Intersection Treatments and Controls

The proposed street network within the centre Structure Plans will largely dictate the form of intersection controls with the majority of local streets only requiring lower level give way or stop sign controlled intersections.

The lack of Primary Distributor roads within the centre Structure Plans boundary will ensure that there is no immediate requirement for higher order intersection controls in the initial stages of development.

A number of intersection controls are proposed along Pinjarra Road and George Street / South Western Highway:

- Three new roundabouts on Pinjarra Road at Murray, Forrest and Roe Streets
- Carey Road intersection at Pinjarra Road will be left in / left out only
- A new roundabout at Peel/Camp Road and George Street
- The James Street intersection on George Street will be raised to create a shared space with at grade pedestrian footpaths and road reserve, in order to slow traffic and connect with the new Town Square

- Henry Street intersection with South Western Highway will be paved
- The signalised intersection of Pinjarra Road and George Street will be upgraded
- New roundabout at South Western Highway and Pinjarra – Williams Road
- Potential reconfiguration of South Western Highway and Pinjarra – Williams Road combined with Paterson Road and South Western Highway

These have been reflected in the network assessment reported on in section 7.

4.6 Pedestrian Networks

At present, the existing pedestrian and cycling environment within Pinjarra is generally poor. Aside from the physical infrastructure discussed below, pedestrian level of comfort can be explained by the general environment – in particular in the Western Australian context through the availability of a shade canopy.

This is shown in the DPLH Plan WA outputs in Figure 36, with most of the core in Pinjarra having low levels of coverage. The alignment of the Murray River is evident, as is large scale extensive farming lots around Pinjarra. The centre Structure Plans aims to primarily support walking and some cycling and discourage the use of private vehicles within the Town Centre.

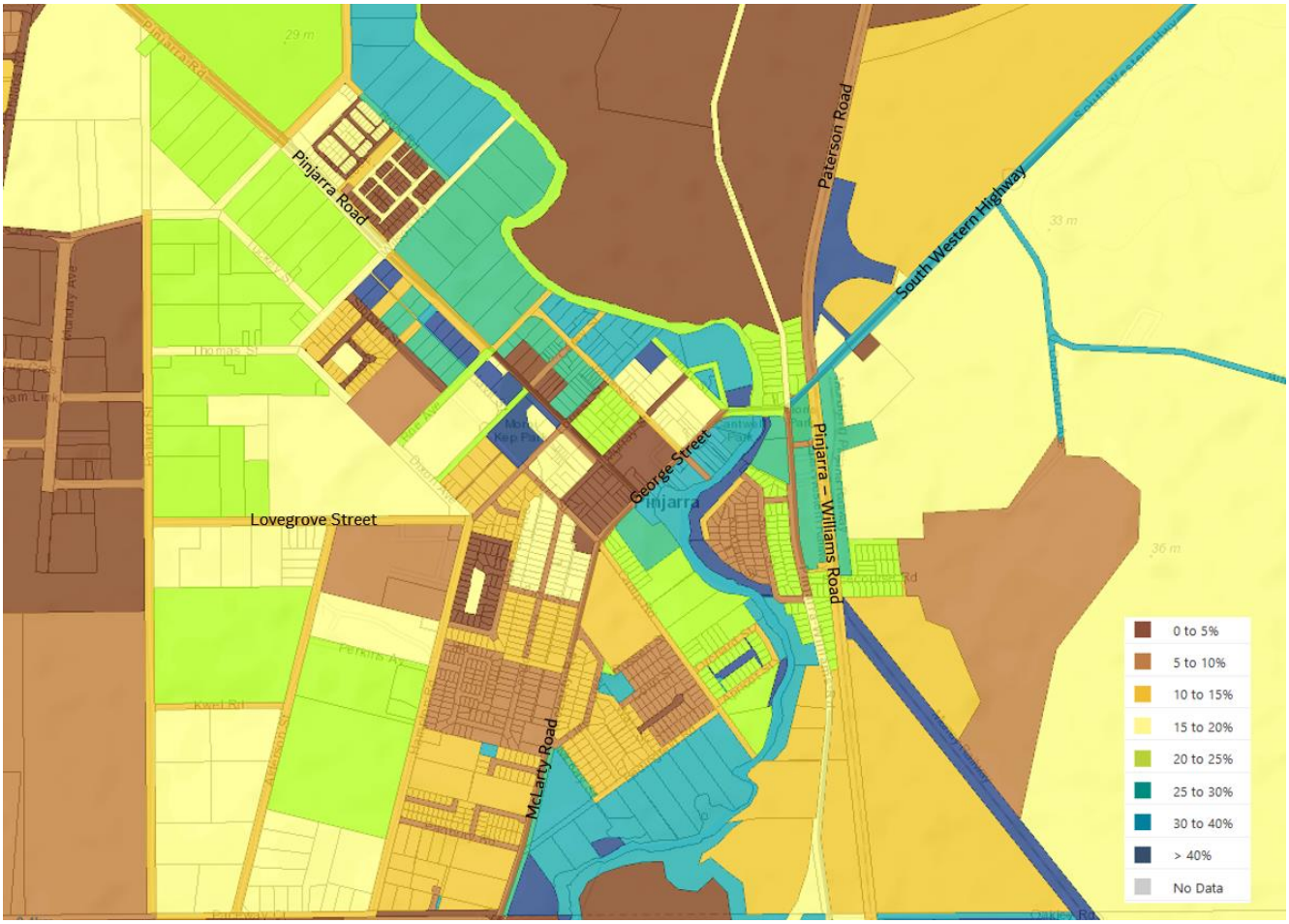

Figure 36 Plan WA canopy coverage for Pinjarra 2018 (source: DPLH)

In order to achieve this, the proposed pedestrian network and main street style development aims to enhance the pedestrian environment along key routes and support future development. The overall network comprises of:

- Shared use path along Forrest Street, James Street, and Pinjarra Road George to Murray Street
- Pedestrian path on Pinjarra Road, Murray Street to Sutton Street
- New paved path along George Street with priority across driveways
- Two new wombat crossings on Pinjarra Road within the Core Precinct
- New median along Pinjarra Road
- New public open space along Pinjarra Road
- New street trees and shrubs along Pinjarra Road and George Street
- Shared space on George Street at the new town square.

Many of the connecting pedestrian networks will be facilitated through the Open Space Network that is proposed within the DSP boundaries, as set out in Figure 37. These networks will utilise the existing street network reserves, combined with areas of open space and vegetation corridors to create connectivity for pedestrians.

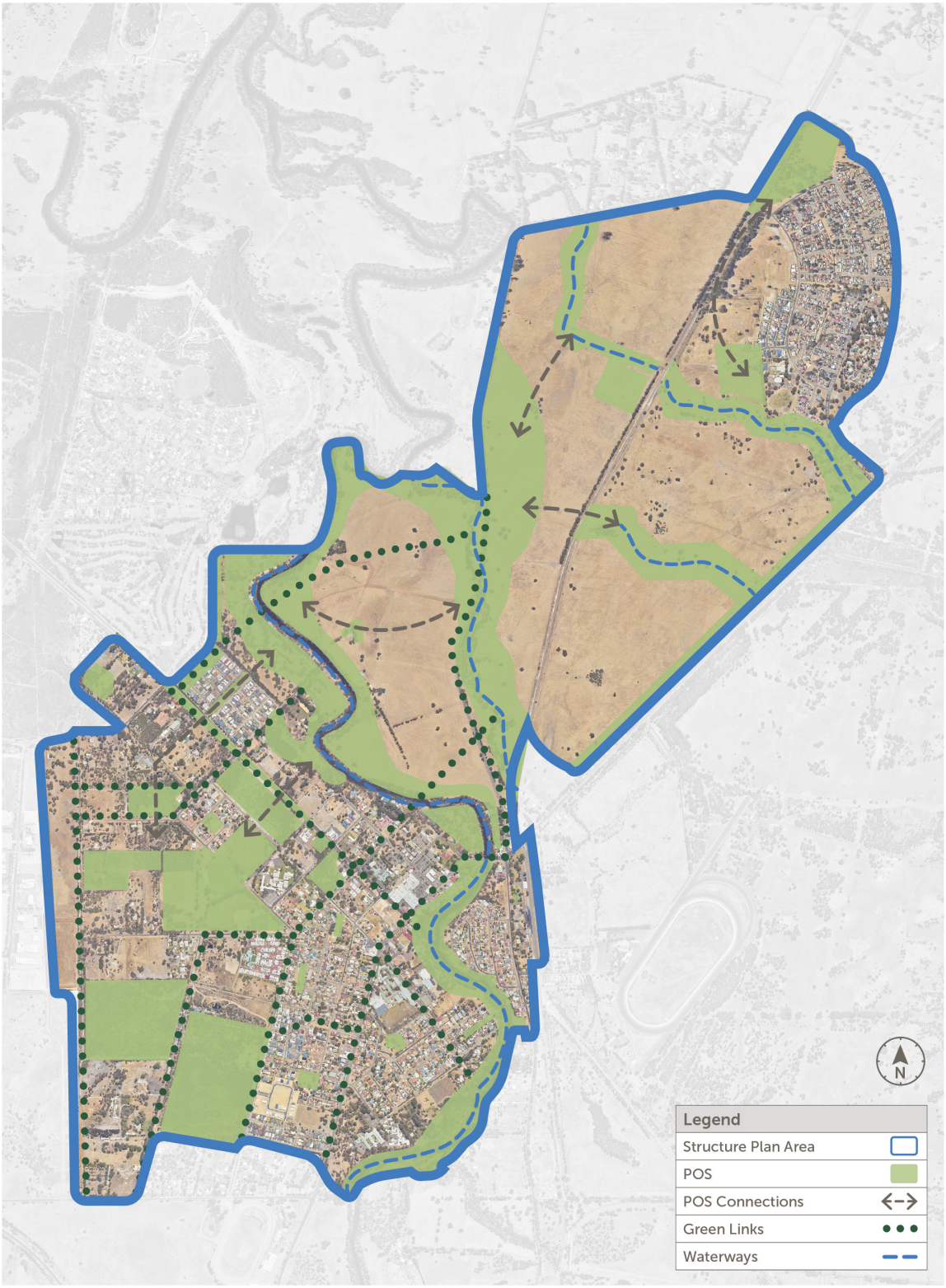

Figure 37 Open Space Network Plan (source: SoM)

Maintaining priority for all people should be given when travelling across minor roads, whether travelling in vehicles, bicycles or walking, along the north – south alignment on James Street, Pinjarra Road and George Street as per DoT's recent position statement (https://www.transport.wa.gov.au/mediaFiles/active-transport/AT_CYC_P_IMHIP_Flyer.pdf)

While the proposed traffic calming elements on Pinjarra Road will likely see traffic speeds reduced, new roundabouts will negatively affect the pedestrian environment, creating safety concerns which reduce attractiveness of trips on foot. Roundabouts facilitate free-flowing traffic which can reduce vehicle accidents at these intersections. The flip side is that free-flowing traffic also creates less opportunities and gaps for pedestrians to safely cross. Roundabouts also mean that when drivers are turning left, they will often look to the right to assess oncoming traffic, and therefore may not be aware of pedestrians crossing to their left.

Pedestrians and cyclists find roundabouts are difficult to navigate as they need to predict driver turning movements and will therefore often avoid crossing in these locations, forcing significant detours from main desire lines. Roundabouts accompanied by a zebra crossing on each arm provide additional safety and priority for pedestrians and cyclists. This will be critical at Roe Avenue, being the main route across Pinjarra Road for children travelling to Pinjarra Primary School and Forrest and Murray Streets which connect the residential side of Pinjarra Road with the Town Centre.The roundabout on Peel St / Camp Road / George Street intersection is a main route for children to St Joseph's School. It is recommended as a minimum that zebra crossings be located on all arms of the roundabout or a zebra crossing be located mid-block to facilitate safe crossing for children. Figure 38 shows examples of treatments which allow priority for people walking and cycling over minor streets.

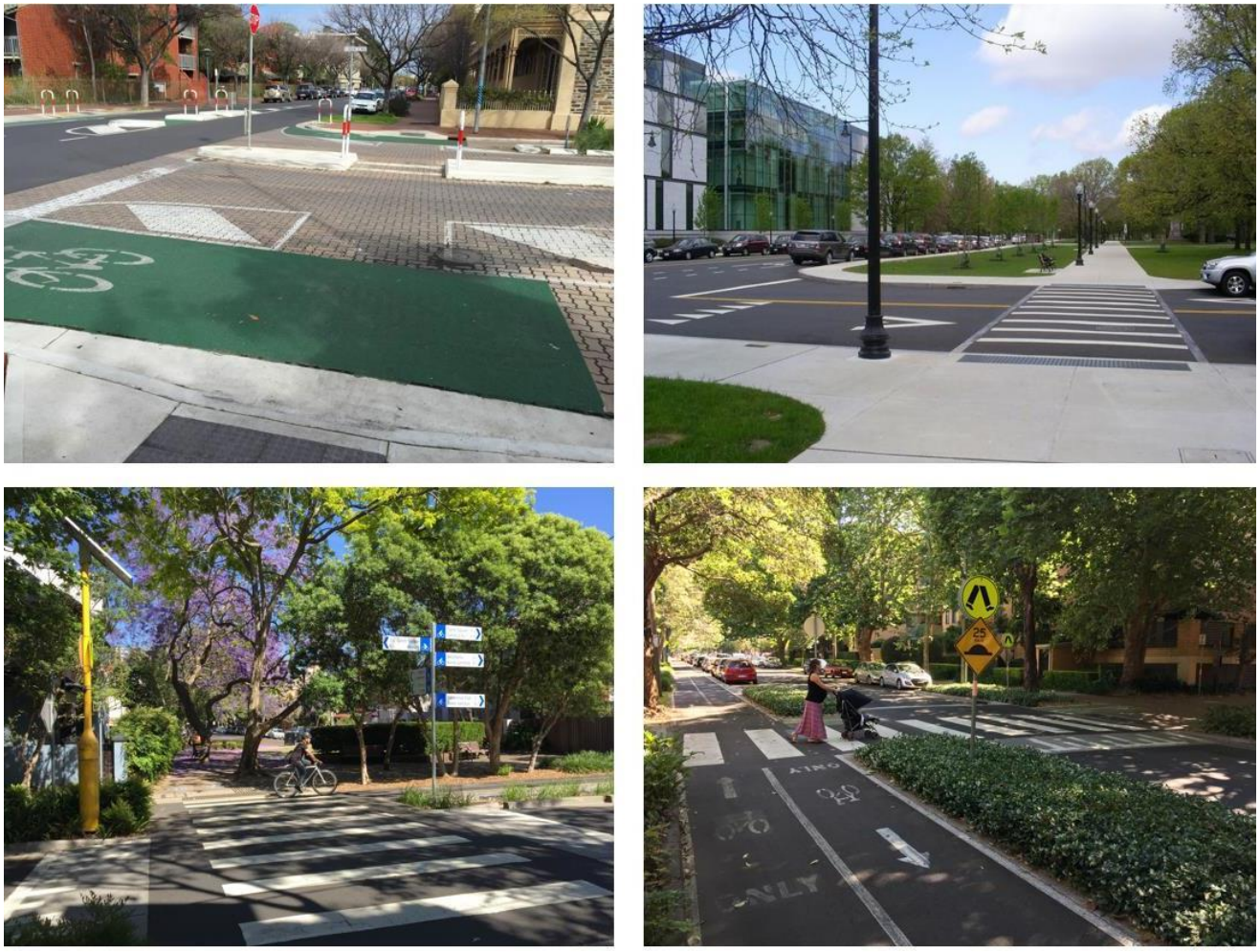

Figure 38 Examples of priority treatments for pedestrians and cyclists (source: Flyt)

A shared space essentially reverses the road rules for drivers and pedestrians, where pedestrians have priority and drivers need to yield, however in practice substantial design interventions are required to reduce the primacy of vehicles. According to Main Roads WA and the DoT, a shared zone legally requires drivers to yield and has a speed limit of 10km/hr.

While there are no clear guidelines on creating a successful shared space, studies in Perth have identified the following principles to ensure pedestrians feel motivated and safe to use the space as intended and that drivers are directed to drive at slow, safe speeds.

- The space needs to be clearly identifiable as a shared space and different from the surrounding area
    - Signs, street furniture, enclosure, parklets, shade, road base treatments, road painting, art, etc.
- Slow driver speeds are essential
    - Use of self-enforcing street design and to not rely on pedestrian movements for slow speeds
    - Reduced sight lines, psychological and physical traffic calming
- High pedestrian volumes typically see drivers slow down
    - This means shared spaces should be located in areas with pedestrian focused land uses either side

The existing zebra crossing to the south west of the proposed shared space on George Street should be maintained, as this will guarantee safe crossing especially for children accessing the private school on George Street and will help to slow vehicles entering the shared space.

The proposed pedestrian priority treatments within the Town Centre shown in Figure 39 will create a safer and walkable area. However, in order for these facilities to be effectively used, the connecting routes into the Town Centre should also be upgraded with adequate pedestrian focused treatments and paths with a minimum width of 2.5m. This applies to Murray Street, Peel Street and Camp Road, Henry Street and Roe Avenue for its connection to the primary school.

