City of Rockingham

Baldivis Roads Needs Study
Traffic and Infrastructure Report

January 2021

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Contents

Introduction

Baldivis is a residential suburb located within the City of Rockingham, approximately 46km south of the Perth Central Business District (CBD). The Census completed in 2016 suggests that there were 31,653 people living in Baldivis. The number of people living in Baldivis is forecasted to grow to 68,543 (i.e. more than double) in the year 2036. In order to accommodate for the population growth, careful considerations need to be given for the adequacy of the existing road network and what upgrades (if required) would be necessary to cater for the expected increase in traffic demand.

The main purpose of this report is as summarised below:

- Determine the road hierarchy for the major roads servicing the Baldivis area (Safety Bay Road, Nairn Drive, Kerosene Lane, Baldivis Road, Fifty Road, Sixty Eight Road, Eighty Road, Kulija Road and Mandurah Road);
- Provide recommendations on road cross-sections;
- Provide recommendations on future intersection controls;
- Assess the needs for pedestrian, cyclist and public transport; and
- Assess other alternatives to reduce traffic volumes.

The assessment undertaken as part of this report will take into account previously prepared traffic assessments and the City's vision on how the road network would function in the future.

Strategic Objectives

This Baldivis Needs Study addresses the Community's vision for the future and specifically the following Aspiration and Strategic Objective contained in the Strategic Community Plan (2019-2029):

Aspiration 3 *Plan for Future Generations*

Strategic Objective Responsive planning and control of land use:

Plan and control the use of land to meet the needs of the growing population, with consideration of future generations

1. Existing Planning Framework

1.1 Metropolitan Region Scheme (MRS) Road Reservations

The MRS identifies the following road reserve classifications:

- Primary Regional Road - Kwinana Freeway and Ennis Avenue
- Other Regional Road - Mandurah Road, Nairn Drive, Kulija Road, Safety Bay Road, Eighty Road, Stakehill Road and Karnup Road.

Refer to Figure 1 showing the MRS plan for the Baldivis area. Please note that broken lines within the figure are future roads.

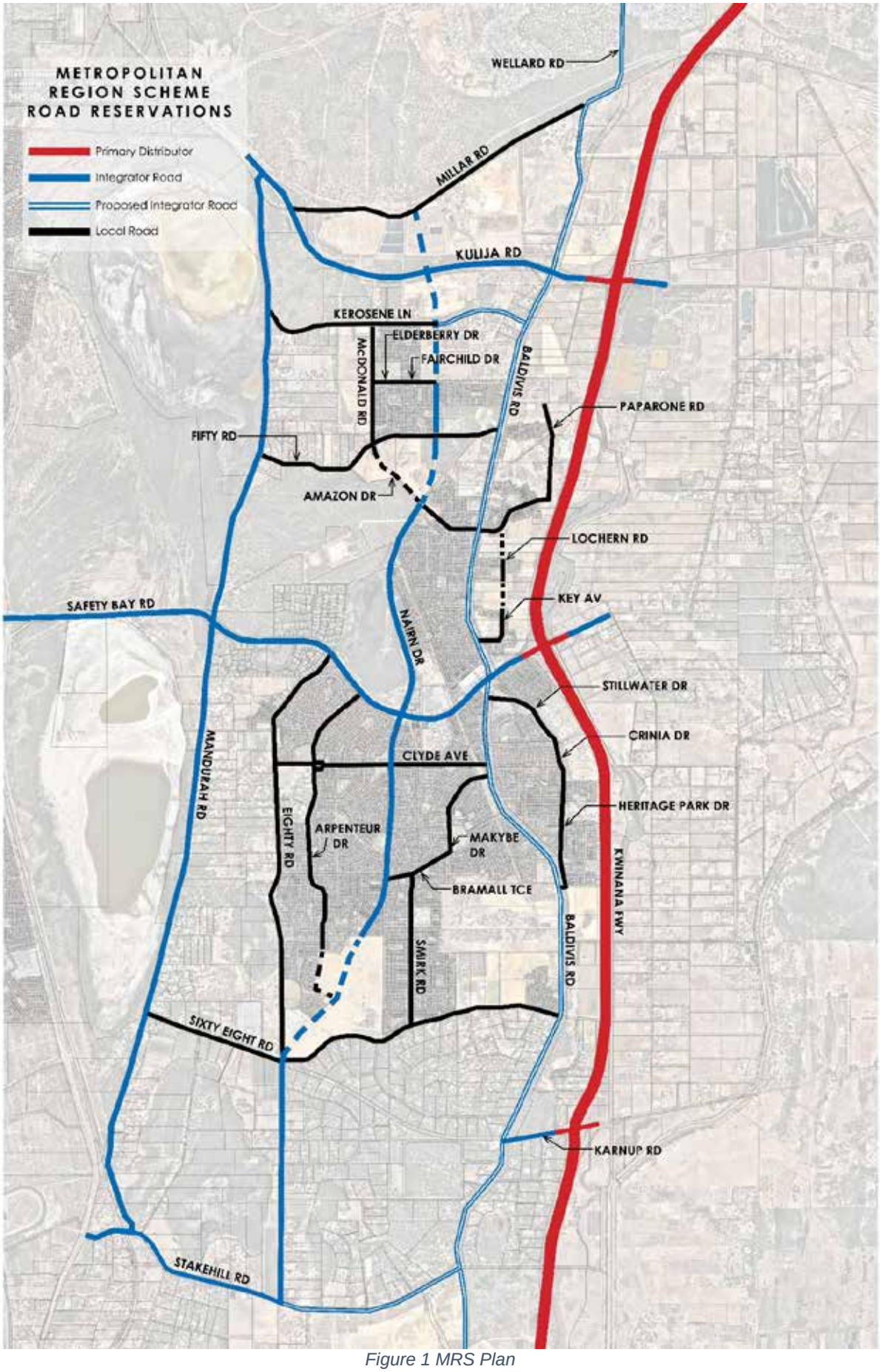


Figure 1 MRS Plan

It should be noted that WAPC's *South Metropolitan Peel Sub-Regional Planning Network* has identified the following proposed Integrator Arterial roads:

- Baldivis Road (between Wellard Road and Karri Street)
- Kerosene Lane (between Baldivis Road and future Nairn Drive)
- Stakehill Road (between future Nairn Drive and Baldivis Road)

1.2 Baldivis (South, North and East) District Structure Plan

The District Structure Plans identifies the following road network hierarchy:

- Primary Regional Road - Kwinana Freeway
- Other Regional Road - Nairn Drive, Kulija Road and Safety Bay Road
- Neighbourhood Connector - Baldivis Road, Kerosene Lane, Eighty Road, Fifty Road and Sixty Eight Road

It should be noted that the East Baldivis District Structure Plan recommends that Baldivis Road be classified as "Integrator B" because the traffic volumes are expected to increase to approximately 16,000vpd and provides an alternative north south route for local traffic instead of using Kwinana Freeway.