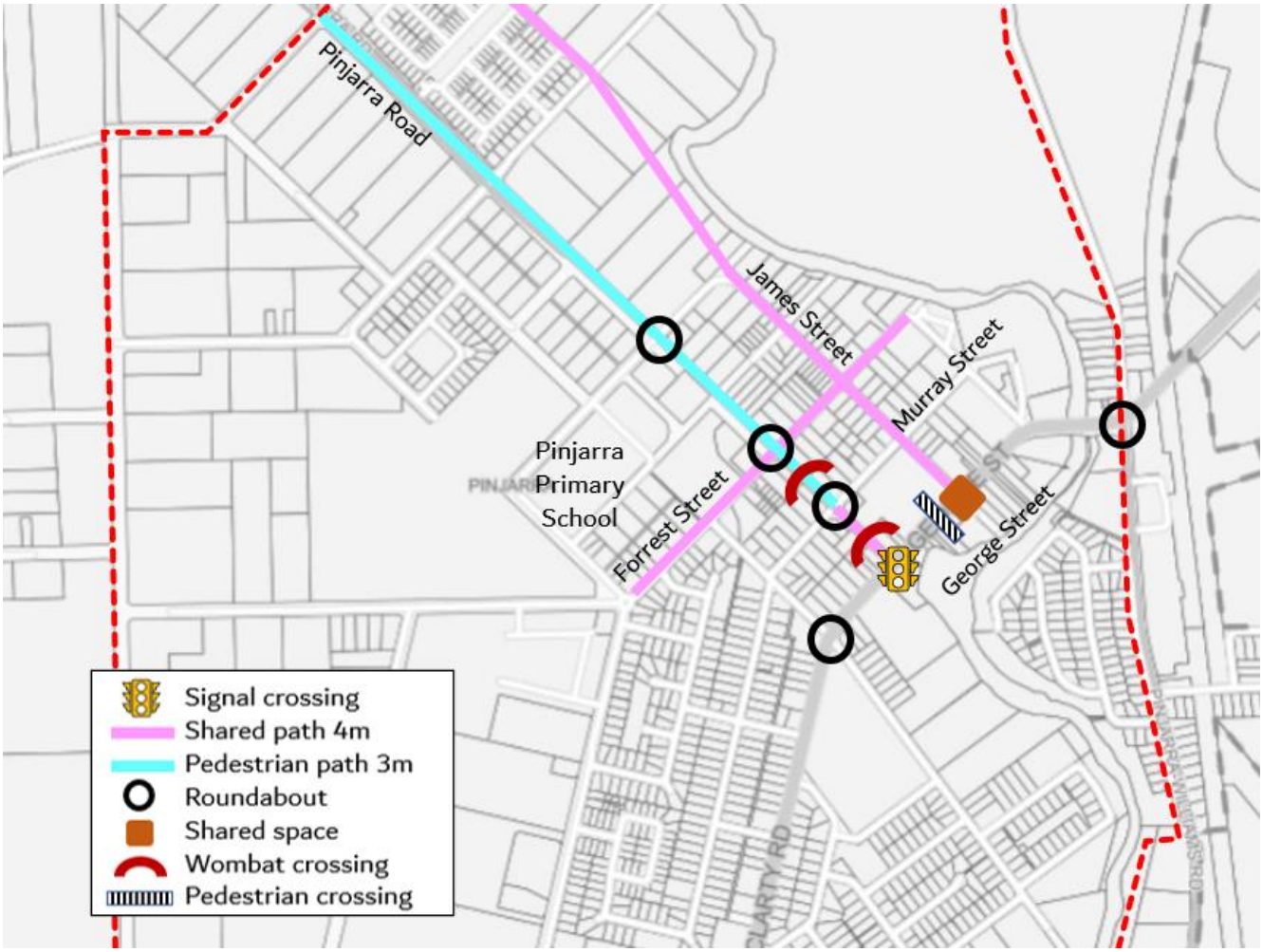

Figure 39 Proposed pedestrian network

4.7 Cycling Networks

The centre Structure Plans cycling network will largely replicate the pedestrian connections along Shared Paths with some key differences. The overall network is shown in Figure 40. It comprises of:

- Shared use path network along Forrest Street, James Street, Pinjarra Road (George Street to Murray Street)
- On street unprotected cycle lanes along Lovegrove Street, Wilson Street, Hampton Road, Alderson Street and Pollard Street
- On street protected cycle lanes along Pinjarra Road (Murray Street to Sutton Street).

The proposed cross sections and cycling infrastructure will generally provide adequate cycling infrastructure along the identified routes. There are a number of gaps within the proposed cycling network which will mean the infrastructure won't perform optimally and will increase the difficulty in navigation and access for people cycling.

Between Sutton Street and Murray Street, Pinjarra Road has proposed protected on street cycle lanes. However at Murray Street, the cycle lanes will stop and people will need to deviate onto the shared path. This deviation is counter-intuitive and given the higher concentration of people using the pedestrian path between Murray Street and George Street (and the

wombat crossings), this may cause both confusion and some safety issues. It is recommended that the protected on street cycle lanes be extended to George Street. This will also comply with the LTCN hierarchy of a primary route.

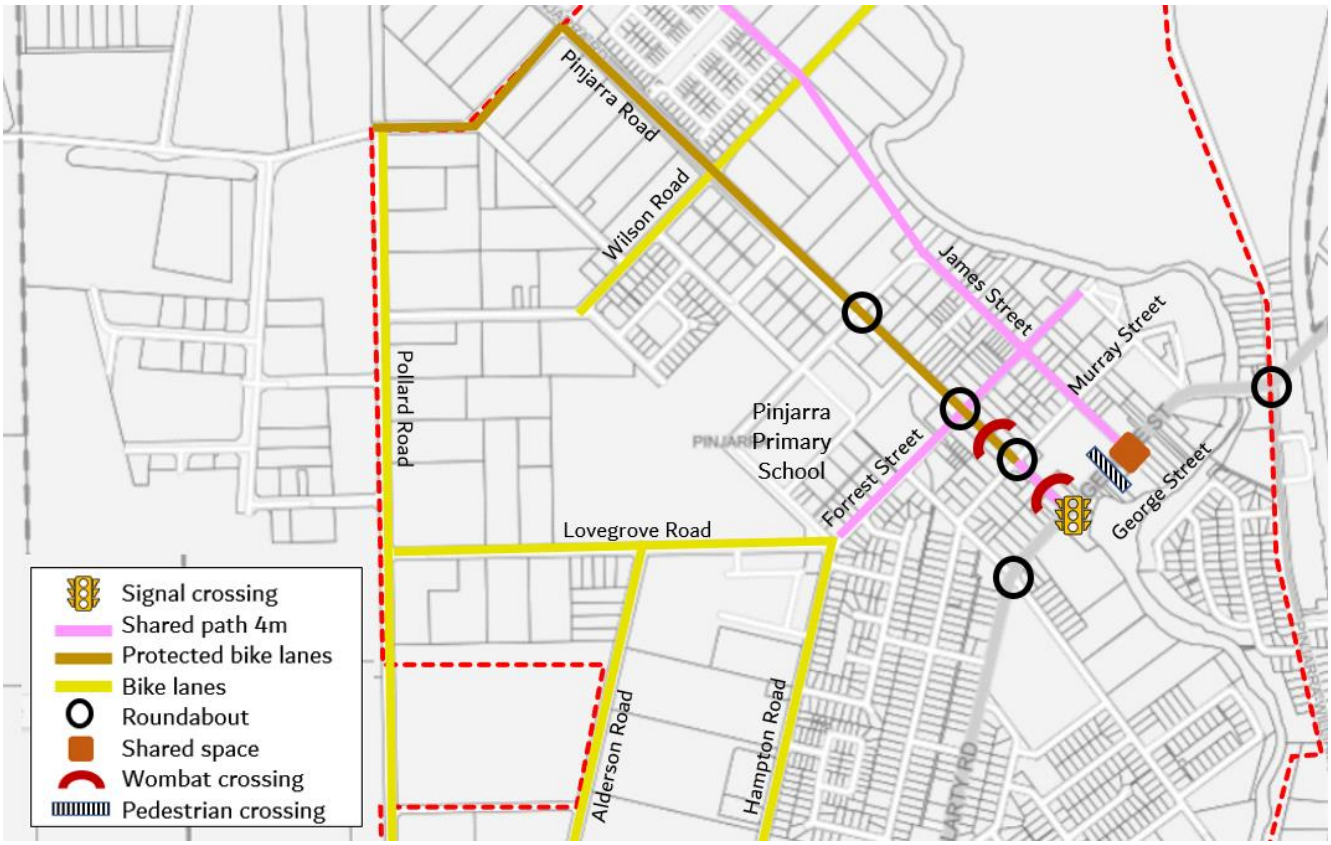

Figure 40 Proposed cycling network

The LTCN identifies George Street as a secondary route connection. A secondary route typically has lower demand than primary routes, but provides a similar level of quality, safety and convenience. The LTCN secondary bicycle route will need to be included within the George Street corridor and link with the primary route along Pinjarra Road.

The shared space at the end of George Street, the zebra crossing to the south-west and protected cycling routes along Pinjarra Road and George Street will enable good connections for people cycling to access the Murray River foreshore as per the Planning Objectives of the Activity Centre Plan.

No locations for bicycle parking have been identified and there are no requirements for new buildings to have end of trip facilities within the centre Structure Plans or the Pinjarra Activity Centre LPP. As set out in section 8, this needs to be addressed.

4.8 Healthy Streets Check

In order to assess the pedestrian and cycling environment along Pinjarra Road, a Healthy Streets Check was completed for both the existing layout and the proposed Masterplan. Healthy Streets is human-centred framework for embedding public health in transport, the public realm and planning. The 10 Healthy Streets Indicators (Figure 41) focus on the human experience needed on all streets, everywhere, for everyone.

The assessment considers 28 measures of various elements including air quality, traffic speeds, provision of places to stop and rest, ability to cross the road and ability to pass on the path, shelter, proportion of heavy vehicles, collision risks, quality of the surface, lighting, passive surveillance and street trees. These assessment scores are combined to then determine the rating of the 10 Indicators.

Figure 41 Healthy Streets Indicators

The Healthy Street Check found that the existing layout scored 40 out of 100 and received a score of zero across six assessment criteria. The 'zero' scores were a result of the lack of protection and space for cyclists; when pedestrian paths narrow to less than 1m; vehicle turning movements are uncontrolled with no protection for pedestrians and cyclists; and the proportion of heavy vehicles at peak hour. Other low scores of 1 include noise, difficulty in crossing side roads and the main road, sharing the path with cyclists, lack of passive surveillance and street trees, and walking distance between resting points.

The proposed layout saw in improvement across all 10 Indicators and received a higher score of 58 out of 100 with only one zero score. The improvements are mostly a direct result of the proposed Heavy Haulage Deviation which will reduce noise and improve air quality, and perceived and actual safety for people walking and cycling. The addition of street trees, wombat crossings along main desire lines, and the allocation of space for cycling also contributes to the higher score. The proposed layout received the highest score (3) for street trees, bus stop accessibility, speed of motorised traffic, noise from large vehicles, air quality, effective width for cycling, and the quality of path and road surface.

A summary of the Healthy Streets Check is shown in Figure 42.

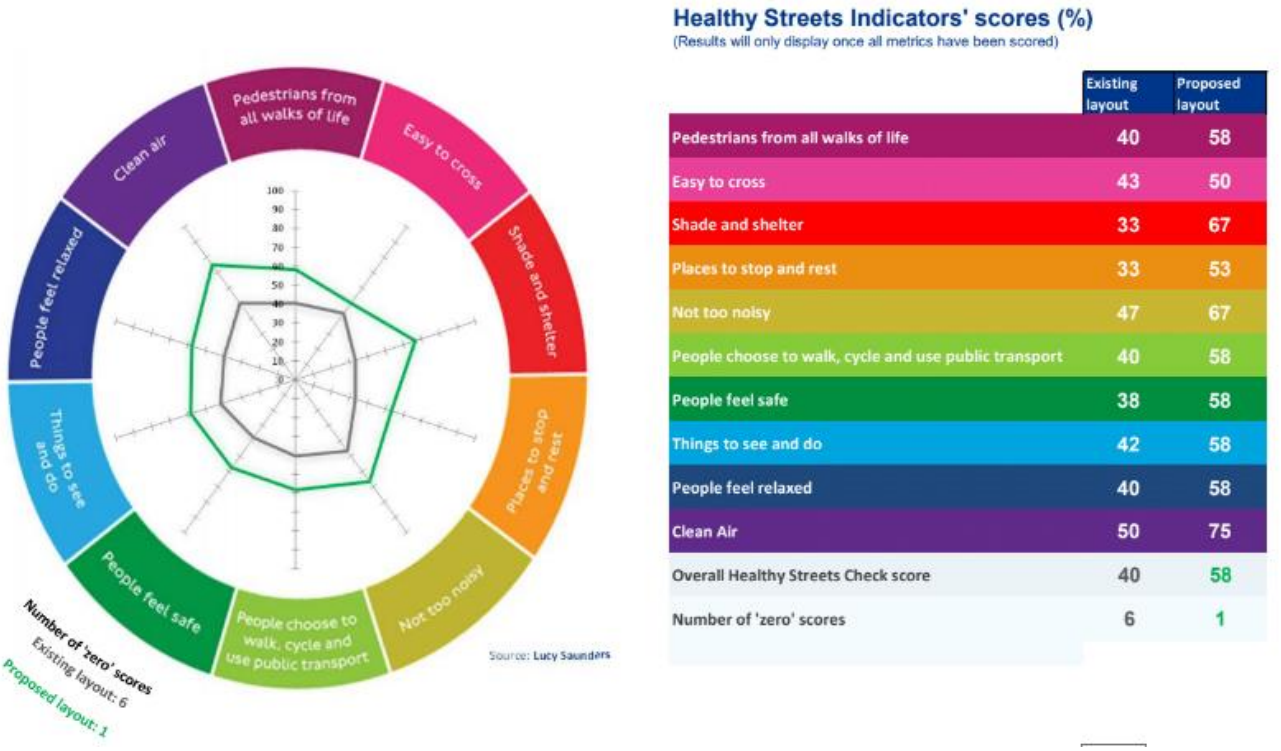

Figure 42 Healthy Streets Summary

The biggest improvement is found in Shade and Shelter which more than doubled from 33 to 67. This comes from the Activity Centre Plan guidelines which states that all buildings need to provide shade and shelter to the adjacent footpath, as well as the extensive tree planting proposed along the corridor. Clean Air, Not Too Noisy, People Feel Safe and People Feel Relaxed can all be attributed in part to the reduction of heavy vehicles from the proposed heavy vehicle route deviation.

The indicator which increased the least is Easy to Cross which only improved by 7 points. While the wombat crossings improved the score somewhat, the inclusion of roundabouts means that it will be more difficult for pedestrians to cross at these intersections. The summary of this report is included within Appendix 1.

4.9 Public Transport Services

Whilst Pinjarra Station remains one of the stops along the Perth to Bunbury railway line, the service is slow, infrequent and expensive so it is not suitable as an attractive regular transport option. Bus services connect to locations along Pinjarra Road and Mandurah Station, however this service is infrequent and does not extend to evenings or weekends and so its ability to connect Pinjarra is limited.

Upgrades to the train car sets will be delivered when the Australind returns to service in 2025, providing a better quality of service. Upgrades would include universal access, improved reliability (through fewer maintenance or mechanical issues), improved bicycle storage and general interior improvements. No increased frequency of service is planned.

The Long Term Growth Plan identifies high frequency transit between Pinjarra and Mandurah, Ravenswood, and the future Nambeelup Industrial Area, as well as a future train station as part of the PTA's rail extension from Armadale to Bunbury. Although the station is not currently part of the metropolitan commuter rail network, the centre Structure Plans identifies

that it will be necessary to support the function of Pinjarra as a secondary centre in the Peel region. The location of the future station precinct is shown in Figure 43.

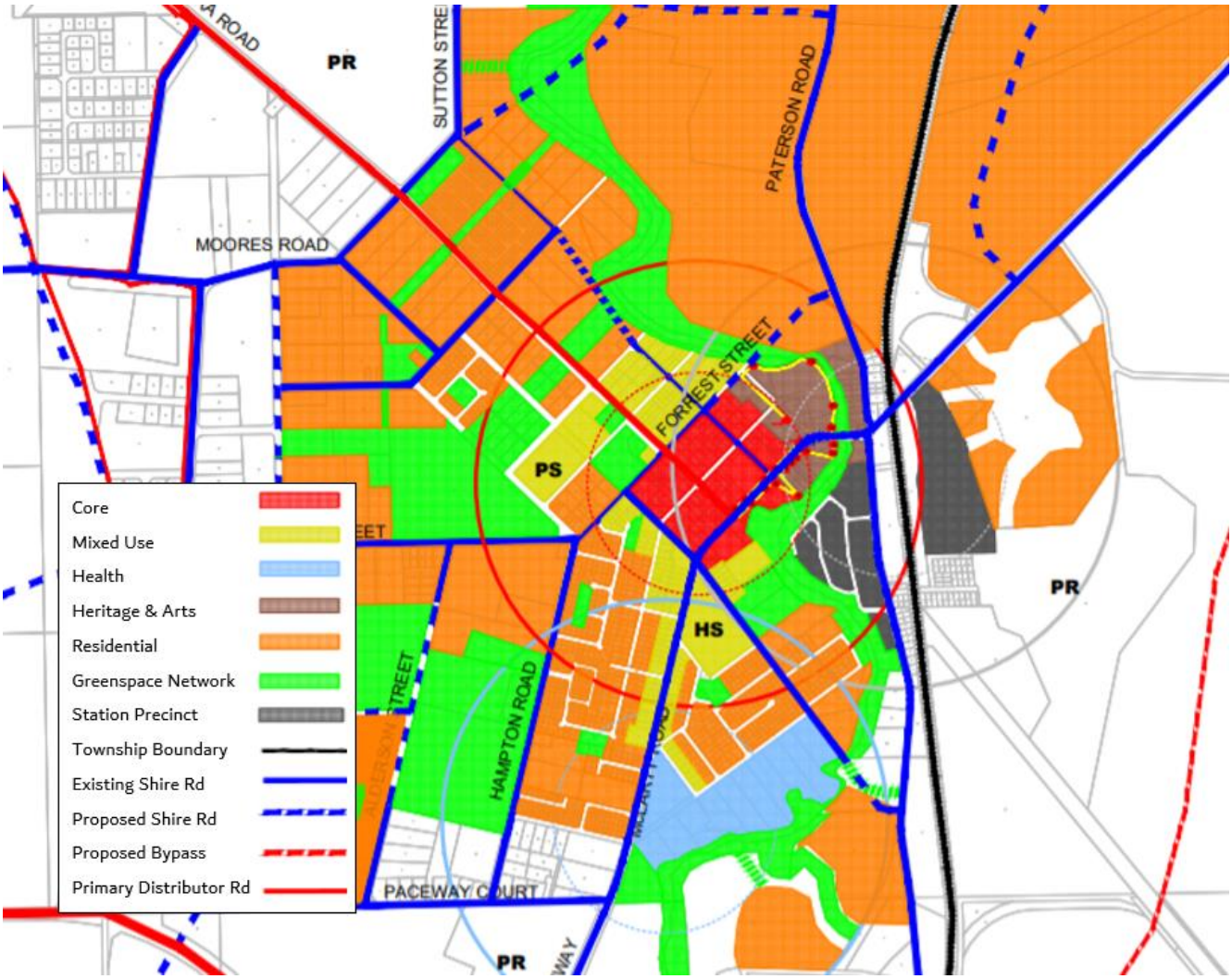

Figure 43 ACP showing the proposed station precinct (source: Shire of Murray)

The centre Structure Plans also identify the potential for a transit service to run between Pinjarra and Mandurah as shown in the cross section for Pinjarra Road (Figure 28) – the PMTS. Light rail or trackless trams may not be entirely appropriate in this location given it normally relies on high land use intensity, residential density and given it does not achieve the speeds of heavy rail, it is not always suitable for distances more than 15kms. This cross section could also accommodate rapid bus movements initially with a transition to a mid-tier mode such as light rail or trackless trams as Pinjarra evolves.

The infrastructure required for light rail or trackless trams would have cost implications in the short to medium term, considering buses can travel these distances easily and incur a lower running cost per kilometre which would be a key consideration of Transperth. The ability for this new mode to provide the level of connectivity, capacity and access to achieve the step change required to deliver on the centre Structure Plans should also be examined in the context of proposals in this Movement Network Plan and may present itself as a longer term solution.

Developing a more effective bus network within Pinjarra will require a longer term strategic plan set out in conjunction with Transperth which focuses on providing the level of frequency and coverage required and sets out a hierarchy of services that

will support patronage to both Pinjarra and Mandurah. An indicative layout using a combination of higher frequency regional routes, high frequency through routes and local routes is set out in Figure 44.