1.3 South Metropolitan Peel Sub-Regional Planning Framework

This report identifies the following road network hierarchy:

- Primary Regional Road - Kwinana Freeway, Ennis Avenue and Kulija Road (proposed)
- Other Regional Road - Mandurah Road, Nairn Drive, Safety Bay Road, Stakehill Road (proposed), Baldivis Road (proposed) and Karnup Road

2. Available Transport Impact Assessment (Local Structure Plan)

2.1 Baldivis Activity Centre Structure Plan (Transcore, February 2012)

This study investigates the traffic impact of the proposed Baldivis Activity Centre Structure Plan for the district centre located on Safety Bay Road, Baldivis which includes the following precincts:

- Core Precinct - Retail
- Eastern Precinct - Bulky Goods Retailing
- Transition Precinct - Mixed Use
- Northern Precinct - Medium and Low Density Residential
- Southern Precinct - Medium and Low Density Residential, including a retirement village

An EMME3 traffic model was created to estimate 2031 PM peak hour traffic flows for the adjacent road network. The extent of the traffic model includes the surrounding areas up to Kerosene Lane to the north and Sixty Eight Road to the south. It is expected that the proposed Structure Plan would generate approximately 3,600 vehicle trips during the PM peak hour period.

The daily traffic volumes on the adjacent road network are summarised below (assuming that the PM peak hour traffic volumes is approximately 10% of the daily traffic volumes):

- Nairn Drive (north of Safety Bay Road) - between 10,800vpd and 14,700vpd
- Nairn Drive (south of Safety Bay Road) - 27,800vpd
- Baldivis Road (north of Safety Bay Road) - between 15,800vpd to 16,800vpd
- Baldivis Road (south of Safety Bay Road) - between 16,100vpd to 24,800vpd
- Safety Bay Road (between Nairn Drive and Baldivis Road) - between 23,300 and 31,200vpd
- Safety Bay Road (west of Nairn Drive) - 33,200vpd
- Safety Bay Road (east of Baldivis Road) - 30,500vpd

2.2 Baldivis (East) Approved Local Structure Plans

There are a number of approved Local Structure Plans which are located within the Baldivis (East) precinct and they provide the following forecasted traffic volumes:

- Baldivis Road (north of Mundijong Road) - 16,200vpd (2031)
- Baldivis Road (north of Fifty Road) - 8,570vpd
- Baldivis Road (north of Amazon Drive) - 9,600vpd (2031)
- Baldivis Road (north of Tamworth Boulevard) - 11,900vpd (2031)
- Baldivis Road (north of Mennock Approach) - 13,700vpd (2031)
- Kulija Road (west of Nairn Drive) - 29,000vpd (2031)
- Kulija Road (east of Baldivis Road) - 28,200vpd (2031)
- Paparone Road (east of Butterleaf Road) - 1,400vpd (2031)
- Paparone Road (east of Turon Court) - 3,000vpd (2031)

- Lochern Road (north of Parkville Boulevard) - 1,400vpd (2031)
- Key Avenue (west of Yowari Drive) - 3,500vpd (2031)
- Key Avenue (north of Quondong Street) - 2,000vpd (2031)

2.3 Baldivis (North) Approved Local Structure Plans

There are a number of approved Local Structure Plans which are located within the Baldivis (North) precinct and they provide the following forecasted traffic volumes:

- Kerosene Lane (east of Mandurah Road) - 3,585vpd
- Kerosene Lane (west of McDonald Road) - 4,600vpd (2021)
- Kerosene Lane (west of Nairn Drive) - 5,600vpd (2031)
- Kerosene Lane (east of Nairn Drive) - 8,520vpd (2031)
- Nairn Drive (north of Amazon Drive) - 22,400vpd (2031)
- Nairn Drive (north of Fifty Road) - 26,500vpd (2031)
- Fifty Road (west of Nairn Drive) - 5,100vpd (2031)
- Fifty Road (east of Nairn Drive) - 3,100vpd (2031)
- Baldivis Road (near Kerosene Lane) - 9,867vpd
- Mandurah Road (near Kerosene Lane) - 9,553vpd
- McDonald Road (south of Fairchild Drive) - 1,500vpd (2031)
- McDonald Road (north of Fifty Road) - 3,000vpd (2031)
- Amazon Drive (south of Fifty Road) - 1,900vpd (2031)
- Amazon Drive (north of Nairn Drive) - 5,500vpd (2031)
- Amazon Drive (south of Nairn Drive) - 5,700vpd (2031)

2.4 Baldivis (South) Approved Local Structure Plans

There are a number of approved Local Structure Plans which are located within the Baldivis (South) precinct and they provide the following forecasted traffic volumes;

- Eighty Road (north of Nairn Drive) - 7,200vpd (2031)
- Sixty Eight Road (east of Nairn Drive) - 6,600vpd (2031)
- Nairn Drive (north of Sixty Eight Road) - 19,500vpd (2031)
- Sixty Eight Road (west of Baldivis Road) - 5,524vpd (2030)
- Eighty Road (north of Taggert Avenue) - 4,700vpd (2031)
- Eighty Road (south of Pike Road) - 3,700vpd (2031)
- Baldivis Road (north of Sixty Eight Road) - 19,108vpd (2030)
- Baldivis Road (south of Sixty Eight Road) - 21,136vpd (2030)

- Safety Bay Road (west of Baldivis Road) - 53,564vpd (2030)
- Safety Bay Road (west of Kwinana Freeway) - 41,292vpd (2030)
- Arpenteur Drive (west of Nairn Drive) - 2,000vpd (2031)
- Arpenteur Drive (north of Furnivall Parade) - 1,600vpd (2031)
- Heritage Park Drive (north of Furioso Green) - 1,000vpd

2.5 Summary

A summary of the existing and future traffic volumes within the study area is shown in Figure 2 and Figure 3.