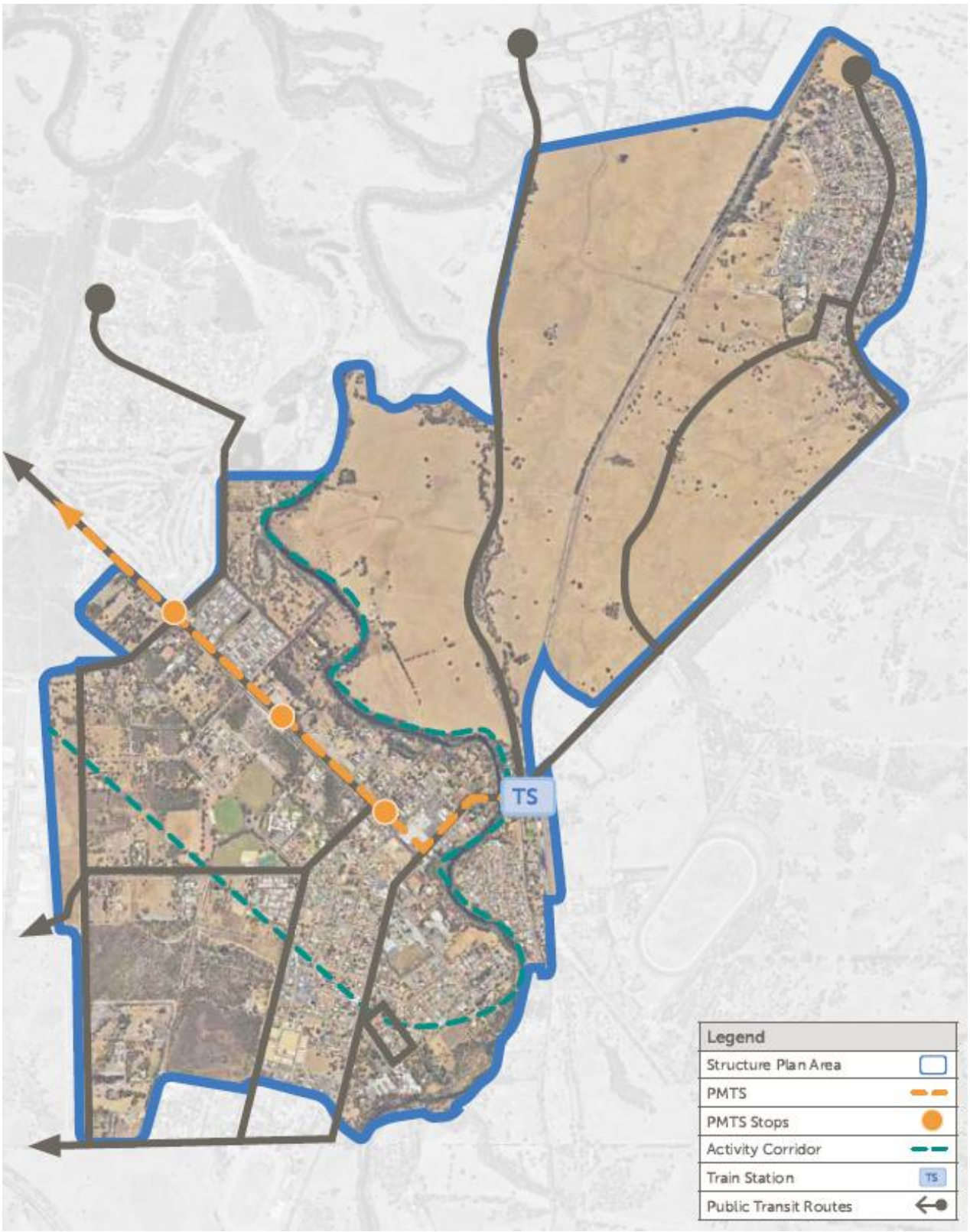

Figure 44 Potential future bus network connections (source: Shire of Murray)

This indicative layout could be introduced gradually in keeping with service planning undertaken by Transperth and be adjusted accordingly. The key element would be:

- Using Pinjarra Station as the terminus point for long distance regional services between Mandurah and Pinjarra
- Pinjarra Road being the key corridor through the Activity Centre
- Including high frequency through routes that connect areas either side of Pinjarra to each other as well as moving through the Activity Centre. These routes could start as local routes and have frequencies increased over time when required
- Local routes connecting existing and future residential areas to the Activity Centre and Pinjarra Station which could be introduced and adjusted accordingly.

This high level strategic plan could be supported by the Movement Network Plan through:

- Examination of implication for use of Pinjarra Station as a long term terminal point
- Planning for bus stop infrastructure to be appropriately located along those routes and corridors agreed with Transperth
- Planning for and designing adequate levels of priority or on-street facilities to support bus movements
- Early planning for bus routes to be considered through development areas external to the centre Structure Plans
- Potential for an off-site Park and Ride along Pinjarra Road to reduce through traffic in the Activity Centre.

In addition to more localised bus movements, the volume of development considered within the centre Structure Plans and previous examination of transit corridors indicates that more legible options could exist to provide capacity and connections. Given the existing urban rail network is being extended, the longer term feasibility of using heavy rail to provide for sub-regional trips could be examined with the PTA, DPLH and DoT.

An indicative alignment with the potential to use Pinjarra Road corridor as a heavy rail extension from Mandurah Station to include five new stations is indicatively set out in Figure 45. This potential alignment would see:

- Extension of heavy rail along Mandurah Road south from Mandurah Station, then passing underneath Pinjarra Road to then sit within the central median of the existing reserve.
- New stations servicing existing or future communities along the corridor at Furnissdale, North Yunderup, Ravenswood, West Pinjarra (substantial Park and Ride Station to reduce vehicle travel demand to both Mandurah as well as destinations along the existing rail network to Perth)
- Rail corridor along Golf Course, over Murray River and then alignment to loop on to existing rail reserve to then terminate at Pinjarra Station
- All major crossings of main roads and water courses would be grade separated
- Likely require grade separated sections of rail through areas where reserve width may not accommodate at-grade infrastructure.

This extension is around 19km in length, which is two kilometres less than the Morley to Ellenbrook Link currently being planned within the METRONET project.

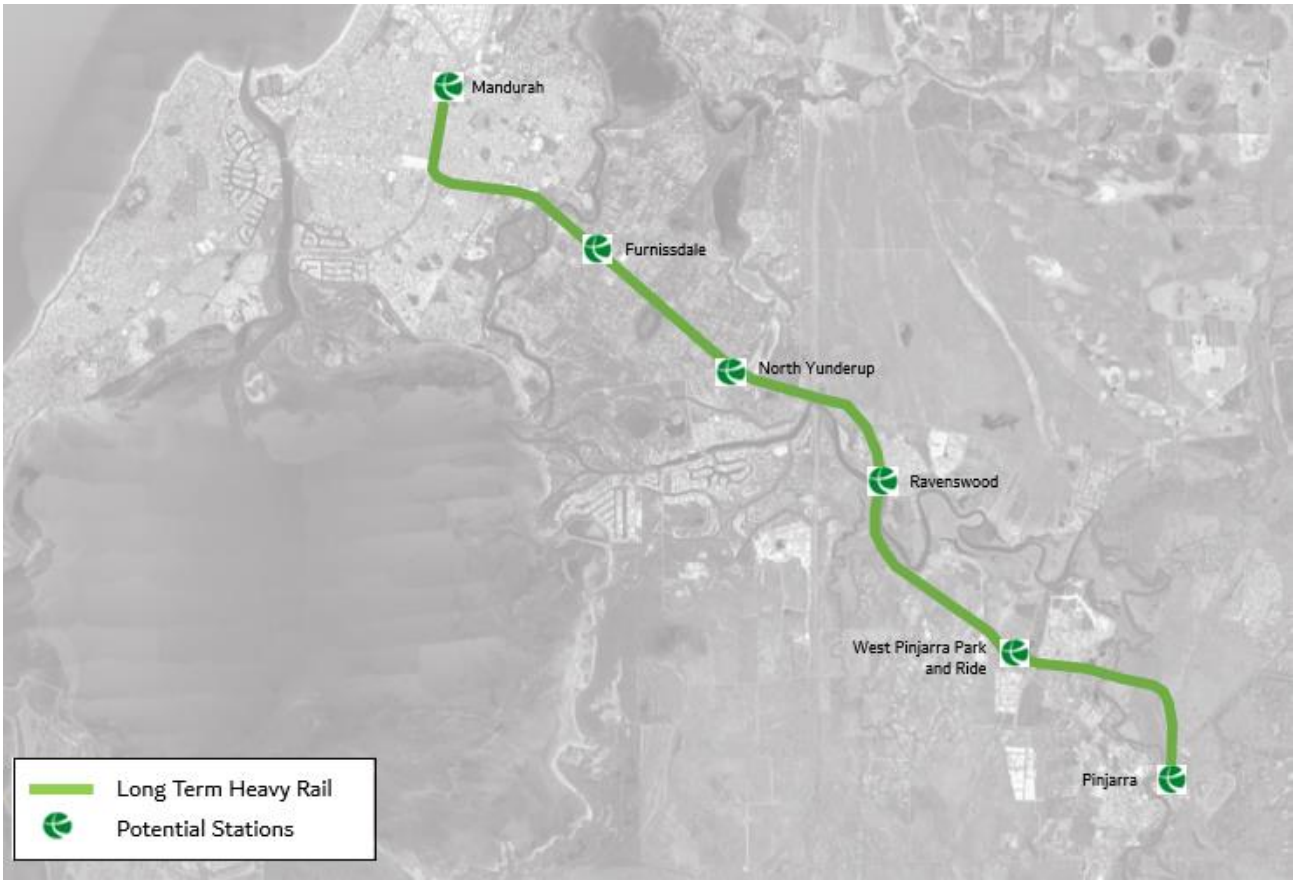

Figure 45 Potential long term heavy rail extension to Pinjarra Road corridor

The evolution of land uses and planning within Pinjarra will support the case for improvements within the Public Transport network. It is acknowledged that the planning and delivery of improvements would be led through the PTA and other State Government agencies, however the delivery of the METRONET projects to outer areas within the Perth Metropolitan Region underlines the importance of increasing accessibility for public transport users, no matter what mode that is within the short, medium and long term.

The existing and future network within the Perth Metropolitan and Peel Regions is based around bus feeder networks connecting into stations and activity precincts. Should that model continue to be the case, the potential network for bus connections set out would be able to accommodate growth within Pinjarra.

Should there be the introduction of a mid tier or third form of public transport, the existing corridor along Pinjarra Road would be able to support that mode. Should extension of heavy rail networks progress, there exists an excellent opportunity to undertake long term planning to deliver an outcomes seen along the Morley Ellenbrook Line, Yanchep Line extension or the Armadale Line extension to Byford.

5. EXTERNAL NETWORK CHANGES

5.1 External Changes

The external network changes within the area surrounding the centre Structure Plans have all been taken into account in the development of this Movement Network Plan.

Use of the 2041 network configuration plots and ROM24 outputs has catered for any proposed changes that may be considered by Main Roads WA, however from a review of the network plots provided there are no strategic or higher order changes to the network evident.

In respect of rail network changes, there are three known projects that are either in planning or delivery that could have implications for the centre Structure Plans:

- Extension of the Armadale Urban Rail line to Byford. This is not expected to have any implications for sub-regional movements to and from Pinjarra
- Fast Train options being examined to connect Perth with Bunbury
- Westport review of transport connections associated with using Bunbury Port for a much higher volume of traffic – primarily primary resources and container movements. The studies associated with Westport concluded that the upgrade of the existing rail connection through Pinjarra and other locations around the South-West would be difficult, expensive and not result in the level of efficiency required to deliver a longer term port option that would provide the overall level of benefits being countenanced.

None of these known transport projects would impact on the outcomes of the Movement Network Plan.

6. INTEGRATION WITH SURROUNDING AREA

6.1 Integration

As established in this assessment, the area around the centre Structure Plans boundaries are broadly split between the following characteristics:

- The south and east extension of the boundary terminates where George Street to the east and McLarty Avenue to the south revert to the South Western Highway alignment
- Rural land and the Murray River to the north and north-east which is potentially earmarked for urban land uses in the future
- New road construction of Pollard Road determines the western boundary with some light industrial uses and then urban land uses to the west between the Forrest Highway alignment and existing Pinjarra townsite
- Pinjarra Harness Racing Club to the south outside of the centre Structure Plans.

Most of the land surrounding the centre Structure Plans shows various signs of development, whether dormant style agricultural uses, rural residential style blocks, special development (residential housing estate) and remnant bushland. The expansion of residential land uses into the rural zones does not pose any immediate conflict other than the loss of arable land for food production.

Planning for these areas, and the integration of the transport network supporting the centre Structure Plans with surrounding locations, have been subject to a substantial planning effort, ranging from high level strategic exercises through to detailed design elements and location specific planning. This level of strategic and statutory planning effort will continue to shape the surrounding area and be principally led by the Shire of Murray, DPLH and Main Roads WA.

6.2 Desire Lines

The key desire lines to and from the centre Structure Plans area will follow the existing and new connections to the local and wider area transport networks, as shown in Figure 46, these are largely comprised of:

- Public transport connections along Pinjarra Road
- Driving trips to and from centre Structure Plans to major local activity areas, including Mandurah, Perth and locations in the South West via either South Western Highway or Forrest Highway, with connections along Greenlands Road or Pinjarra Road
- Trips associated with the rural hinterland via Pinjarra-Williams Road or South Western Highway
- Trips to and from adjacent residential areas on the periphery of Pinjarra
- Employment based trips to sub-regional employment generating areas such as Alcoa via the South Western Highway and Peel Business Park via Paterson Road.

Pedestrian and cycling desire lines will also likely follow the established network, or the proposed networks within the centre Structure Plans area including the future LTCN path along Pinjarra Road.

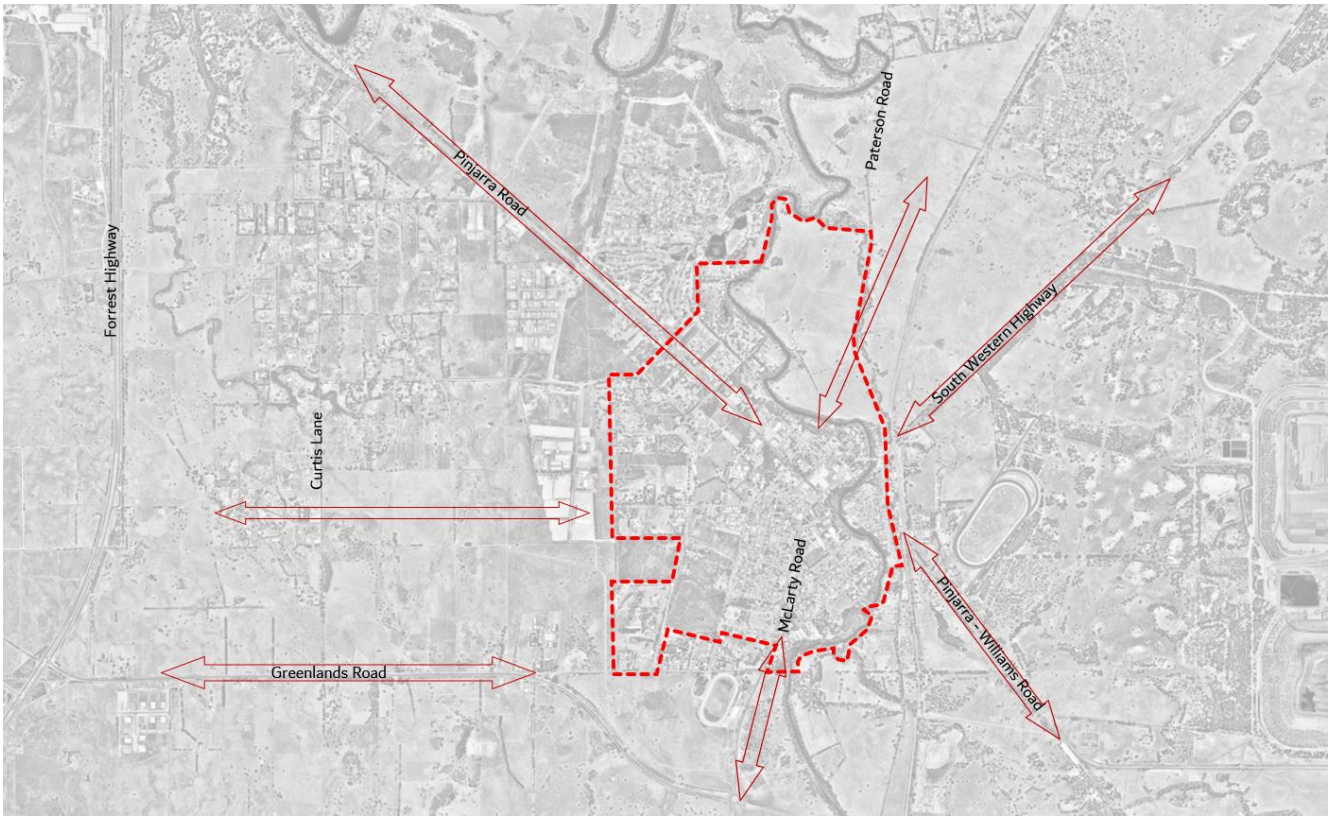

Figure 46 Indicative transport desire lines for ACP

6.3 Suitability of Network to Satisfy Desire Lines

The existing road network largely operates within capacity and is fit for purpose for most vehicle volumes and types, including the current RAVS network. The network proposals within the centre Structure Plans, and those actively being delivered such as the Eastern Deviation, are designed to accommodate the level of growth expected within the centre Structure Plans area.

As set out in sections 3.6 and 3.7, the existing pedestrian and cycling networks are either poor or of a low standard.

7. ANALYSIS OF TRANSPORT NETWORKS

7.1 Introduction

A mesoscopic model has been established to act as a middle tier assessment tool that sits below Main Roads WA's (MRWA) ROM24 model and individual intersection analysis software. The mesoscopic model covers a more fine-grained network than ROM24 (that necessarily sits at a higher, macroscopic tier) with the intent of providing a more detailed analysis of the centre Structure Plans. The mesoscopic modelled network is shown below in Figure 47 covering the wider, and town centre areas, and covers an AM and PM peak hour (08:00 – 09:00 and 15:00 – 16:00). The red coloured network reflects the proposed infrastructure discussed previously in Section 4, and these are assumed to have been delivered for both the 2031 and 2041 forecast years that are being assessed.

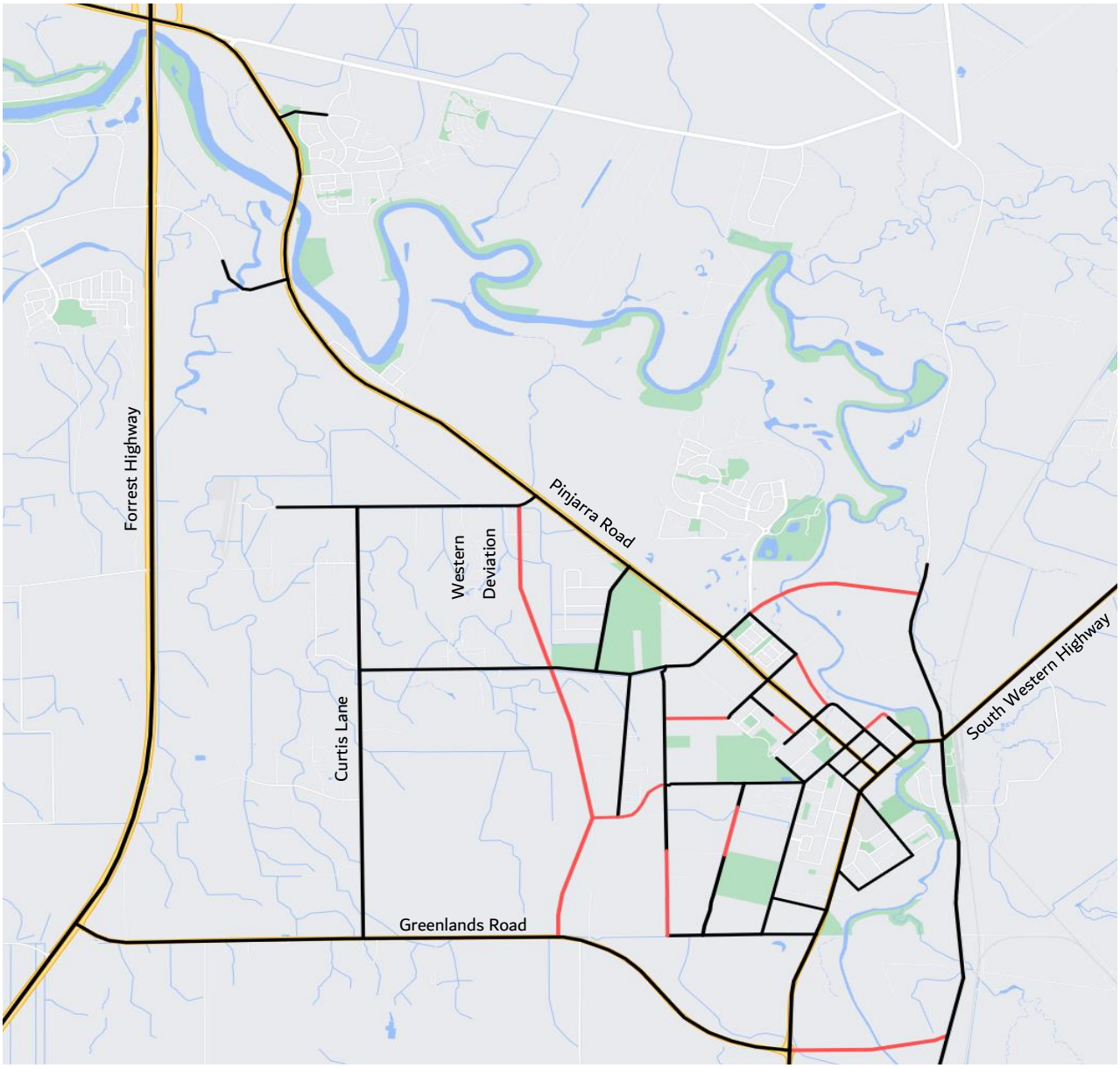

Figure 47 Mesoscopic Modelled Network Extents

7.2 Modelled Network Updates

In addition to the proposed wider area infrastructure changes, the following details have also been modelled, with the intersection treatments proposed set out in Figure 48:

- Heavy vehicles are not permitted in the town centre and therefore use the Western Deviation (running between Beacham Road and Greenlands Road) and the haulage deviation between Greenlands Road and Pinjarra Williams Road to bypass the town. Roundabout treatments have been modelled for the majority of intersections along these routes.
- The landscape masterplan (previously discussed in Section 4.4) has been modelled along Pinjarra Road between Roe Avenue and South Western Highway, and along South Western Highway between Henry Street and Clifton Crescent. These changes include:
    - 40kph speed limit and reduction to a single lane in each direction along Pinjarra Road
    - Roundabout intersections at Roe Avenue, Forrest Street, Murray Street and Peel Street
- Signal timings have been optimised where necessary to help accommodate changes in demands and distribution.

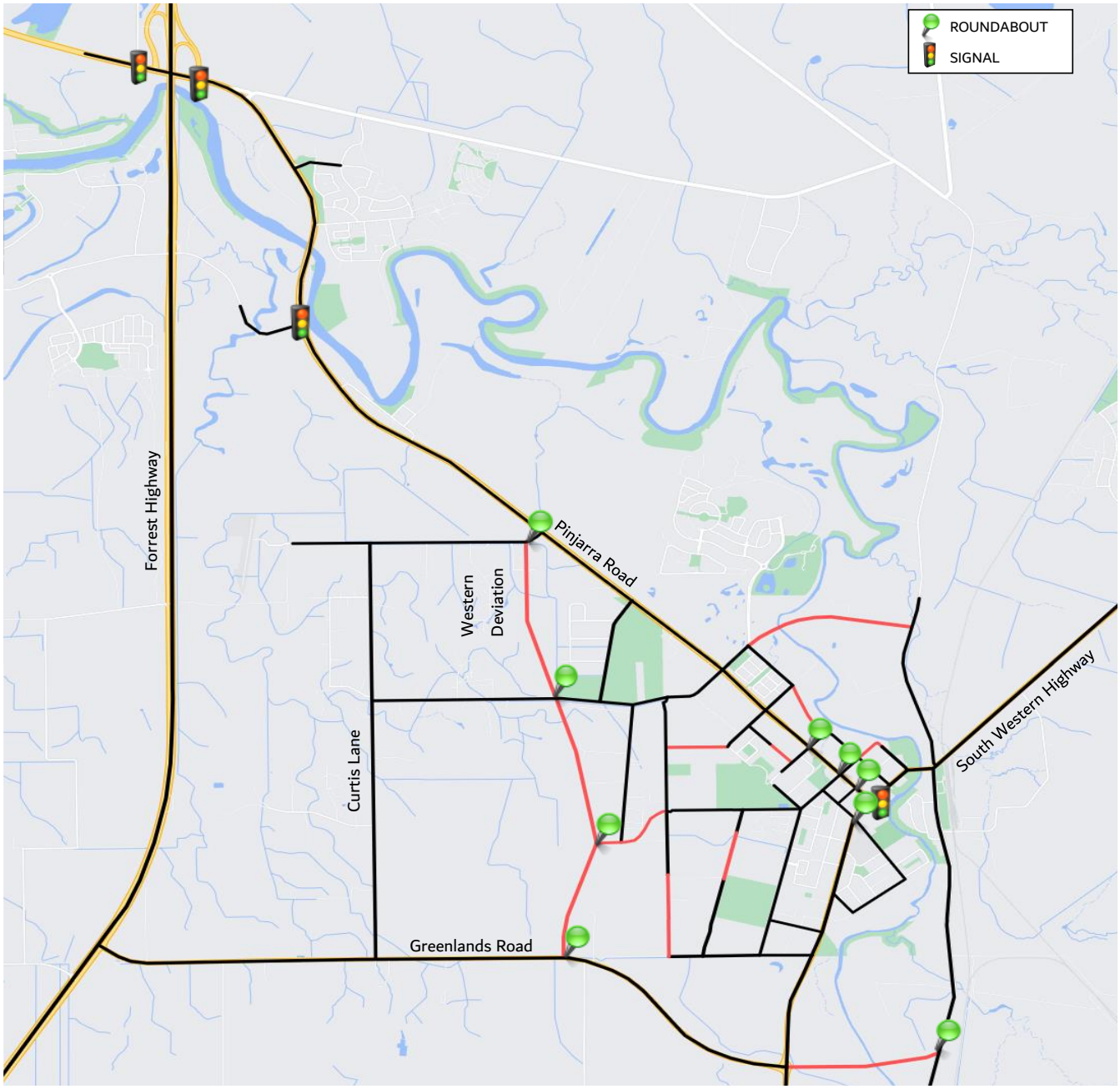

Figure 48 Modelled Intersection Treatments

7.3 Trip Generation

The zoning within the model has been established to tie in with specific areas of trip generation and attraction. The zones also reflect the ROM24 zoning although are disaggregated to provide a certain level of refinement. ROM24 has been used to calculate the external zone demands and distribution changes to the forecast years 2031 and 2041. This set of changes were applied to the base 2020 external zone demand matrices. The zones that are referred to as external are shown in Figure 49, covering the extremities of the modelled network and also areas away from centre Structure Plans.

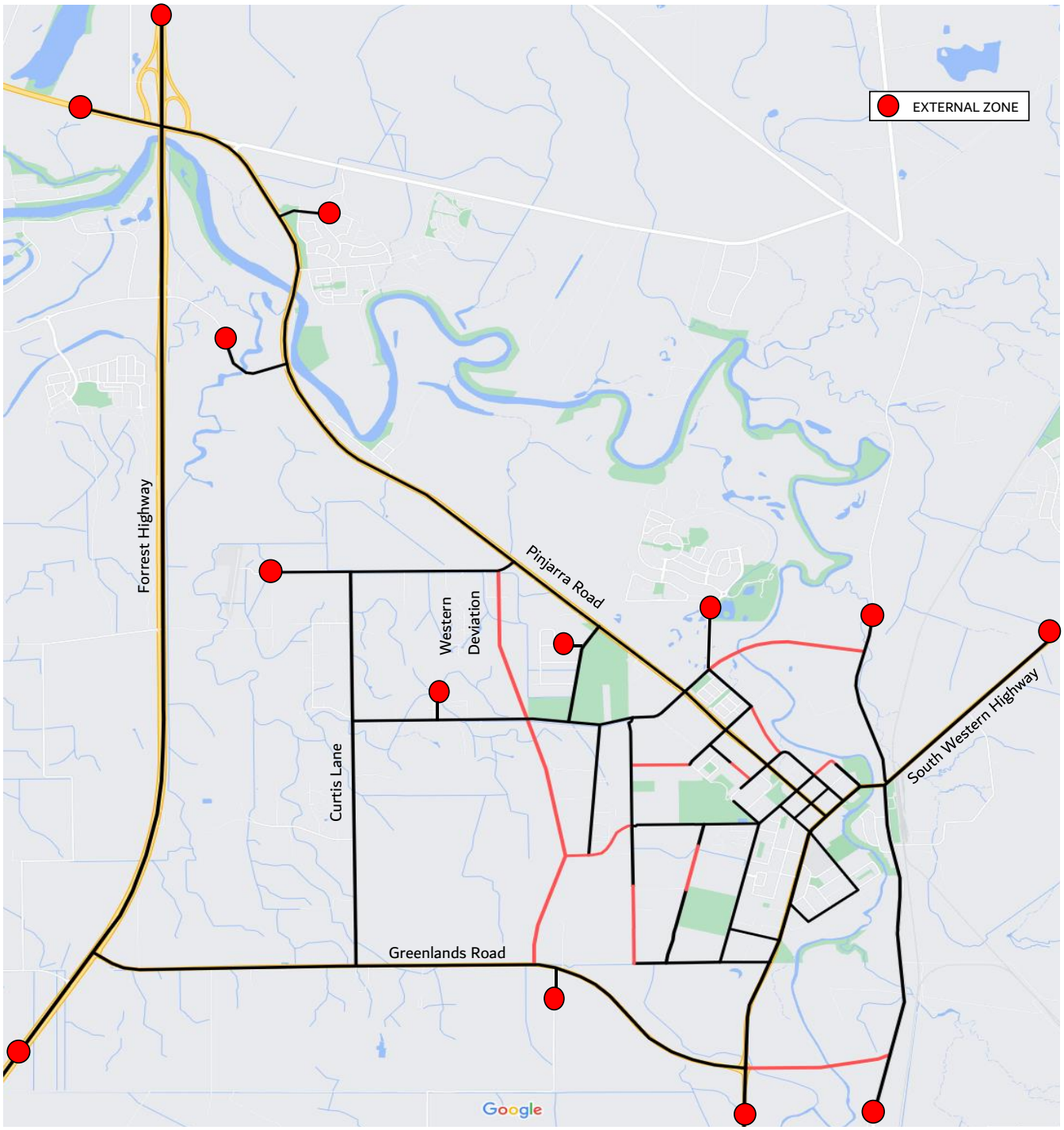

Figure 49 External Model Zones

Details for the centre Structure Plans have been provided and used as a basis for calculating the trip generation. Land use and yields have been through some refinement and also comprise several assumptions that are documented further in this section. The Pinjarra District Structure Plan (DSP) zoning is shown in Figure 50 detailing the ACP as a single zone, 22. This has been disaggregated further into five separate zones to reflect the differing land uses and access locations.

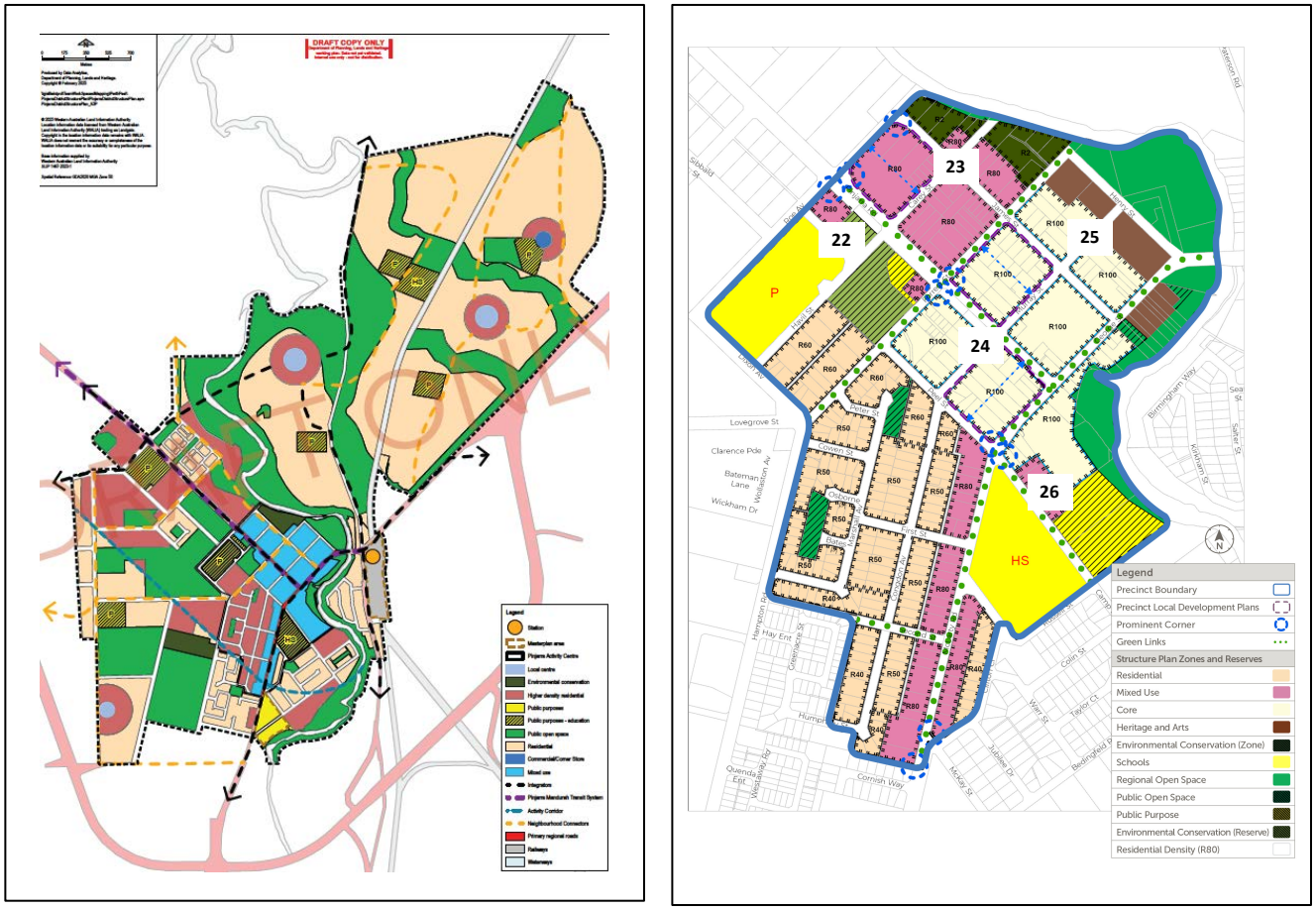

Figure 50 District Structure Plan and PSP Zoning

The translation of the DSP and PSP zones into the modelled network are shown in Figure 51 covering the town centre area residential zones (orange) and the core/mixed use ACP zones (blue).

This detailed disaggregation allows for individual trip generation rates to be calculated for each zone separately, and following model assignment, allows each zone to be interrogated separately.

Following the calculation of trip generation, internal trips that exist between and within the District Structure Plan and Activity Centre Plan zones have been reduced by 30% to account for linked trips or a potential reassignment to alternate modes.

The reduction in trips to take account of linked trips or other modes then places greater significance on the Shire of Murray progressing planning and construction of complementary infrastructure, such as improved pedestrian and cycling connections, as well as greater parking management controls. Additional public transport coverage also plays a key role in reducing the impact of single purpose vehicle trips to and from the centre Structure Plans.