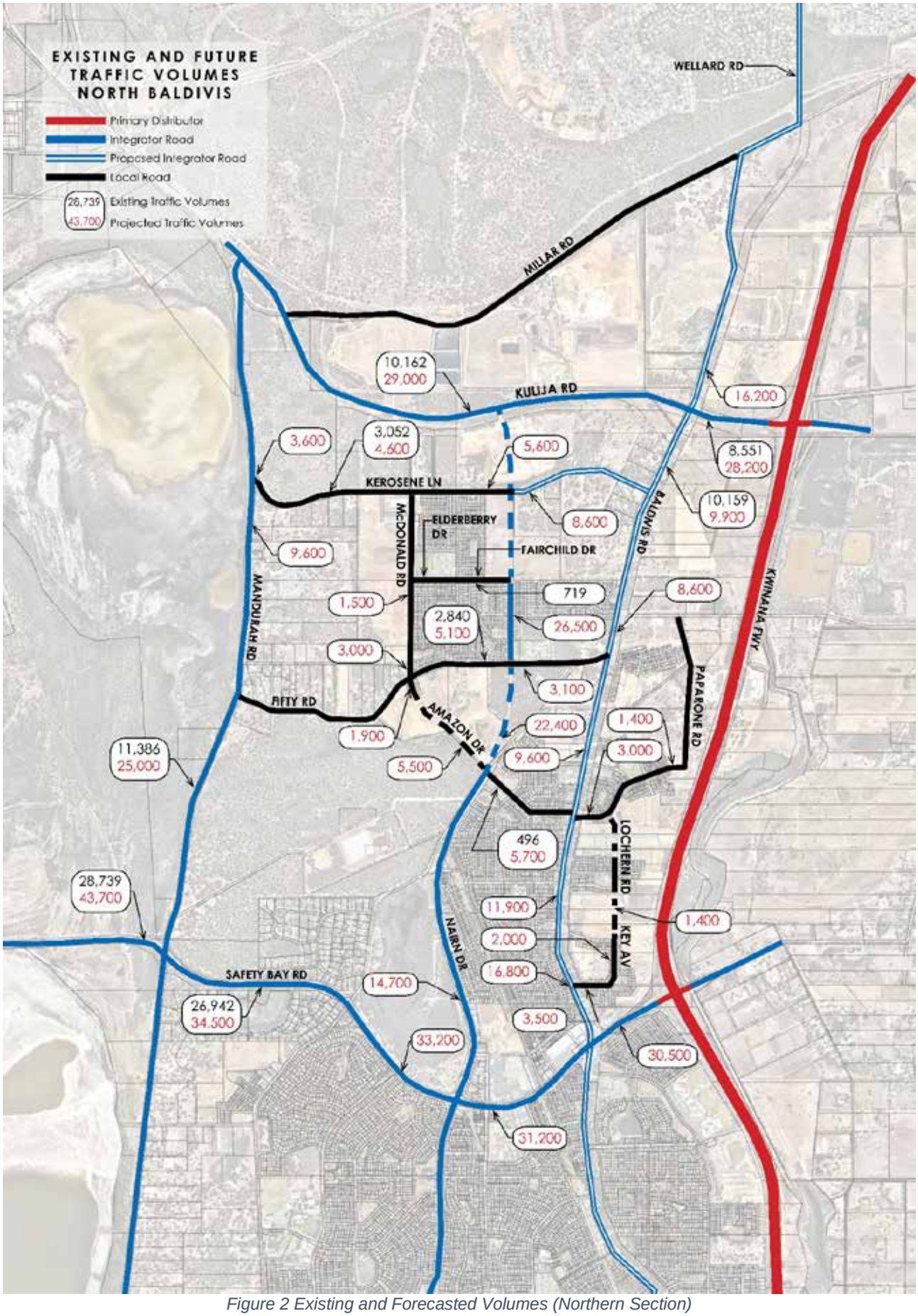


Figure 2 Existing and Forecasted Volumes (Northern Section)