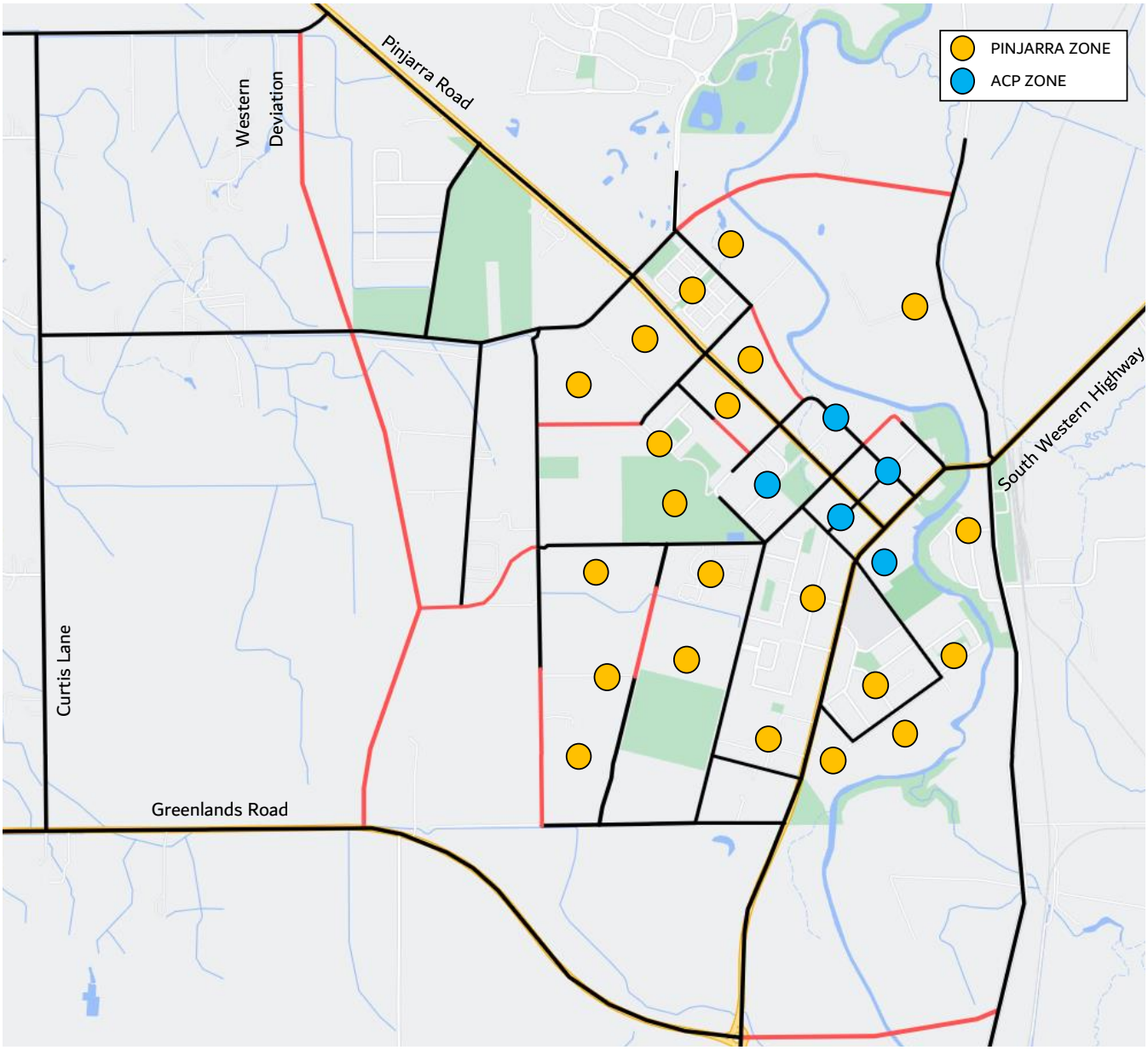

Figure 51 Town centre model zones

7.3.1 Residential trip generation

Trip generation has been calculated on the basis that the land uses and yields provided reflect an "Ultimate" forecast year. This does not necessarily have a specific forecast year that can be attributed to full delivery of all land uses, although for this project, 2051 has been chosen.

The forecast modelling is undertaken on the basis that 2031 and 2041 projections need to be understood further, and the ultimate land use and associated trip generation need to be scaled accordingly.

Table 3 outlines the residential dwelling targets for each of the DSP zones. The centre Structure Plans are discussed separately.

Table 3 Residential Dwelling Targets

Zone	Existing Dwellings	Additional Dwellings	Dwelling Target (ultimate)
1	0	155	155
2	0	431	431
3	135	0	135
4	0	762	762
5	0	0	0
6	0	338	338
7	53	94	147
8	0	352	352
9	0	0	0
10	0	0	0
11	0	330	330
12	80	225	305
13	281	741	1,022
14	74	30	104
15	0	0	0
16	147	405	552
17	0	414	414
18	8	80	88
19	102	0	102
20	0	0	0
21	0	0	0
ACP	0	2,818	2,818

Vehicle trip generation for the residential land use has been calculated separately for the AM and PM peak hour using the following rates that are based on our previous surveys, WAPC trip generation rates and observations of similar residential areas.

- Structure Plan Zones, AM peak, 0.8 trips per dwelling. 25% inbound, 75% outbound

- Structure Plan Zones, PM peak, 0.8 trips per dwelling. 70% inbound, 30% outbound
- ACP Zones, AM peak, 0.4 trips per dwelling. 25% inbound, 75% outbound
- ACP Zones, PM peak, 0.4 trips per dwelling. 70% inbound, 30% outbound.

Adjusting the ultimate dwelling targets back to 2031 and 2041 has considered the population summary data available on https://profile.id.com.au/. The combined population forecasts for Pinjarra and West Pinjarra are shown in Figure 52, highlighting the more dramatic increase from 2026 onwards where forecast population and growth is back-end loaded.

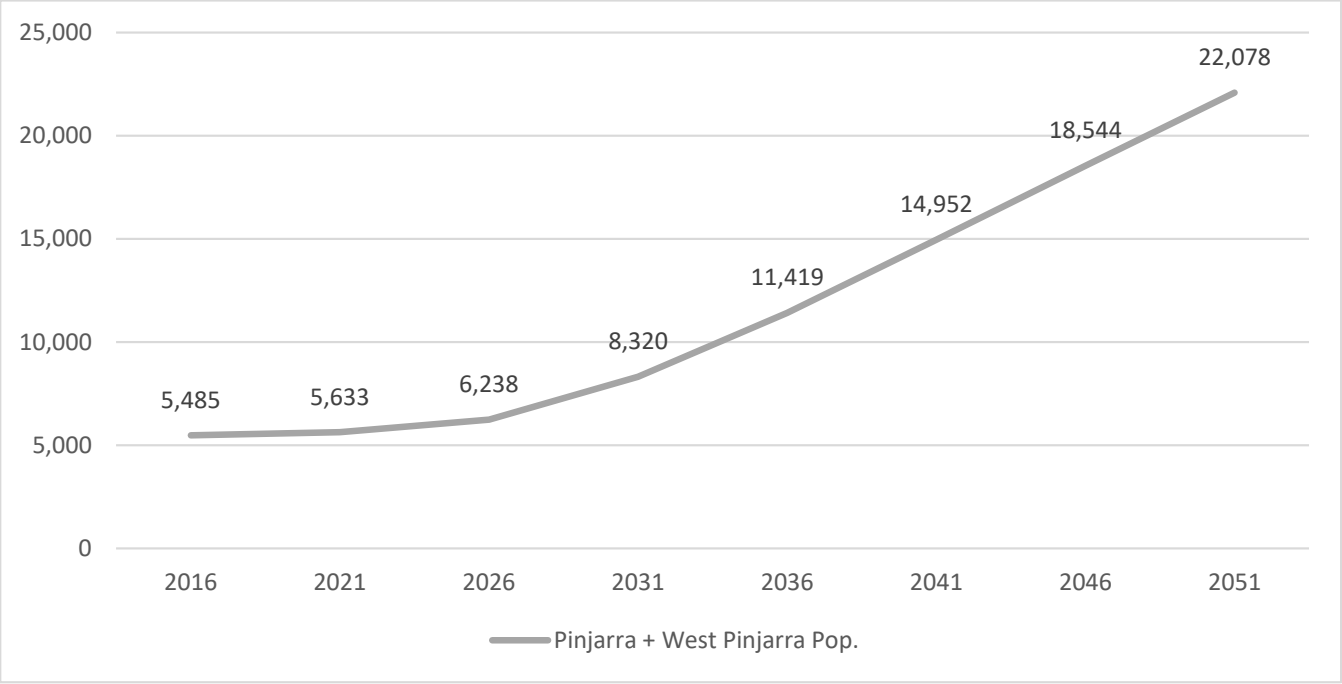

Figure 52 Pinjarra and West Pinjarra Population Forecasts

Using an assumed occupancy of 2.4 people per dwelling, the 2031 and 2041 population is converted into the dwelling target values and are distributed proportionately across the Structure Plan zone areas. The dwellings increase from 2020 base has been calculated as:

- 2020 to 2031 – 1,232 dwellings
- 2031 to 2041 – 2,763 dwellings.

Table 4 shows the calculated dwelling totals at the forecast year milestones and how they increase to the ultimate, or 2051 forecast year. These yields have been used to calculate the trip generation for inclusion in the peak hour models.

Table 4 2031, 2041, Ultimate Residential Dwellings

Zone	Dwellings by 2031	Dwellings by 2041	Dwelling Target (ultimate)
1	27	86	155
2	74	240	431
3	135	135	135
4	131	424	762
5	0	0	0
6	58	188	338
7	69	105	147
8	60	196	352
9	0	0	0
10	0	0	0
11	57	184	330
12	119	205	305
13	408	694	1,022
14	79	91	104
15	0	0	0
16	217	372	552
17	71	231	414
18	22	53	88
19	102	102	102
20	0	0	0
21	0	0	0
ACP	484	1,569	2,818

It should be noted that the ACP zones (both Core, and Mixed Use) contain a large proportion of residential dwellings forecast for the future year scenarios. This is on the basis that all floors above ground level are considered for residential use. The peak hour residential trip generation for the DSP zones is summarised in Table 5 while the centre Structure Plans zones are discussed in the following section.

Table 5 Residential Trip Generation

ZONE	Increase from 2020 to 2031				Increase from 2031 to 2041			
	AM Peak		PM Peak		AM Peak		PM Peak	
	In	Out	In	Out	In	Out	In	Out
1	5	16	15	6	12	36	33	14
2	15	44	41	18	33	100	93	40
3	0	0	0	0	0	0	0	0
4	26	78	73	31	59	176	164	70
5	0	0	0	0	0	0	0	0
6	12	35	32	14	26	78	73	31
7	3	10	9	4	7	22	20	9
8	12	36	34	15	27	81	76	33
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	11	34	32	14	25	76	71	31
12	8	23	22	9	17	52	49	21
13	25	76	71	31	57	171	160	68
14	1	3	3	1	2	7	6	3
15	0	0	0	0	0	0	0	0
16	14	42	39	17	31	94	87	37
17	14	43	40	17	32	96	89	38
18	3	8	8	3	6	18	17	7
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0
ACP	Presented separately							

7.3.2 Retail and commercial trip generation

The centre Structure Plans are split into a Core area and Mixed Use area. The centre Structure Plans documentation suggests that zones are comprised of a mix of residential (previously calculated) and retail/restaurant/bar. The existing food and retail splits across the town centre taken from land use information extracted from the 2016 Census data have been used to split the projected floorspace as follows:

- Food – 23%
- Other Retail – 77%.

Initial calculations using the centre Structure Plans documentation had assumed all retail/commercial development would be delivered by the year 2041. Following discussion with the Shire of Murray, details from the Syme Marmion & Co report (August 2016) have been used for calculation. This report includes the forecast year data for projected square metre floorspace shown in Table 6.

Table 6 Projected Floorspace (source: Syme Marmion report, Table 9)

Land Use	2016	2026	2036	2051
Service Ind	2,622	2,622	2,622	7,100
Shop/Retail	14,144	16,500	27,000	92,000
Other Retail	2,949	3,963	6,486	22,100
Office/Business	7,449	8,275	13,541	46,000
Health/Welfare	4,917	4,917	5,431	18,500
Entertainment	15,295	15,295	15,295	26,000
Utilities/Coms	806	806	806	2,600
Vacant	5,751	5,751	5,751	14,600

Projecting the floorspace for the years 2031 and 2041 has assumed:

- 2031 = increase from 2026 floorspace as the 3% change per year between 2026 and 2036
- Increase in floorspace = 58,129m^2 x (3% per year x 5)
- 2031 floorspace. 58,129m^2 + 9,402m^2 = **67,531m^2**

- 2041 = increase from 2036 floorspace as the 13% change per year between 2036 and 2051
- Increase in floorspace = 76,932m2 x (13% per year x 5)
- 2041 floorspace. 76,932m2 + 50,656m2 = **127,588m2**

The 2031 and 2041 proportioned floorspace has then been split between the Core (47%) and Mixed Use (53%) areas. The floor space is proportioned further again, across the individual centre Structure Plans zones based on their area. Trip generation for the floorspace is then calculated as:

- Retail (food), AM peak, 2.5 trips per 100m^2. 20% inbound, 80% outbound
- Retail (other), AM peak, 1.25 trips per 100m^2. 80% inbound, 20% outbound
- Retail (food), PM peak, 10 trips per 100m^2. 50% inbound, 50% outbound
- Retail (other), PM peak, 4 trips per 100m^2. 50% inbound, 50% outbound.

The centre Structure Plans (Core and Mixed Use) zones and their resulting trip generation for the residential, retail (food) and retail (other) land uses are summarised below.

Table 7 ACP Zones Trip Generation

ZONE	2031				Increase from 2031 to 2041			
	AM Peak		PM Peak		AM Peak		PM Peak	
	In	Out	In	Out	In	Out	In	Out
22 Mixed	24	20	71	69	23	23	68	63
23 Mixed + Residential	152	128	457	445	146	145	436	408
24 Mixed + Core	135	126	405	386	136	161	406	363
25 Core + Heritage	197	188	591	559	202	248	600	529
26 Mixed + Core + Public	140	119	421	408	135	137	403	376

7.4 Model Outputs

The calculated trip generation has been converted into the mesoscopic peak hour demand matrices and assigned to the proposed forecast year networks. The models have been run to ensure that they converge well and that the outputs are therefore presented from a stable set of model iterations.

The modelled networks have been interrogated to help understand the movements through the network, potential peak hour volumes and hotspot areas of concern. The hotspots are considered important where they can start to help identify issues with particular intersections or demands being able to load onto the network. It should be noted that the model forecast years are 2031 and 2041 and a degree of uncertainty would necessarily exist.

7.4.1 Link volumes

Figure 53 highlights several locations across the network that the model outputs have been provided for. Link volumes in Table 8 show the vehicles per hour for the specific time periods, are presented by separate direction and alongside the Base 2020 outputs for comparison. Volumes travelling past location 1 (north of South Yunderup Road) increase through the forecast years, although the increase is somewhat less significant at location 2 where the Western Deviation provides some relief for Pinjarra Road travelling through the town centre. The use of the Western Deviation services the light industrial areas and in the short term is comprised mainly of heavy vehicles that are forced to use this route away from the centre. Longer term, it would provide a distributor role for other land uses.

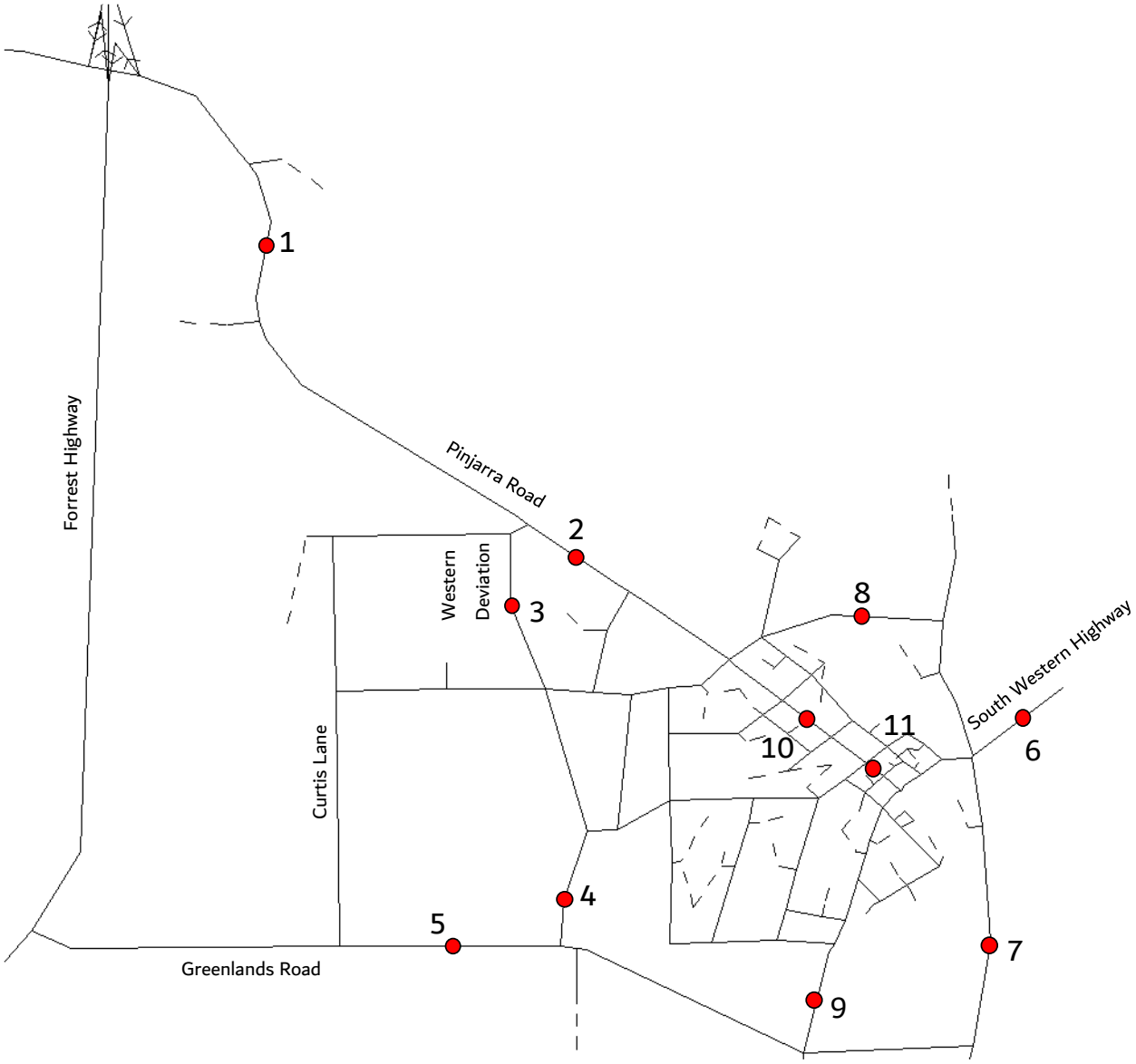

Figure 53 Model Output Locations

The use of the Western Deviation by light vehicles supports trips that are travelling either side of Pinjarra itself which would find it more efficient (and lower cost) than travelling through the centre. There is some use of the route by demands on the outer edge of the DSP zones, although it does not appear to provide an attractive alternate for trips travelling to or from the core area.

The use of Greenlands Road increases through the forecast years and is a result of this being a more efficient route choice than Pinjarra Road and any delays incurred at either South Yunderup Road or the freeway interchange signalised intersections.

The volumes along Pinjarra Road where the landscape masterplan has been included start to suggest possible capacity issues during the 2041 PM peak hour where the northbound volume (north of Roe Avenue) is modelled as 1,334 vehicles within a single lane. The capacity hotspots are discussed further in Section 7.4.2.