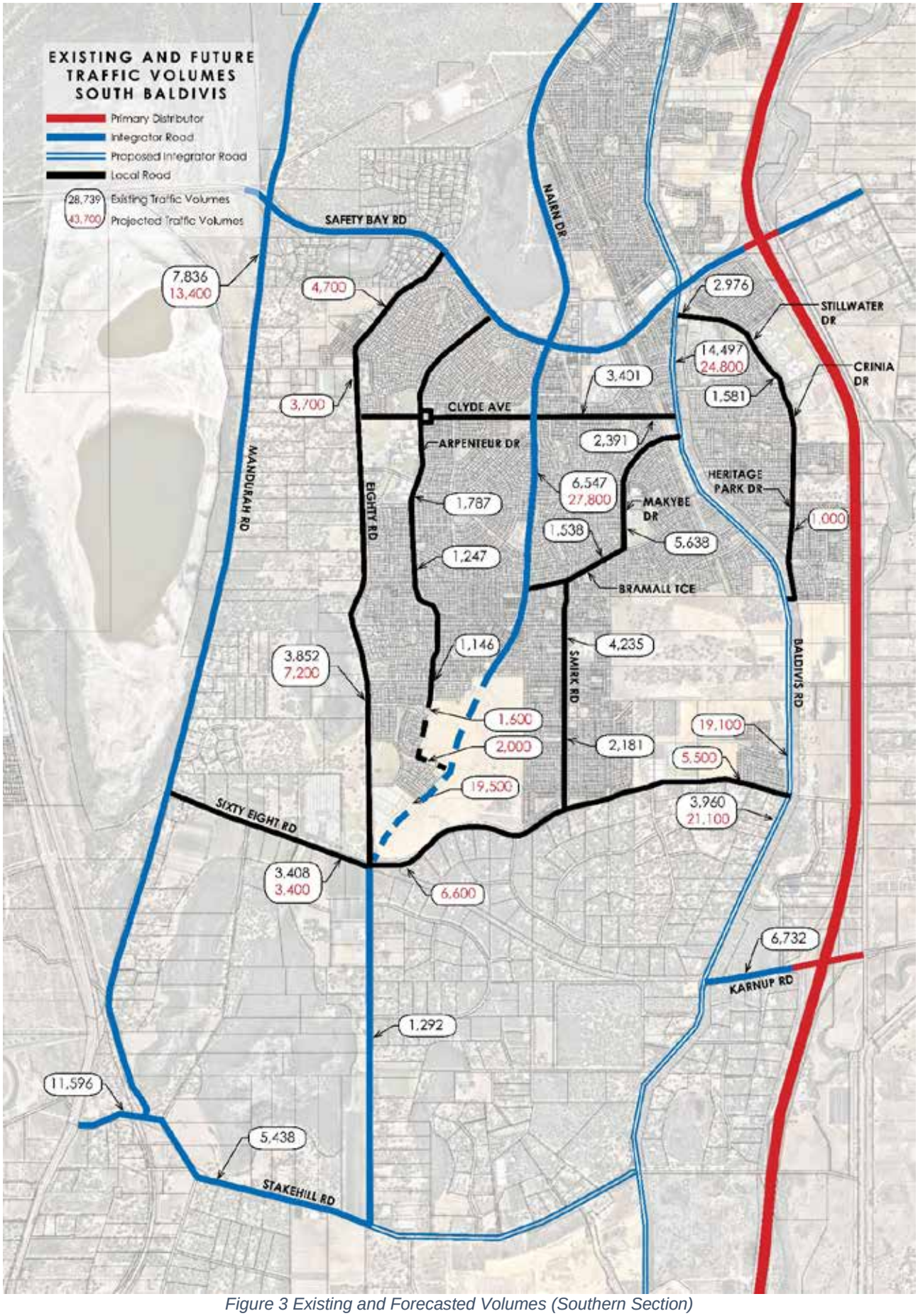


Figure 3 Existing and Forecasted Volumes (Southern Section)

3. Road Network Planning

3.1 Road Hierarchy

A review of the currently available traffic assessments and relevant road planning information has identified the following:

- Nairn Drive is currently classified as a “Neighbourhood Connector A” road in accordance with MRWA’s *Road Information Mapping Systems* and will be extended to Kulija Road and Paganoni Road to the north and south respectively in the future. Nairn Drive is proposed to be classified as an “Integrator Arterial A” to serve as the main north-south link within Baldivis.

- Baldivis Road is currently classified a “Regional Distributor” road (except between Safety Bay Road and Serpentine Road where it is classified as an “Integrator Arterial B”). There have been upgrade works completed for some sections of Baldivis Road into a boulevard treatment (i.e. two lanes with a narrow central median) therefore is proposed to be a “Neighbourhood Connector A” road. It is expected that the remaining undeveloped sections would be upgraded to a similar urban standards to encourage the uptake of Nairn Drive as the main north-south link within Baldivis. It should be noted that when the intersection of Baldivis Road/Kulija Road is grade separated in the future then there will be a section of Baldivis Road (between Kulija Road and Kerosene Lane) that is required to be upgraded to an “Integrator Arterial B” road.

- Safety Bay Road is classified as an “Integrator Arterial A” and no change to the road hierarchy is expected.

- Kulija Road and Mandurah Road is classified as a “Regional Distributor” and no change to the road hierarchy is expected. It should be noted that Kulija Road will be upgraded to the Fremantle Rockingham Controlled Access Highway.

- Kerosene Lane is currently classified as an “Access Street” in accordance with MRWA’s *Road Information Mapping System* and proposed to be upgraded to a “Neighbourhood Connector A” road. It should be noted that when the intersection of Baldivis Road/Kulija Road is grade separated then a section of Kerosene Lane (between the future Nairn Drive and Baldivis Road) is required to be upgraded to an “Integrator Arterial B” road. Consideration should be given to the possible realignment of Kerosene Lane when approaching Mandurah Road to improve traffic safety at this intersection.

- Fifty Road is classified as a “Neighbourhood Connector B” road and is proposed to be upgraded to a “Neighbourhood Connector A” road. There have been upgrade works completed for some sections of Fifty Road and it is expected that the undeveloped sections would require to be upgraded to a similar urban standard.

- Sixty Eight Road is classified as a “Neighbourhood Connector B” road and proposed to be upgraded to a “Neighbourhood Connector A” road. There have been upgrade works completed for some sections of Sixty Eight Road and it is expected that undeveloped sections (between Eighty Road and Viva Boulevard) would require to be upgraded to a similar urban standard. It should be noted that the section between Wensley Street and Viva Boulevard is required to be upgraded by the City of Rockingham.

- Eighty Road is classified as a “Neighbourhood Connector B” road. The road cross-section is unlikely to change from the existing because of the rural lots located to the west of the road carriageway, ;, considerations should be given to upgrading it to a “Neighbourhood Connector A” road.

- McDonald Road is classified as a “Neighbourhood Connector B” road which provides a north-south link between Kerosene Lane and Fifty Road. This road classification is proposed to remain unchanged.

- Fairchild Drive and Elderberry Drive is classified as a “Neighbourhood Connector B” which provides an east-west link between McDonald Road and future Nairn Drive extension. This road classification is proposed to remain unchanged.
- Amazon Drive is classified as a “Neighbourhood Connector A” road near the commercial areas and “Neighbourhood Connector B” along the other sections. This road provides an alternative east-west link between McDonald Road and Baldivis Road. This road classification is proposed to remain unchanged.
- Key Avenue, Lochern Road and Paparone Road is classified as a “Neighbourhood Connector B” which provides an alternative north-south link for residential developments to the east of Baldivis Road (north of Safety Bay Road). A road hierarchy reclassification is unlikely, however, these roads should be monitored to ensure that they are not used as a through route and hence may create delays at selected intersections with Baldivis Road.
- Arpenteur Drive is classified as a “Neighbourhood Connector B” road which provides an alternative north-south link between Safety Bay Road and Furnivall Parade. This road classification is proposed to remain unchanged.
- Stillwater Drive is classified as a “Neighbourhood Connector B” and this road classification is proposed to remain unchanged.
- Clyde Avenue and Smirk Road is classified as a “Neighbourhood Connector B” and this road classification is proposed to remain unchanged.
- Makybe Drive and Bramall Terrace is classified as a “Neighbourhood Connector B” and this road classification is proposed to remain unchanged.
- Crinia Drive and Heritage Park Drive is classified as an “Access Street” and there is potential that this section of road may be used as through traffic therefore may warrant upgrading to a “Neighbourhood Connector B” road.

3.2 Comparison of Road Classifications

A comparison of road classifications for Liveable Neighbourhoods and MRWA are shown below.

Liveable Neighbourhoods	MRWA
Primary Distributor	Primary Distributor
Integrator Arterial A	District Distributor A
Integrator Arterial B	District Distributor B
Neighbourhood Connector A	Local Distributor
Neighbourhood Connector B	Local Distributor
Access Street A	Access Street
Access Street B	Access Street
Access Street C	Access Street
Access Street D	Access Street

3.3 Proposed Road Network Hierarchy

The proposed road network hierarchy for the Baldivis area is shown in Figure 4.

In summary, the proposed road network hierarchy is:

- Primary Distributor Road - Kwinana Freeway, Kulija Road (Fremantle Rockingham Controlled Access Highway)
- Integrator Arterial Road - Safety Bay Road, Kulija Road, Nairn Drive, Mandurah Road, Baldivis Road (north of Kerosene Lane).
- Neighbourhood Connector Road - Eighty Road, Baldivis Road, Kerosene Lane, Fifty Road, Sixty Eight Road, McDonald Road, Fairchild Drive/Elderberry Drive, Amazon Drive, Key Avenue/Lochern Road/Paparone Road, Arpenteur Drive, Stillwater Drive, Clyde Avenue/Smirk Road and Makybe Drive/Bramall Terrace.

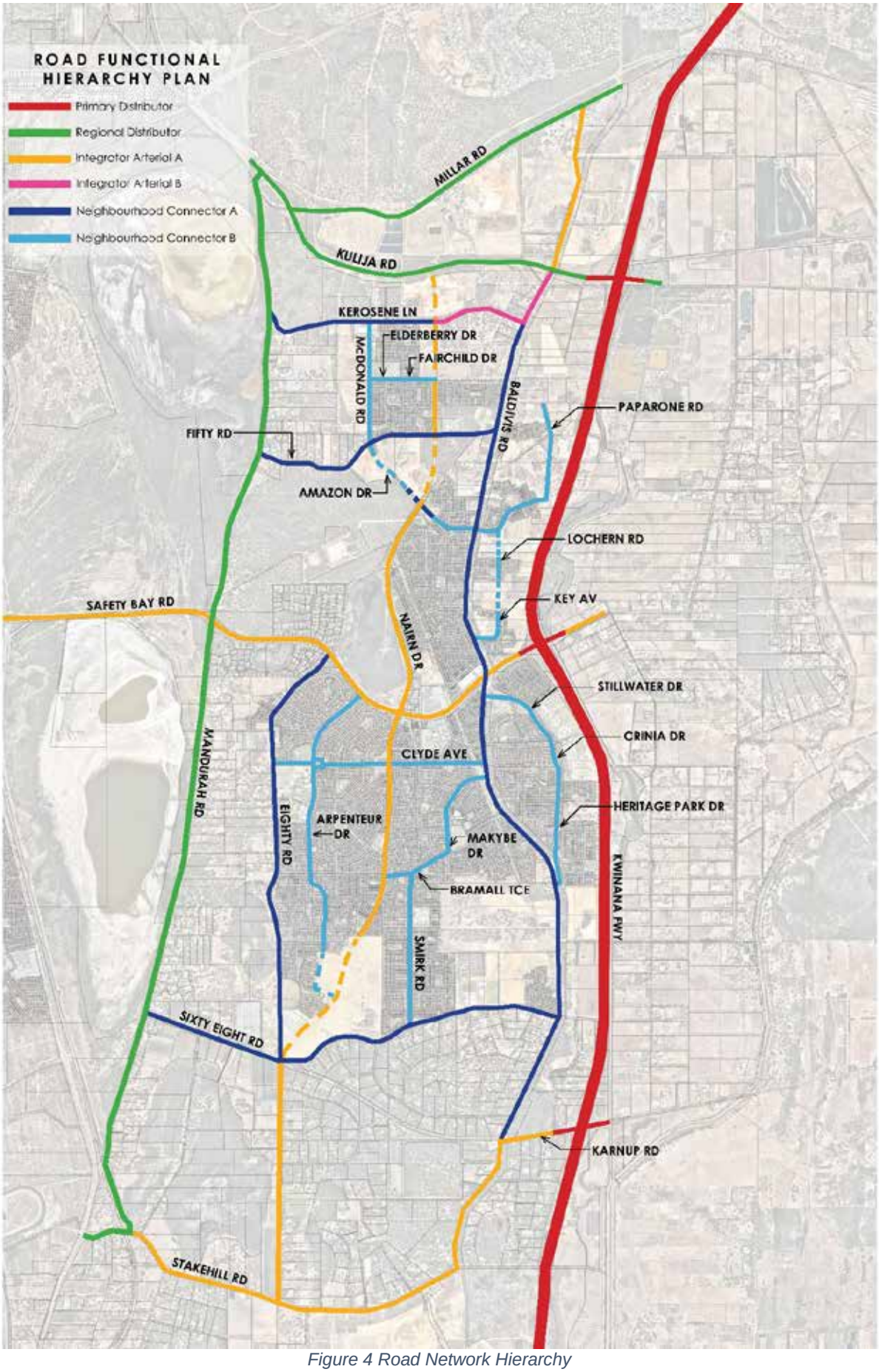


Figure 4 Road Network Hierarchy

3.4 Road Cross-Sections

The road cross-sections proposed in this section are mainly based on Liveable Neighbourhoods.