Table 8 Modelled Link Volumes

Location	Total Vehicle Demand Volumes						
	Direction	AM 2020	AM 2031	AM 2041	PM 2020	PM 2031	PM 2041
1. Pinjarra Rd North of South Yunderup Rd	SB	777	1,083	1,345	754	1,293	1,887
	NB	825	1,286	1,757	948	1,416	1,839
2. Pinjarra Rd North of Phillips Rd	SB	781	881	1,065	603	1,024	1,622
	NB	605	907	1,337	881	1,165	1,468
3. Western Dev south of Beacham Rd	SB		118	112		111	151
	NB		105	142		141	247
4. Western Dev north of Greenlands Rd	SB		140	154		142	185
	NB		124	119		175	284
5. Greenlands Rd	EB	58	147	178	60	212	362
	WB	72	174	292	116	207	296
6. South Western Hwy north of Paterson	EB	221	550	741	227	610	808
	WB	231	503	631	453	840	1,098
7. Pinjarra – Williams Rd	SB	47	59	80	55	76	266
	NB	55	72	91	78	89	114
8. Sutton Street extension	EB		162	311		174	354
	WB		77	163		123	219
9. South Western Hwy south of Greenlands	SB	160	238	328	243	315	348
	NB	209	265	266	203	328	544
10. Pinjarra Rd North of Roe Avenue	SB	660	726	832	515	927	1,088
	NB	482	770	1,083	757	1,079	1,334
11. Pinjarra Rd South of Forrest Street	SB	510	558	691	439	736	794
	NB	412	648	904	652	854	855

7.4.2 Volume capacity and delays

The model is also able to output volume : capacity (V/C%) ratios for links, link or turning movement delays or intersection delays. The modelled networks shown from Figure 54 to Figure 57 present the AM and PM peak hour outputs for the year 2041 for the DSP area, and separately zoomed in around the centre Structure Plans area. These show the links with V/C% greater than 85% and experiencing capacity issues. The AM peak hour outputs generally related to demands from the DSP and centre Structure Plans zones accessing Pinjarra Road and are more prevalent where give-way priority controlled intersections are coded for Sutton Street and Wilson Road.

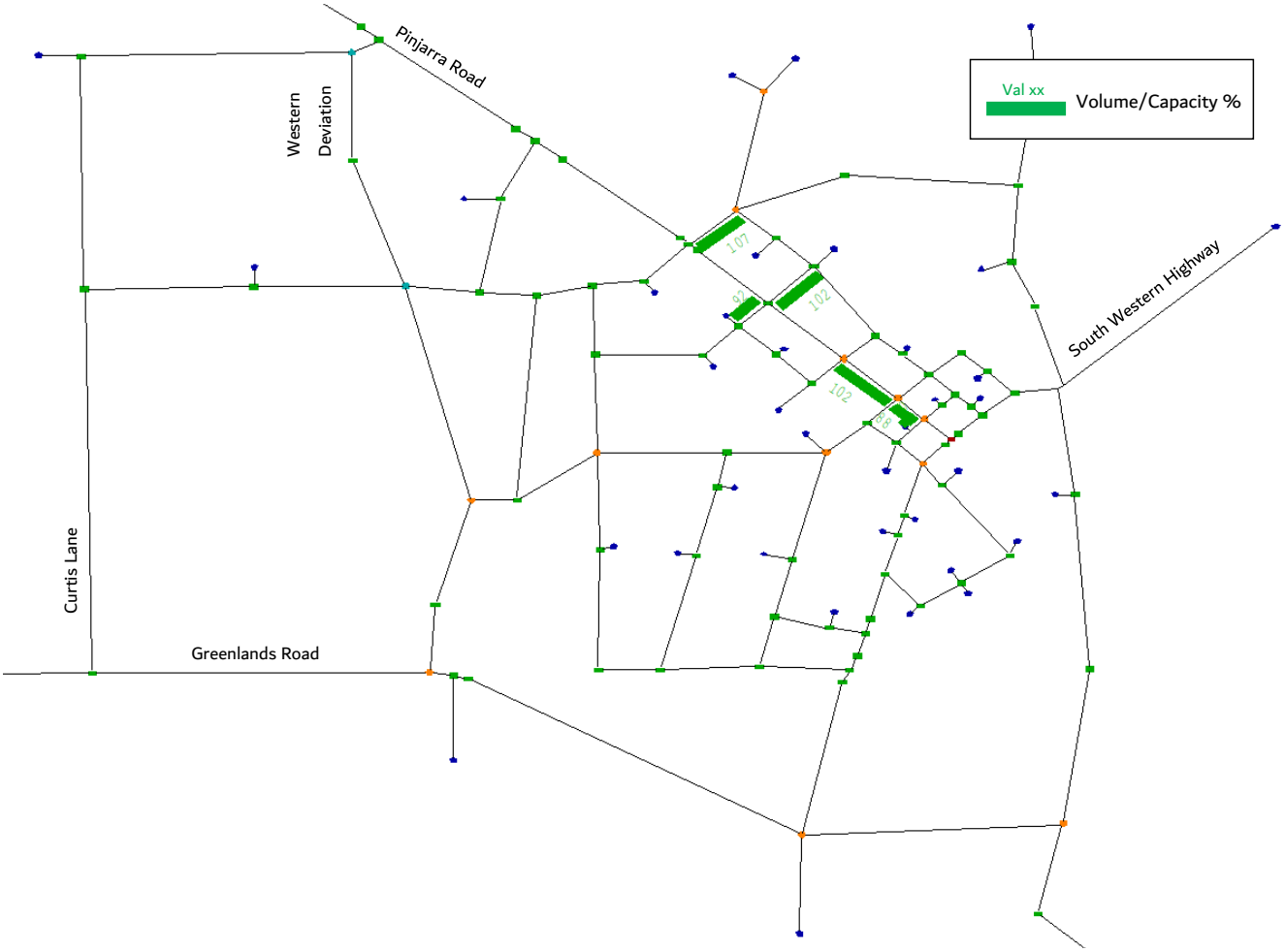

Figure 54 2041 AM Peak DSP Area V/C% Greater than 85%

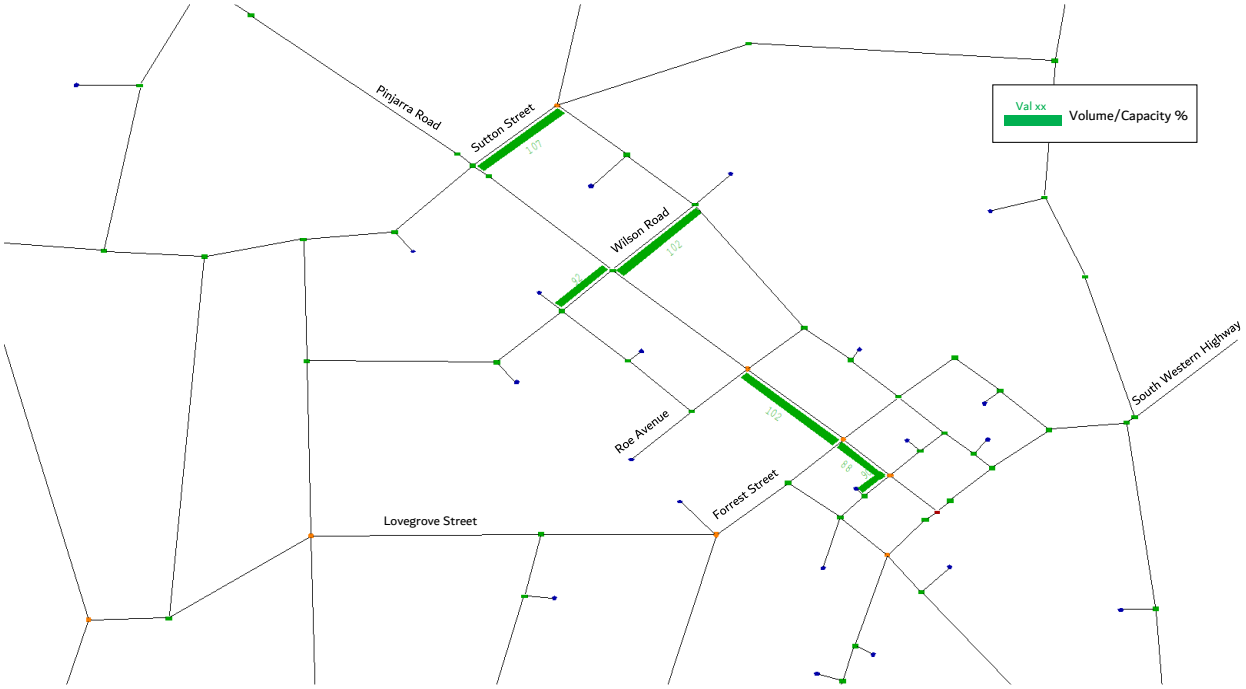

Figure 55 2041 AM Peak centre Structure Plans Area V/C% Greater than 85%

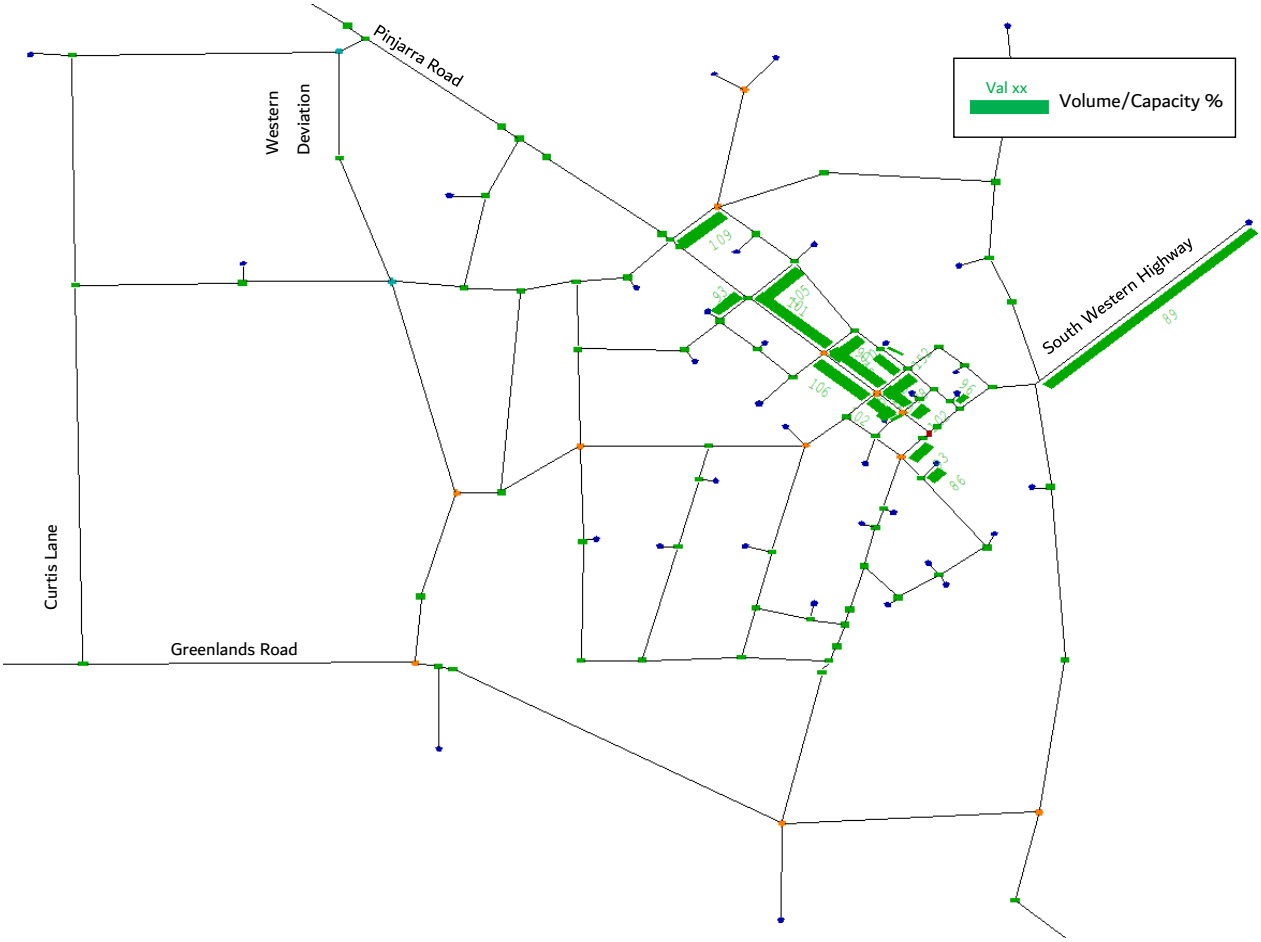

Figure 56 2041 PM Peak V/C% Greater than 85%

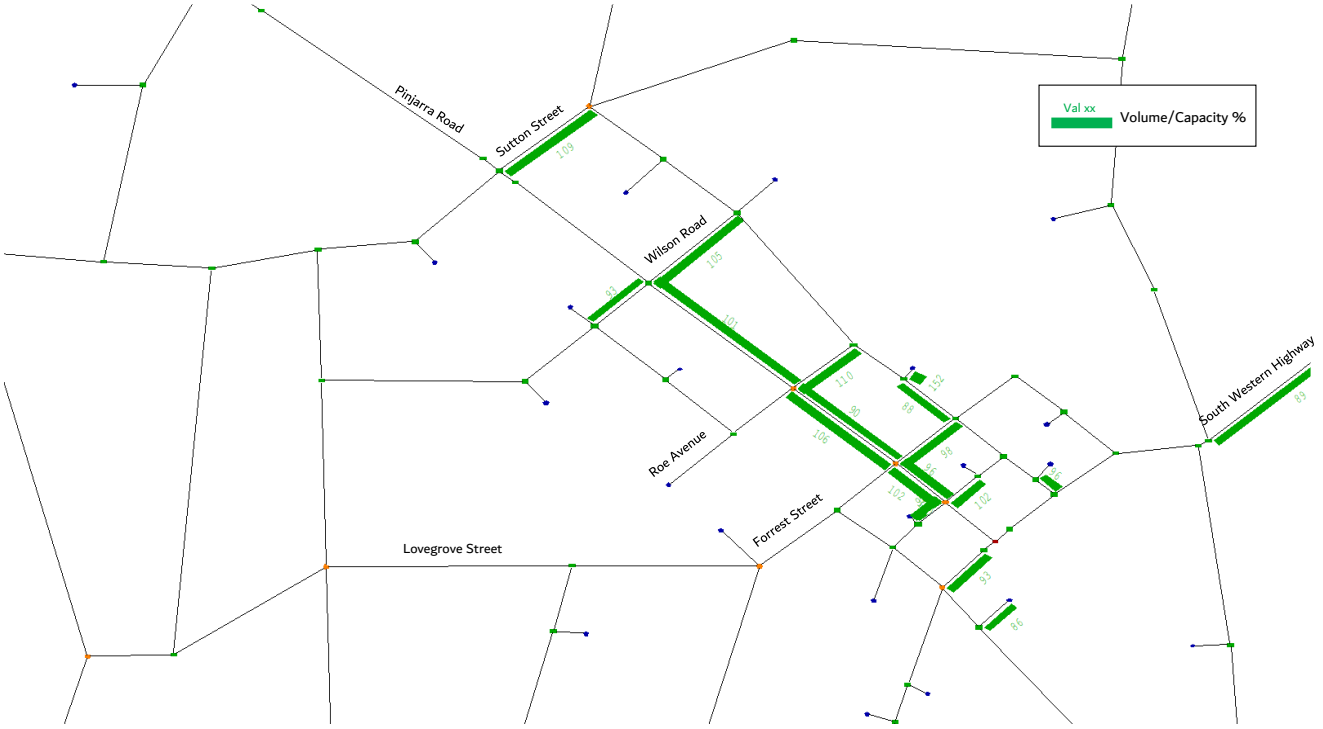

Figure 57 2041 PM Peak centre Structure Plans Area V/C% Greater than 85%

Higher V/C ratios are also modelled for the PM peak as a result of side road demands struggling to gain access to and from Pinjarra Road. However, there are also more issues arising along Pinjarra Road itself as a result of larger competing demands on several approaches to an intersection.

This is particularly noticeable at the Pinjarra Road intersections with Forrest Street and Murray Street where large right turning volumes on most approaches result in efficient operation of the roundabouts becoming difficult.

The southwest bound approach along South Western Highway towards Paterson Road is also shown to have a higher V/C ratio. This is directly attributed to the high right turning demands (approx. 200 vph) travelling north along Paterson Road that are required to give way to demands travelling northeast along South Western Highway.

There is currently no right turn pocket for this movement and results in blocking back and the higher V/C output. Both this intersection and the South Western Highway with Pinjarra – Williams Road intersection have been flagged for possible consideration.

7.5 Model Conclusions

Detailed trip generation and assignment have been undertaken for the forecast years 2031 and 2041. This has helped to start highlighting areas where the proposed land use and densification around Pinjarra might start to experience some operational issues, especially within the centre Structure Plans. Modelling has also been used to understand the potential volumes and use of the newly proposed infrastructure like the Western Deviation.

The landscape masterplan along Pinjarra Road has been included in the models and its reduction to a slow speed, low capacity route into the town centre has also been analysed. In 2041, the model has started to show signs of difficulty for the side road vehicle demands to join Pinjarra Road.

Following further refinement of the trip generation, the model could be used to further compare possible intersection control treatments and their effect on the distribution of trips across the wider network. The model could also inform discussions on land use development outcomes and support asset delivery and management programs of the SoM.

8. PARKING

8.1 Introduction

The primacy of the centre Structure Plans as a sub-regional centre with limited, to no public transport accessibility, the supply and management of parking within the activity centre precinct is anticipated to be a key transport issue for the precinct over the coming years. The management of both the supply and demand of parking will be necessary to ensure the right level of parking is available to meet local demand without negatively impacting on the function or design of the urban area. It will also require the Shire of Murray to take a more proactive role in implementing parking management to minimise impacts and reduction in amenity.

For on-site parking, there are new legislative requirements relating to payment-in-lieu should the Shire of Murray consider applying this within the Activity Centre. The completion of a Payment in Lieu of Parking Plan (PLPP) is a requirement after amendments to the Planning and Development (Local Planning Schemes) Regulations 2015 were formalised in July 2021. This is discussed in section 8.6.

8.2 Parking Management Principles

Provision of parking within the centre Structure Plans should be guided by a range of principles that both support development within the centre as well as manage travel demand into and out of Pinjarra. At present, parking within the Activity Centre is largely uncontrolled outside of time restrictions and there is no paid on-street parking. The Activity Centre Local Planning Policy sets a number of principles that could inform the Parking Supply and Management Plan, namely:

- To concentrate activities, particularly those that generate high numbers of trips within the traditional central portion of the town centre to reduce the need for multiple vehicle trips, activate secondary businesses adjacent to major attractors, activate the centre beyond traditional retail hours and create a critical mass which would encourage walkability and contribute to the town's sense of place.
- Provide pedestrian friendly streetscapes which maximise pedestrian and cycle access to and through the Town Centre and between key destinations including the Murray River foreshore, the Murray River Square and other key nodes of activity.
- Enhance vehicle connectivity, movement and parking through interconnected street networks, opportunities for freight and through traffic to bypass the town and on-street and reciprocal parking opportunities.