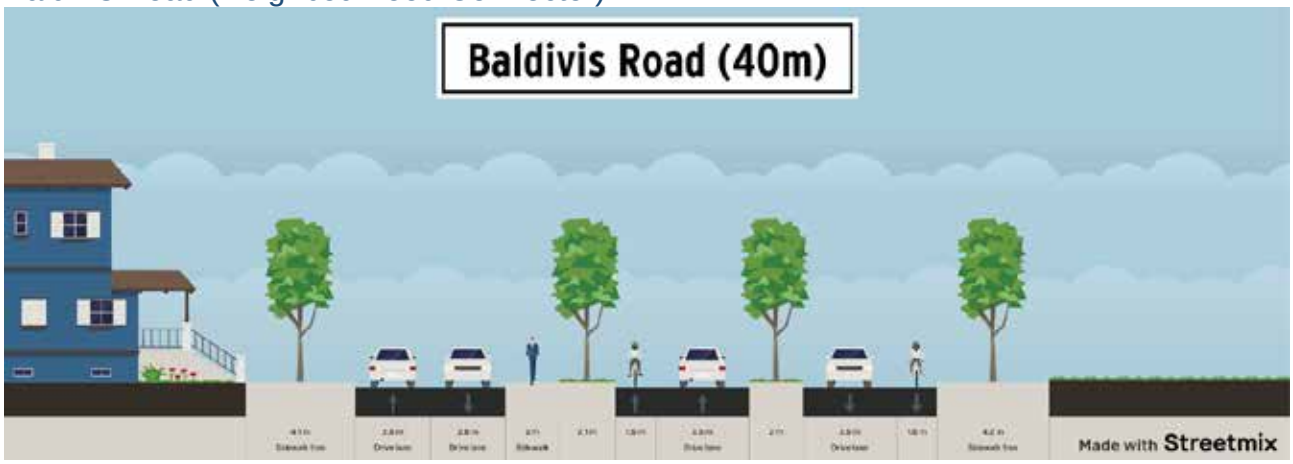
Nairn Drive (Integrator A)

Safety Bay Road (Integrator A)

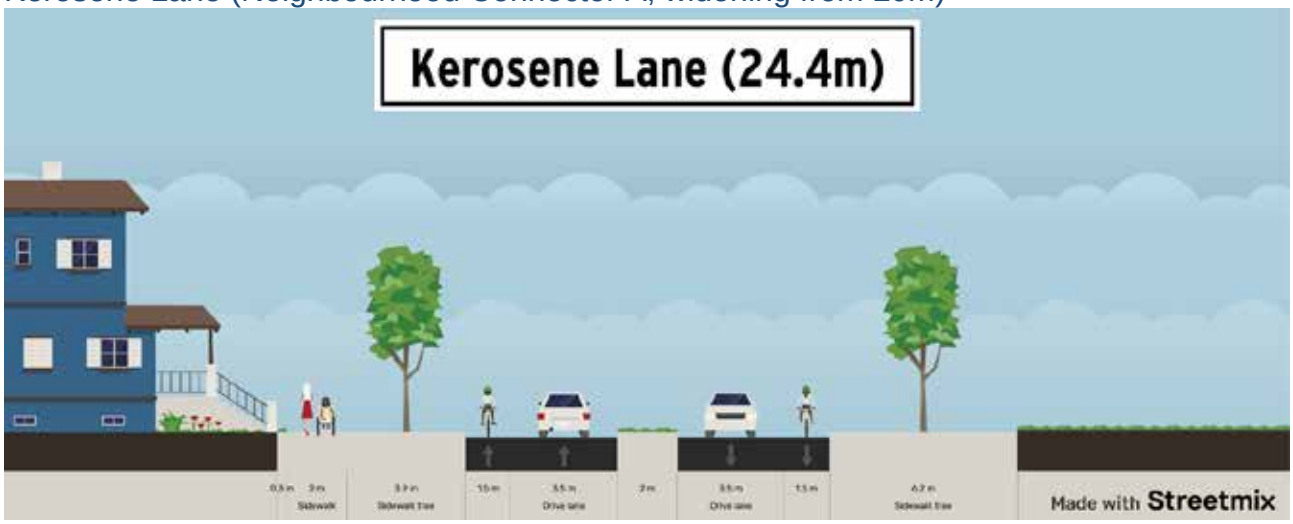
Kulija Road (Integrator A)

Mandurah Road (Existing)

Baldivis Road (Neighbourhood Connector)



Kerosene Lane (Neighbourhood Connector A, widening from 20m)



Kerosene Lane (Integrator Arterial B, widening from 20m)

Fifty Road (Neighbourhood Connector A, widening from 20m)

Sixty Eight Road (Neighbourhood Connector A, widening from 20m)

Eighty Road (Neighbourhood Connector A)

3.5 Intersection Control

3.5.1 Existing Signalised Intersections

There are currently six sets of signalised intersections within the study area:

- Mundijong Road/Kwinana Freeway
- Safety Bay Road/Settlers Avenue
- Safety Bay Road/Norseman Approach/Burlington Drive
- Safety Bay Road/Kwinana Freeway
- Karnup Road/Kwinana Freeway
- Stakehill Road/Mandurah Road

3.5.2 Existing Roundabouts

There are a large number of roundabouts located within Baldivis, especially near residential dwellings. The existing roundabouts located along major roads are as follows:

- Baldivis Road/Fifty Road/Arden Avenue
- Baldivis Road/Ingram Road
- Baldivis Road/Amazon Drive
- Baldivis Road/Pemberton Boulevard/Parkville Boulevard
- Baldivis Road/Tamworth Boulevard/Nyilla Approach
- Baldivis Road/Safety Bay Road
- Baldivis Road/Makybe Drive
- Baldivis Road/Highbury Boulevard/Palomino Parade
- Baldivis Road/Paramount Boulevard
- Baldivis Road/Millar Road
- Baldivis Road/Heartwood Boulevard
- Nairn Drive/Eighty Road/Kingaroy Drive
- Nairn Drive/Safety Bay Road
- Nairn Drive/Clyde Avenue
- Nairn Drive/Wise Meander/Blaxland Terrace
- Nairn Drive/Furnivall Parade
- Eighty Road/Amberley Drive/Taggert Avenue
- McDonald Road/Dunning Street
- McDonald Road/Elderberry Drive
- Amazon Drive/Santorini Parkway

- Amazon Drive/Everest Way/Cervantes Avenue
- Elderberry Drive/Fairchild Drive/Linaker Street/Firebrand Grove
- Key Avenue/Lochern Road/Paparone Road (there are 5 roundabouts, please refer to Figure 5 for details)
- Arpenteur Drive (there are 12 roundabouts, please refer to Figure 5 for details)
- Stillwater Drive/Callistemon Gardens
- Stillwater Drive/Rivergums Boulevard/Avoca Chase
- Clyde Avenue (there are 5 roundabouts, please refer to Figure 5 for details)
- Smirk Road (there are 6 roundabouts, please refer to Figure 5 for details)
- Makybe Drive/Bramall Terrace (there are 4 roundabouts, please refer to Figure 5 for details)
- Safety Bay Road/Mandurah Road
- Sixty Eight Road/Percival Place

3.5.3 Proposed Signalised Intersections

There are two locations where signalised intersection is proposed:

- Nairn Drive/Fifty Road. There is a primary school located at the corner of Fifty Road and Nairn Drive. The signalisation of this intersection would allow safer vehicle access to Nairn Drive from Fifty Road, minimise congestion due to the primary school and to allow safe pedestrian movement to/from the primary school.
- Nairn Drive/Amazon Drive. There is a proposed Neighbourhood Centre located to north-west of this intersection. The signalisation of this intersection would allow safer vehicle access to Nairn Drive from Amazon Drive and to allow safe pedestrian movement to/from the Neighbourhood Centre.

3.5.4 Proposed Roundabouts

The following are locations where roundabout treatment is proposed:

- Baldivis Road/Kerosene Lane. Baldivis Road is expected to accommodate for high traffic volumes therefore vehicles from Kerosene Lane is likely to encounter difficulties when entering Baldivis Road. It should be noted that when the intersection of Baldivis Road/Kulija Road is grade separated then it would further increase traffic volume which further warrants upgrading the existing full movement T-intersection to improve traffic safety and minimise delays. The intersection of Baldivis Road/Kerosene Lane would also provide for a future fourth leg to the east, providing access to future residential estate.
- Baldivis Road/Amazon Drive. This intersection is already a roundabout, however, would require upgrading in the future to connect with Paparone Road.
- Baldivis Road intersections with Rivergums Boulevard, Claret Ash Boulevard, Furioso Green, Serpentine Road, Solis Boulevard and Sixty Eight Road. Baldivis Road is expected to accommodate for high traffic volumes therefore vehicles from the minor roads are likely to encounter difficulties entering Baldivis Road. A roundabout treatment would improve traffic safety and minimise delays.

- Baldivis Road/Pug Road. Baldivis Road is expected to accommodate for high traffic volumes therefore vehicles from the minor roads are likely to encounter difficulties entering Baldivis Road. A roundabout treatment would improve traffic safety and minimise delays.

- Nairn Drive intersections with Kerosene Lane, Arpenteur Drive and Eighty Road. Nairn Drive is an “Integrator Arterial” road therefore would accommodate very high traffic volumes which may cause difficulties for vehicles from minor roads to enter Nairn Drive. A roundabout treatment at this location would improve traffic safety and minimise delays.

- Eighty Road intersections with Pike Road, Tranby Drive, Kendall Boulevard and Furnivall Parade. The traffic volumes along Eighty Road is expected to increase and minor roads are likely to have difficulties entering Eighty Road. A roundabout treatment would improve traffic safety and minimise delays.

- Sixty Eight Road/Smirk Road. Traffic volumes along Sixty Eight Road is expected to increase and vehicles entering Sixty Eight Road from Smirk Road are likely to have difficulties. A roundabout treatment would improve traffic safety and minimise delays.

- Amazon Drive/McDonald Road/Fifty Road. This intersection is effectively a four-way intersection with high traffic volumes expected on all approaches in the future therefore a roundabout treatment at this location would improve traffic safety and minimise delays.

3.5.5 Other Intersection Treatments

The following are locations where other intersection treatment is proposed:

- Grade separated interchange at Kulija Road/Nairn Drive. Both Kulija Road and Nairn Drive is expected to accommodate for high traffic volumes therefore an interchange is likely required to provide priority to Kulija Road which forms part of the Fremantle to Rockingham Controlled Access Highway.

- Grade separated intersection at Kulija Road/Baldivis Road. The existing staggered T-intersection has a number of traffic accidents and near misses therefore raises some traffic safety concerns hence a grade separation is proposed in the future.

3.5.6 Summary

A summary of existing and proposed intersection control is shown in Figure 5.