Issues relating to parking provision should also be expressly considered within a Parking Supply and Management Plan – as set out within the DoT Parking Guidelines for Activity Centres. As set out within the Guidelines:

"*Parking is perhaps the most effective transport system management tool currently available, and application of good parking supply and management principles will influence where, when and who uses the road network and encourage efficient use of available parking resources. Car parking is a link in a whole journey chain and not an end in itself. It is an enabler that allows and facilitates access for a large part of the population.*

Without an adequate supply of properly managed parking, our transport system's ability to meet the needs and desires of the people of the Perth and Peel Region is constrained. Parking is required because motor vehicles, in particular private motor vehicles, will remain for the foreseeable future the predominant means by which people access goods, services, opportunities and amenities. As all motor vehicle trips start and end with a parking event, parking supply and management is central to integrated transport and land use planning.

However, this must be balanced against the need to limit parking in such a way as to control demand for car travel effectively. In a rapidly growing city, it is not possible or desirable to meet all access demands by private vehicle. This will be particularly so at strategic metropolitan centres and specialised centres where there is a concentration of activity and a resulting focus of demand for access.".

The Guidelines also establish that setting principles for the evolution of parking management is a key step. These principles need to be formalised through the completion of a Parking Supply and Management Plan, with the following draft principles for the centre Structure Plans suggested as part of this assessment:

- The overall travel demand to and from the centre Structure Plans be considered through assessment of supply and demand based on the land uses proposed
- The assessment should set a maximum overall level of parking for the centre – both on-street and off-street
- The Shire of Murray should establish warrants for the introduction of parking management and the different types of parking management for on-street bays
- A hierarchy of users for on-street spaces should be determined, supporting those users that need parking the most (ACROD, services vehicles, buses etc)
- Encourage the efficient use of available parking resources and minimise land and capital investments in parking – including no Park and Ride facilities within the centre Structure Plans
- Maximise the efficient use of public car parking by ensuring a high level of turnover and availability
- Ensure car park design does not hinder safe and secure pedestrian, cyclist and public transport access (including access on foot from public transport)
- Support shared use arrangements between landowners to maximise the efficient use of on-site car parking
- Provide longer term parking for commuting and employees of businesses in dedicated locations at the periphery of the centre rather than within the public realm
- On-site podium parking should be adaptable for other land uses in the future.

8.3 Parking Demand Management

As an Activity Centre, the centre Structure Plans should be designed to maximise the efficiency of walking, cycling and public transport through the investment in public infrastructure and coordinated design of this infrastructure.

Given the residential intensification proposed within the inner areas of Pinjarra in the future, this is critical in not only greatly reducing demand for private vehicle usage for local trips, but also for reducing the demands on available parking. In order to encourage residents and visitors to reduce their demand for parking, the Shire of Murray should be proactive in discussing with residents through ongoing education campaigns about the opportunities and benefits associated with walking, cycling and using public transport.

Given the volume of demands that will come out of the centre Structure Plans area, that is critical. As stated already, there will still be substantial demands on parking given the location of Pinjarra and its role as a sub-regional Centre. As set out within the DoT Guidelines:

"*Parking demands are highly variable between users, destinations, trip purposes, and can vary across the day, week, season or years. Parking demand can be divided in the following categories:*

- *On-street or off-street*
- *Long or short stay (long stay is typically 4 hours or greater whilst short stay is for periods up to 4 hours)*
- *Public or private access controlled*
- *Service delivery*
- *Special purposes/needs*
- *Residential*
- *Special event*"

As part of the Parking Supply and Management Plan, demands for each of these categories (potentially excluding Special Event) should be examined and addressed.

The management of demands also is linked to on-street and off-street management, as set out in the DoT Guidelines. All of these issues below should be addressed in the Parking Supply and Management Plan.

"*Limiting the supply of parking in an activity centre is of less value if that parking is not managed to ensure the intended users can access that parking and the centre can operate efficiently. There are a number of key principles to guide planning for parking management in major activity centres, including:*

- *parking users should be categorised and prioritised accordingly. Typically, to promote activity and vitality in a centre, short term and casual users should have priority access over long term and regular users including commuters;*
- *management, especially for public parking, should be flexible to adapt to changing demands and ensuring prioritised users an get parking as required;*
- *local government should develop and maintain an effective parking supply, compliance and enforcement regime that applies not only to parking under its controls, both on and off-street, but also that supports effective parking management by private land owners and parking managers;*
- *in strategic metropolitan and specialised centres, common use and public parking facilities are the preferred supply option and should be at least 25 per cent of the off-street parking supply. Public parking is the most flexible form of parking supply as it allows. A wide range of users to access the same facility throughout the day. It also allows the management of parking to change over the years to better reflect needs;*
- *as much as is practicable, ownership and management of parking should not to be fragmented. The structure plan adopted for each centre will determine the permitted levels of fragmentation or subdivision, if any;*
- *on-street parking should to be managed to benefit short stay users and to promote economic or social wellbeing goals for the centre;*
- *parking pricing, together with time limitations, are essential tools for parking management; and*

- *parking and access management is to be integrated with all stages of the planning and approval process to outcomes are consistent, equitable and effective*".

8.4 Public Parking Supply Management

Existing parking within the precinct is substantial given the size of development and scale of land uses within Pinjarra Town Centre. This is illustrated within Figure 58, which examines the land area of existing at-grade on and off-street parking (but does not include the below grade parking available off Murray Street or parking along George Street) within the two key central blocks in Pinjarra. This showed that near 40% of all land space was allocated to parking. This level of land use allocation is not sustainable as the centre Structure Plans progress.

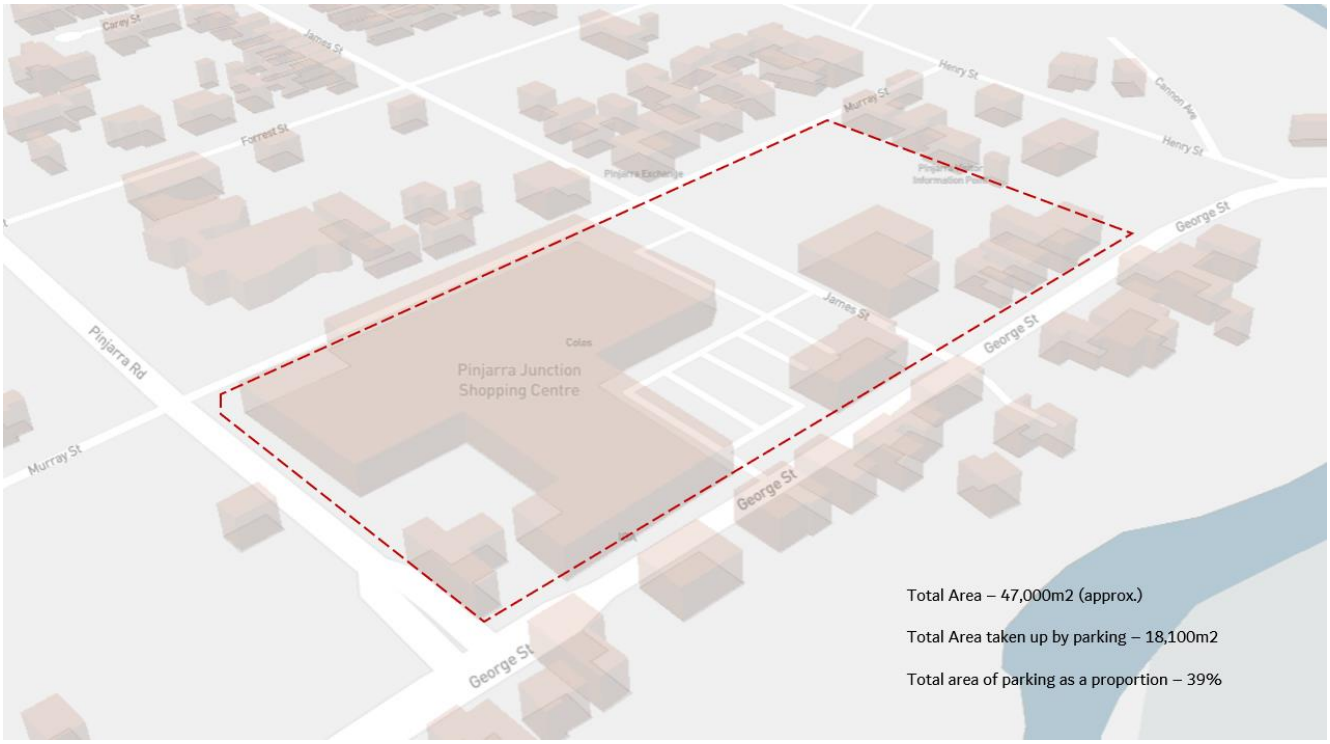

Figure 58 Illustration of public parking provision in Pinjarra Town Centre

Supply of parking, which would be examined in detail in the Parking Supply and Management Plan, should be focussed on:

- **Existing off-street carparking**: provided for existing retail facilities being off-street and time managed for the purposes of retail land uses.
- **On-Street Public Parking**: Upgrades to the road designs will include the creation of embayed parking on all streets to provide visitor parking opportunities for the adjacent sites and assist in slowing traffic through local streets. Concept designs for the upgraded road network have included additional on street parking bays within the precinct subject to detailed design of the street network and crossover considerations. Timed parking is required within the centre Structure Plans to manage supply so that it caters for the retail uses in the centre.
- **Land Uses**: the Shire of Murray should set contemporary parking supply rates within Design Guidelines for the centre Structure Plans and LPS No. 4 that set maximums for all land uses.
- **Residential Parking**: should be set using SPP7.3 and provisions within.

8.5 Off-Street Parking Requirements

The Shire's Local Planning Scheme No. 4 and Pinjarra Activity Centre Local Planning Policy provide ratios for the minimum on-site car parking requirements for each of the listed uses within the Scheme.

In an Activity Centre precinct it is considered appropriate to reduce the supply of private parking to maximise the availability of land for development purposes and encourage residents and visitors to utilise more sustainable transport options of cycling, walking and using public transportation. This is particularly important for Pinjarra, where high levels of redevelopment within the central area of the Town are forecast by the Shire of Murray.

The existing Pinjarra Activity Centre Local Planning Policy sets out the following principles for the Core Precinct (Table 9) and the Mixed Use Precinct (Table 10). In aligning with these principles, on-site parking should be required to comply with a maximum ratio dependent on the proposed land use(s) when the rates are established through the Parking Supply and Management Plan.

Table 9 Pinjarra Activity Centre Local Planning Policy principles - Core Precinct

Principle	Acceptable Outcome
The amount of car parking for town centre residents shall reflect a town centre lifestyle with proximity to services and employment.	Maximum car-parking provision of 2 bays per dwelling unless dwelling is less than 80 m^2, wherein a maximum of 1 bay per dwelling applies. No on-site parking for residential visitors. Cash in lieu of onsite parking is encouraged where opportunities for consolidated car parking areas are available.
The amount of car parking for town centre residents shall reflect a town centre lifestyle with proximity to services and employment.	Maximum car-parking provision of 2 bays per dwelling unless dwelling is less than 80 m^2, wherein a maximum of 1 bay per dwelling applies. No on-site parking for residential visitors. Cash in lieu of onsite parking is encouraged where opportunities for consolidated car parking areas are available.
The amount of car parking for retail and commercial uses shall be commensurate with an urban centre rather than a suburban shopping centre	Non-residential uses at 3 bays per 100 m^2. Cash in lieu of onsite parking is encouraged where opportunities for consolidated car parking areas are available.

Table 10 Pinjarra Activity Centre Local Planning Policy principles - Mixed Use Precinct

Principle	Acceptable Outcome
The amount of car parking for residents shall reflect an inner suburban lifestyle with proximity to services and employment.	Car-parking is consistent with deemed to comply provisions of R-Codes. No on-site parking for residential visitors. Provision of on-street parking bays is encouraged where safe to do so. Cash in lieu where justified to the satisfaction of the decision maker. Reciprocal parking between residential and commercial visitors is encouraged in the case of mixed-use buildings.
The amount of car parking for retail and commercial uses shall be commensurate with an urban centre rather than a suburban shopping centre	Non-residential uses at 3 bays per 100 m^2. Cash-in-lieu or reciprocal parking arrangements may be supported where justified to the satisfaction of the decision maker.
Commercial visitor parking shall be located where it is convenient and available for reciprocal use.	Commercial visitor parking located with direct pedestrian access to the main building entrance(s).

The adoption of the State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments provides a basis from which the future provision of parking within residential development must be applied in Pinjarra and should usurp the Local Planning Policy. Within the guidelines, there are performance based outcomes that supplement the acceptable outcomes that the Shire of Murray can use in judging the level of parking per site.

Simplification of maximum ratios for other land uses should be simplified based on more detailed analysis. An example simplification of parking requirements is shown within Table 11 which improves legibility and supports other outcomes being sought within the centre Structure Plans.

There are no End of Trip (EoT) provisions in the existing Local Planning Policy, which must be a requirement. This would establish a level of bicycle parking, showers and lockers required to support trips made to or from non-residential land uses by foot, bicycle or mobility device.

Table 11 Example minimum and maximum parking and minimum bicycle parking requirements for land use

Land Use Category	Minimum Car Parking Bays	Maximum Car Parking Bays	Minimum Bicycle Parking Racks
Residential Uses	Studio and 1 bed - 0.75 bay per dwelling / unit 2 Bed and above – 1 bay per dwelling Visitors - 1 bay per four dwellings up to 12 dwellings, 1 bay per eight dwellings for the 13th dwelling and above	Studio and 1 bed – 1.5 bay per dwelling / unit 2 Bed and above – 2 bays per dwelling subject to design outcomes Visitors - 1 bay per four dwellings up to 12 dwellings, 1 bay per eight dwellings for the 13th dwelling and above	1 bicycle parking rack per dwelling/ unit 0.25 visitor bicycle parking rack per dwelling/unit
Commercial and Retail Uses	3 bays per 100m^2 of gross floor area	3 bays per 100m^2 of gross floor area	1 bay per 100m^2 of gross floor area for staff, min of one female and male showers located in separate changing rooms for first 10 non-residential racks with one per area for each additional 20 racks. One full sized locker per rack minimum.
Civic, Community or other uses	To be determined by the local government based on site specific parking management plan.		

8.6 Payment In Lieu

Regulations relating to how payment in lieu of parking (cash-in-lieu) is calculated and applied have been recently changed through work associated with the Planning Reform agenda. As set out within DPLH fact sheets on this element of planning reform:

"*The Action Plan for Planning Reform (Action Plan) called for a consistent policy with practical criteria, basic benchmarks and fair methodology for considering the use of payment in lieu of car parking in established town centres, retail/café corridors and other commercial and mixed-use centres.*

A key component in delivering both the Action Plan and the tailored COVID-19 planning reform package to support the State's economic recovery from the pandemic involves amendments to the Planning and Development (Local Planning Schemes) Regulations 2015 (Regulations).

The first tranche of gazetted amendments to the Regulations included a new Part 9A for car parking provisions, which is to become operational on 1 July 2021. One of its key elements is standardising how local governments implement payment in lieu, to better create certainty and transparency for all parties in the assessment of development applications throughout the Perth metropolitan and Peel region Scheme areas.

In preparing for the operational date, the Department of Planning, Lands and Heritage (Department) and its consultants have engaged extensively with key stakeholders to inform the preparation of a draft Payment in Lieu of Car Parking Plan template, associated explanatory guidance and Methods of Calculation.".

Local Government must develop a Payment in Lieu of Parking Plan (PLPP) based on the requirements set out by the WAPC in a specific template and as required within the Manner and Form document. The Manner and Form document covers the following key items that must be addressed:

- General introduction and purpose (including dates of operation, objectives etc.)
- Terms
- Parking plan area and application
- Estimate of costs for payment in lieu
- Purposes for using funds
- Operation
- Financial administration

The PLPP must be developed by the Shire of Murray within two years of the regulations coming into effect, as set out within the Explanatory Guidelines:

"*Clause 77G(3) and (4) provides transitional arrangements through interim parking provisions to provide a two year period for a local government to put in place Plan(s) where interim parking provisions were in place immediately before the day the Planning Regulations Amendment Regulations 2020 Part 2 Division 3 came into operation.*

However, it is important to note that during the transition period a local government is still required to apply the method(s) used to calculate the Reasonable Estimate of Costs for Payment in Lieu of Parking approved by the WAPC and published in the Gazette, as provided in clause 77H(4).

Local governments are strongly encouraged to commence the development of Plans in the Manner and Form prescribed in the Regulations at the earliest opportunity during the two-year transition period. A local government will be unable to lawfully impose payment in-lieu of parking conditions on a development approval under its local planning scheme after the interim parking provisions expire on 1 July 2023 if there is no adopted Plan in place.".

Based on the changes in regulations, it is recommended that the Shire of Murray develop a PLPP over the entirety of the centre Structure Plans.

9. CONCLUSIONS

9.1 Introduction

This Movement Network Plan has been completed by Flyt for the centre Structure Plans for the Shire of Murray. Input for the plan has been provided from a range of organisations and stakeholders associated with the centre Structure Plans. The centre Structure Plans cover the entirety of the existing Pinjarra townsite, as well as areas to the west and north that have been highlighted through planning processes which would be subject to development in the future.

The assessment within the Movement Network Plan is necessarily high level given the timeframe involved in planning strategically for a substantial area like that being considered in the centre Structure Plans.

Most inputs into the plan have been provided by the Shire of Murray, either through information provided specifically for the plan or from reports and documents already produced for or by the Shire. In addition, forecast analysis has been completed using a range of inputs including business case assessments for various projects, forecast information from community.id or from mode specific sources such as 2031 and 2041 ROM24 plots provided by Main Roads WA.

9.2 Strategic Planning Actions for Transport Network

Information relating to the internal network within the centre Structure Plans area reflects the intent of previous strategic planning work alongside recommendations for adjustments to elements for all modes. These recommendations are set out in the following summary points.

- The Shire of Murray, alongside DoT. implement the secondary and primary routes set out in the LTCN in full
- The Shire of Murray implement the proposed cycling network within the centre Structure Plans
- The proposed form of the local network within the centre Structure Plans be used as a basis for developing strategic connections through and to Pinjarra, as well as formulating strategic decisions around land development outcomes
- Upon the completion of the Western Deviation project, progress the declassification of Pinjarra Road from Primary Distributor to District Distributor between the intersection of George Street and the Western Deviation. This would require changes to the PRS and LPS, as well as the Shire of Murray having responsibility for the road
- Upon declassification of Pinjarra Road, complete an application to Main Roads WA Heavy Vehicle Services to progress with the removal of a RAV network classification between the Western Deviation and George Street
- Upon the completion of the Eastern Deviation project (Stage 1), progress the declassification of South Western Highway, McLarty Road and George Street from Primary Distributor to District Distributor between the Eastern Deviation and Greenlands Road. The road would transfer control to the Shire of Murray and RAV network classification of South Western Highway between Greenlands Road and the Pinjarra-Williams Road would be revoked
- Work with Main Roads WA to ensure agreement that both the Western Deviation and Eastern Deviation are classified as Primary Distributors and are under the care and control of Main Roads WA

- Shire of Murray progress with classifying Paterson Road from the intersection of South Western Highway as a District Distributor, rather than a Local Distributor to recognise the connection north to Nambeelup and potential future increase in traffic volumes
- As planning and delivery of the local road network progress, classify new connections or extensions of Curtis Lane, Moores Road and Lovegrove Street as Local Distributors to reflect spacing in the network and the likelihood that these connections will all form the role that is required of a Local Distributor, linking the higher-level Distributor Roads to land uses
- Shire of Murray to consider supporting RAV classifications of other road connections into the Pinjarra Industrial Estate on an as-needed basis
- New road reserve widths for the network to be based on centre Structure Plans but be subject to detailed design, relevant standards and the use of road reserves for cycling and public transport infrastructure. Any street network cross sections and designs will need to consider the new draft Design WA documents which provide guidance on Activity Centres and Precinct Planning. Outlined in the SPP Draft 4.2 Activity Centres and the "Movement" section of the Precinct Design Guidelines.
- The staged implementation of intersection treatments set out in the centre Structure Plans be reviewed and assessed on an as-needed basis to conform to relevant standards and procedures
- The Shire of Murray review the intent of Pinjarra Road Streetscape Landscape Concept Masterplan for the movement network including parking, bus infrastructure and cycling infrastructure
- The Shire of Murray engage with Transperth on the potential for longer term planning for a more appropriate bus network within and around Pinjarra
- During the course of planning for implementation and delivery of the street network within the centre Structure Plans, design road network infrastructure where bus routes would be a feature to accommodate bus stop infrastructure as per the PTA Design Guidelines manual
- The Shire of Murray instigate examination of the future strategic public transport network into and through Pinjarra alongside PTA, DoT and DPLH based on the extension of the urban rail network as a means of activating potential for the corridor between Mandurah and Pinjarra
- The Shire of Murray examine potential for longer term reconfiguration of Freeway interchange access with Main Roads WA
- On the basis of the DoT Activity Centre Guidelines, develop a Parking Supply and Management Plan for the centre Structure Plans
- As required by changes to the Planning and Development (Local Planning Schemes) Regulations 2015, the Shire of Murray complete a Payment in Lieu of Parking Plan for the centre Structure Plans
- The Shire of Murray establish on-street parking policies and warrants to support staged introduction of appropriate parking management in Pinjarra
- As a result of more contemporary assessment of requirements relating to residential development, the Shire of Murray revise residential parking requirements within Local Planning Policy to reflect the outcomes in SPP 7.3
- The Shire of Murray include appropriate EoT provisions within the Local Planning Policy to establish minimum requirements for non-residential land uses.

APPENDIX 1

Key scoring rules >

Healthy Streets Check	Scoring System					Enter score here		Notes
	3	2	1	0	More info on each question	Existing layout	Proposed layout	Please supplement your answers with detailed notes where possible
1 Total volume of two way motorised traffic	There are fewer than 500 vehicles per hour at peak.	There are 500 to 1000 vehicles per hour at peak.	There are more than 1000 vehicles per hour at peak, where people cycling are separated from motorised traffic.	There are more than 1000 vehicles per hour at peak, where people cycling are mixed with motorised traffic.	ⓘ	0	1	The new footpath will provide adequate space. However the Masterplan / PRSACP does not take into account the LTCN primary route along Pinjarra Road.
2 Interaction between large vehicles and people cycling	No large vehicles are using the street, or cycle traffic is separated from motorised traffic.	The proportion of large vehicles is less than 2% of motorised traffic, 7am to 7pm.	The proportion of large vehicles is 2% to 5% of motorised traffic, 7am to 7pm. or The proportion of large vehicles is greater than 5% of motorised traffic, 7am to 7pm, and people are cycling either: - in a nearside general traffic lane or bus lane at least 4.5m wide, or - in a cycle lane where the combined width of the cycle lane and the next general traffic lane is at least 4.5m.	The proportion of large vehicles is greater than 5% of motorised traffic, 7am to 7pm, and people are cycling either: - in a nearside general traffic lane or bus lane less than 4.5m wide, or - in a cycle lane where the combined width of the cycle lane and the next general traffic lane is less than 4.5m.	ⓘ	0	2	The Pinjarra Deviation will remove most HV's from Pinjarra Road
3 Speed of motorised traffic	85th percentile speed is less than 20mph. or Existing 85th percentile speed is 20 to 25 mph, but there are some proposals to reduce speed further. or Existing 85th percentile speed is over 25 mph but a complete redesign of the street environment should reduce this to below 20mph.	85th percentile speed is 20 to 25mph. or Existing 85th percentile speed is 25 to 30 mph, but there are some proposals to reduce speed further.	85th percentile speed is 25 to 30mph. or Existing 85th percentile speed is greater than 30 mph, but there are some proposals to reduce speed further.	85th percentile speed is greater than 30mph. or Existing 85th percentile speed is greater than 30 mph, and there are no proposals to reduce this speed.	ⓘ	3	3	
4 Traffic noise based on peak hour motorised traffic volumes	There are fewer than 55 vehicles per hour (c. <58 DB).	There are 55 to 450 vehicles per hour (c. 58-70 DB).	There are more than 450 vehicles per hour (c. >70 DB).	_	ⓘ	1	1	
5 Noise from large vehicles	The proportion of large vehicles is less than 5% (c. +0 to +3DB).	The proportion of large vehicles is 5 to 10% (c. +3 to +5 DB).	The proportion of large vehicles is greater than 10% (c. +5 DB and over).	_	ⓘ	2	3	Reduction in HV's will reduce noise

6	**NO2 concentration** (from London Atmospheric Emission Inventory)	**If assessing existing:** The NO2 concentration is less than 32µg/m3. **If assessing proposal:** The existing NO2 concentration is less than 32µg/m3 **or** the existing concentration is 32 to 40µg/m3 with local traffic volume reduction measures proposed.	**If assessing existing:** The NO2 concentration is 32 to 40µg/m3. **If assessing proposal:** The existing NO2 concentration is 32 to 40µg/m3 with no proposal to reduce local traffic volume **or** the existing NO2 concentration is greater than 40µg/m3 with local traffic volume reduction measures proposed.	**If assessing existing:** The NO2 concentration is greater than 40µg/m3 (legal limit value). **If assessing proposal:** The existing NO2 concentration is greater than 40µg/m3 with no proposal to reduce local traffic volume.	–	ⓘ	2	3	Reduction in HV's along this route will improve the air quality
7	**Reducing private car use**	There is no through-movement for motorised traffic, with access limited to local residents, deliveries and public service vehicles.	There are some time or movement restrictions for motorised traffic.	There are no access restrictions for motorised traffic.	–	ⓘ	1	1	No changes to permeability and access for vehicles
8	**Ease of crossing side roads for people walking**	Side roads are closed to motor traffic. **or** Side roads are one-way out for motor vehicles and have features to encourage drivers to turn cautiously.	Side roads are two-way or one-way in for motor vehicles, and have features to encourage drivers to turn cautiously.	Side roads have dropped kerbs only.	**Side roads have no dropped kerbs.**	ⓘ	1	0	Side roads have dropped kerbs, but the proposed roundabout makes it easier for drivers to miss pedestrians crossing at the side road. Drivers will now look right to turn left off Pinjarra Road where they not not see pedestrians. While the zero score does not accord with the definition, it demonstrates that the situation has worsened for pedestrians from the new design.
9	**Mid-link crossings, to meet pedestrian desire lines**	All main pedestrian desire lines are provided for with crossings.	Only some of the main pedestrian desire lines are provided for with crossings.	No main pedestrian desire lines are provided for with pedestrian crossings.	–	ⓘ	1	2	2 pedestrian crossings are provided. One connects the existing shopping centre which accords with pedestrian desire lines.
10	**Type and suitability of pedestrian crossings away from junctions**	Crossing is uncontrolled, with conflicting traffic volume less than 200 vehicles per hour. **or** A Zebra or parallel crossing is provided. **or** Crossing is signalised so that people crossing the main carriageway have priority, while traffic on the main carriageway has on-demand green.	Crossing is uncontrolled, with conflicting traffic volume between 200 and 1000 vehicles per hour. **or** Crossing is signalised and straight-across where the distance to cross is less than 15m or greater than 15m in a 20mph speed limit. **or** Crossing is signalised and staggered where the distance to cross is greater than 15m in a 30mph+ speed limit.	Crossing is uncontrolled, with conflicting traffic volume greater than 1000 vehicles per hour. **or** Crossing is signalised and straight-across where the distance to cross is greater than 15m in a 30mph+ speed limit.	–	ⓘ	1	1	No protected or controlled pedestrian crossings.
11	**Technology to optimise efficiency of movement** (pedestrians, cyclists, buses and general motor traffic)	All appropriate detection and optimisation technology has been applied to traffic signals.	Some detection and optimisation technology has been applied to traffic signals.	No detection and optimisation technology applied to traffic signals.	–	ⓘ	1	1	

12	Additional features to support people using controlled crossings	Controlled crossings have many additional features to enhance their quality (please see scoring guidance).	Controlled crossings have some additional features to enhance their quality (please see scoring guidance).	Controlled crossings have no additional features to enhance their quality (please see scoring guidance). or There is no step-free access at the crossing point and/or there is no physical delineation between the footway and carriageway away from crossing points.	–	ⓘ	1	1	
13	Width of clear continuous walking space	There is 2m or more clear width for walking in quiet locations (flows of <600 pedestrians an hour). or There is 2.5m or more clear width for walking in moderately busy locations (flows of 600-1200 pedestrians an hour). or There is 3m or more in busy locations (flows of >1200 pedestrians an hour).	There is 2m to 2.5m clear width for walking in moderately busy locations (flows of 600-1200 pedestrians an hour). or There is 2.5m to 3m in busy locations (flows of >1200 pedestrians an hour).	There is 1.5m to 2m clear width for walking in quiet and moderate locations (flows of <1200 pedestrians an hour). or There is 2m to 2.5m clear width for walking in busy locations (flows of >1200 pedestrians an hour).	There is less than 1.5m clear width for walking.	ⓘ	0	1	While not a requirement in this version, note that the pedestrian paths on the roundabout signifcanlty deviate from desire lines.
14	Sharing of footway with people cycling	No part of the footway is designated as shared use for walking and cycling.	Part or all of a footway wider than 3m with fewer than 200 pedestrians per hour is designated as shared use.	Part or all of a footway used by more than 200 pedestrians per hour is designated as shared use. or Part or all of a footway less than 3m wide is designated as shared use.	–	ⓘ	1	2	no onstreet cycle lanes. The footpath is 4m wide and can accommodate both cyclists and pedestrians. Unclear if there are obstructions or if the path narrows.
15	Collision risk between people cycling and turning motor vehicles	Side roads are closed to motorised traffic, or turning movements by motor vehicles are minimised. and At signal-controlled junctions, all conflicting movements between cycle traffic and turning motor traffic are separated.	Some measures are in place to reduce turning movements by motor vehicles at priority junctions. and At signal-controlled junctions, cycle movements are not separated and fewer than 5% of turning vehicle movements are made by larger vehicles but mitigation measures are in place.	There are no restrictions on turning movements by motor vehicles at side roads and other uncontrolled accesses. and At signal-controlled junctions, cycle movements are not separated and more than 5% of turning vehicle movements are made by larger vehicles but mitigation measures are in place.	At signal-controlled junctions, cycle movements are not separated, more than 5% of turning vehicle movements are made by larger vehicles and there are no mitigation measures in place.	ⓘ	0	1	The Deviation will devrease the number of heavy vehicles along Pinjarra Road.

16	Effective width for cycling	Where cycles are separated from other traffic, the width of the lane or track is 2.2m or more (one-way) or 3.5m or more (two-way). Otherwise: Width of the nearside general traffic lane (where there is no cycle lane) or width of the cycle lane plus adjacent general traffic lane is 4.5m or more.	Where cycles are separated from other traffic, the width of the lane or track is 1.5m to 2.2m (one-way) or 2.5m to 3.5m (two-way). Otherwise: Width of the nearside general traffic lane (where there is no cycle lane) or width of the cycle lane plus adjacent general traffic lane is between 4m and 4.5m.	Where cycles are separated from other traffic, the width of the lane or track is less than 1.5m (one-way) or less than 2.5m (two-way). Otherwise: Width of the nearside general traffic lane (where there is no cycle lane) or width of the cycle lane plus adjacent general traffic lane is less than 3.2m.	Width of the nearside general traffic lane (where there is no cycle lane) or width of the cycle lane plus adjacent general traffic lane is between 3.2m and 3.9m.	ⓘ	0	3	The 4m shared path will accommodate cyclists and pedestrians.
17	Impact of kerbside activity on cycling	There is no kerbside activity. or People cycling are physically separated from parking or loading facilities.	There is occasional kerbside activity, and people cycling can keep at least 1.0m clearance to vehicles parked or loading.	There is frequent or continuous kerbside activity, and people cycling can keep at least 1.0m clearance to vehicles parked or loading.	People cycling cannot maintain at least 1.0m clearance from vehicles parked or loading.	ⓘ	0	2	The 4m shared path will accommodate cyclists and pedestrians.
18	Quality of carriageway surface	The carriageway surface is even and smooth, with sufficient skid resistance. or There are defects but resurfacing of the whole carriageway is proposed.	There are a few minor defects in the carriageway surface (please see scoring guidance).	There are many minor defects in the carriageway surface (please see scoring guidance).	There are major defects in the carriageway surface (please see scoring guidance).	ⓘ	3	3	
19	Quality of footway surface	There is an even and level surface for walking on footways. or There are defects but resurfacing of the whole footway is proposed.	There are a few minor defects in the footway surface (please see scoring guidance).	There are many minor defects in the footway surface (please see scoring guidance).	There are major defects in the footway surface (please see scoring guidance).	ⓘ	3	3	
20	Surveillance of public spaces	There is constant surveillance – because mixed use buildings overlook the street or space, or because there are many people using the space or walking through.	There is intermittent surveillance – because surrounding buildings are single-use or do not completely overlook the street, or because there are few people using the space or walking through.	There is poor surveillance – because few buildings overlook the street or space, there is little activity.	–	ⓘ	1	1	While land use intensification along Pinjarra Road is proposed, as this is left to private investment the timeframes cannot be guaranteed.
21	Lighting	Street lighting meets the British Standard 5489:2003 and the European Standard CEN/TR 13201. and Lighting of off-carriageway facilities for walking or cycling exceeds the same standards.	Street lighting meets the British Standard 5489:2003 and the European Standard CEN/TR 13201 but lighting of off-carriageway spaces for walking or cycling does not.	Street lighting does not meet the British Standard 5489:2003 and the European Standard CEN/TR 13201.	–	ⓘ	1	1	

22	Provision of cycle parking	Cycle parking exceeds existing demand and is accessible by all.	Cycle parking meets existing demand and is accessible by all.	Cycle parking does not meet existing demand. or Cycle parking meets existing demand but is not accessible by all.	–	ⓘ	1	1	
23	Street trees	If assessing existing: There are multiple trees, with canopies spaced less than 15m apart on average. If assessing proposal: All existing trees are to be retained and the street is already tree-lined with less than 15m between tree canopies. or All existing trees are to be retained, with planting of new trees designed to reduce the average canopy spacing to less than 15m.	If assessing existing: There are multiple trees, with canopies spaced more than 15m apart on average. If assessing proposal: Not all existing trees are to be retained, however new planting will ensure the overall number of trees is maintained or increased. or All existing trees are to be retained, however the canopy spacing will remain more than 15m on average.	If assessing existing: There are no trees, or only one tree. If assessing proposal: There are no existing or proposed trees. or The number of trees has been reduced.	–	ⓘ	1	3	Proposed multiple street trees laong corridor on both sides
24	Planting at footway-level (excluding trees)	If assessing existing: There is substantial planting in good condition designed to create or improve social space and/or act as a connection between other green spaces (eg pocket park, rain garden, community garden area). If assessing proposal: Existing greenery is to be enhanced with integrated SuDS features or new planting or new areas of greenery are proposed.	If assessing existing: There is some planting, eg shrubs, verges, hedges, ornamental flower beds, or adaptation for some animal species. If assessing proposal: Existing standalone greenery is to be retained.	If assessing existing: There is no planting, or existing planting is in a poor condition. If assessing proposal: No green infrastructure is proposed, or the size of existing greenery is to be reduced.	–	ⓘ	2	2	Existing greenery is to be retianed.
25	Walking distance between resting points (benches and other informal seating)	There is less than 50m between resting points.	There is between 50m and 150m between resting points.	There is more than 150m between resting points.	–	ⓘ	1	1	Unable to determine if there's additional seating
26	Walking distance between sheltered areas protecting from rain. Including fixed awning or other shelter provided by buildings/infrastructure	There is less than 50m between sheltered areas.	There is between 50m and 150m between sheltered areas.	There is more than 150m between sheltered areas.	–	ⓘ	1	1	Urban built form unable to be determined. While the ACP "Development Scale and Intensity" Street Interface Principle requires "buidlings to provide shade and shelter to the adjacent footpath", many new development are set back from the footpath and some sections are more than 150m apart
				Are there any bus services running on this street? (Y/N) If not, do not complete metrics 27-28			Y	Y	**An answer is required here in order to generate results**
27	Factors influencing bus passenger journey time	There are positive influences on bus journey time, e.g. bus lanes, and/or exemptions for buses from movement bans for general traffic.	Buses are mixed with traffic but not significantly delayed.	There are negative influences on bus journey time, e.g. unclear markings, narrow lane width, parking/loading issues, short cage length, mixing with congested traffic.	–	ⓘ	2	2	

28	Bus stop accessibility	Bus stop is wheelchair accessible, there is clear space for boarding and alighting and there is a clearway in place at the bus stop.	Bus stop is wheelchair accessible but either there is limited clear space around the bus stop for boarding and alighting or, for borough roads, there is no clearway in place.	Bus stop is not wheelchair accessible, ie the kerb height is less than 100mm.	–	ⓘ	3	3	
				Are there any rail/underground/bus stations accessible from this street? (Y/N) If not, do not complete metrics 29-31			**N**	**N**	**An answer is required here in order to generate results**
29	Bus stop connectivity with other public transport services	The bus stop is within sight of another service – less than 50m away.	The bus stop is between 50m and 150m away from another service.	The bus stop is more than 150m away from another service.	–	ⓘ			
30	Street-to-station step-free access	All entry points to the station are step-free.	The main entry point to the station is not step-free but step-free alternatives are provided.	There is no step-free access to the station.	–	ⓘ			
31	Support for interchange between cycling and underground/rail	Secure cycle parking is provided close to station access points, and exceeding existing demand.	Cycle parking is available close to station access points that meets existing demand.	There is insufficient cycle parking to meet demand, or cycle parking is poorly located for station access points.	–	ⓘ			
					If 'zero' scores (known road danger issues) remain, please explain why opposite:		**6**	**1**	*Insert design response for 'zero' scores here*