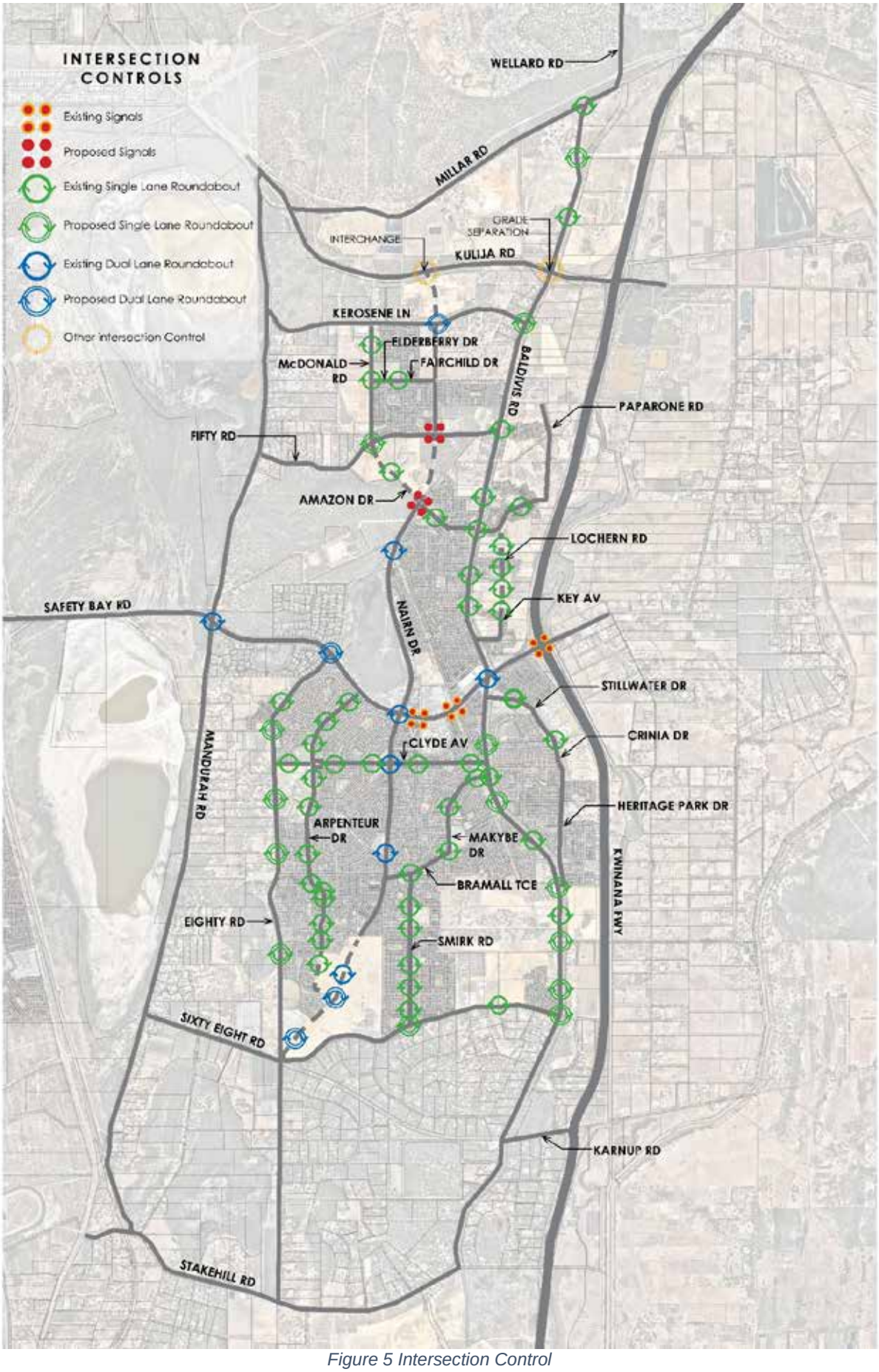


Figure 5 Intersection Control

3.6 Pedestrian and Cyclist Facilities

The existing pedestrian and cyclist facilities as well as the Long Term Cyclist Network plan are shown in Figure 6 and Figure 7 respectively.

There would be a 2.0m wide footpath at least to one side of newly developed residential areas to encourage the general population to walk and/or cycle.

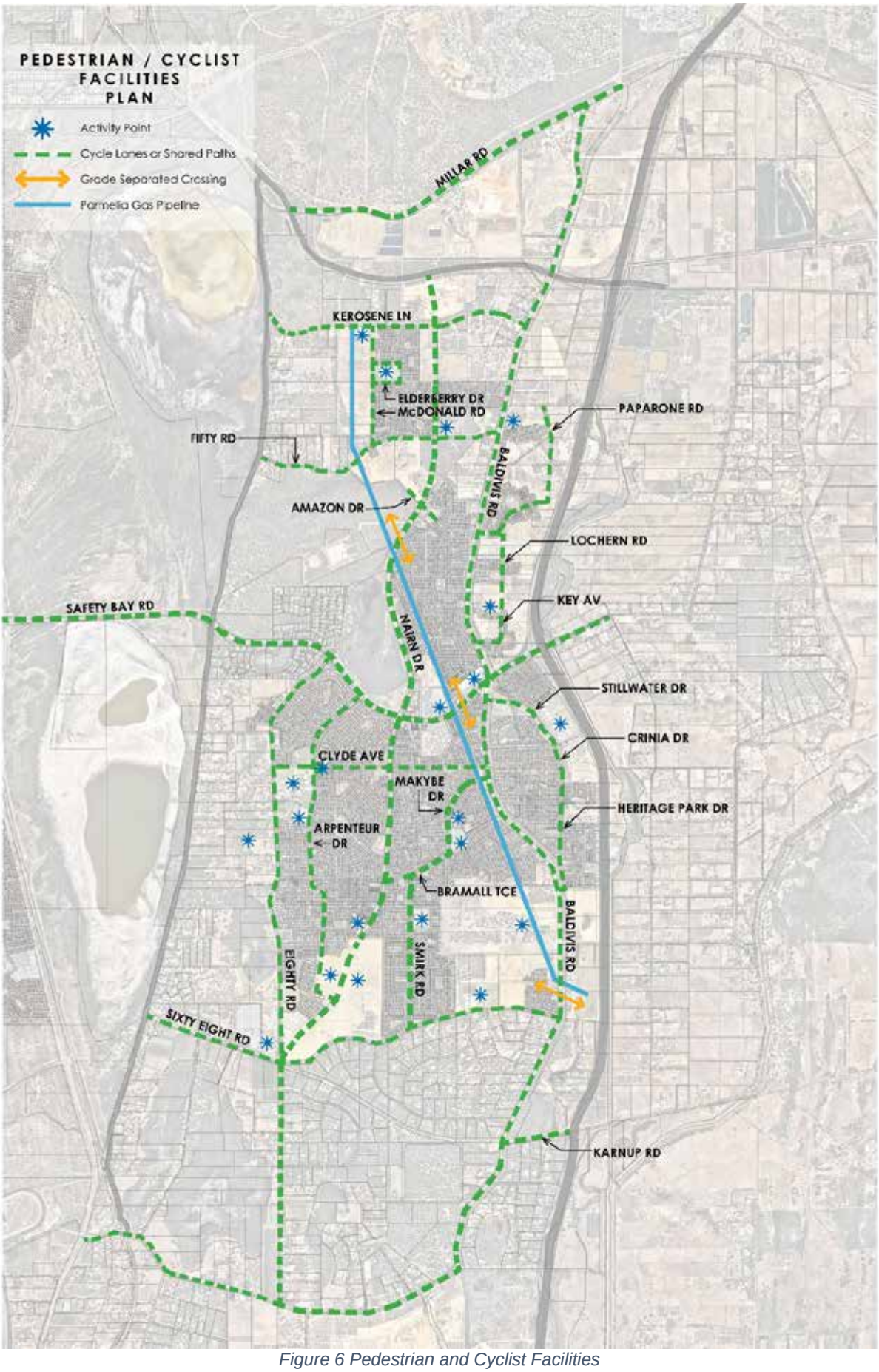


Figure 6 Pedestrian and Cyclist Facilities

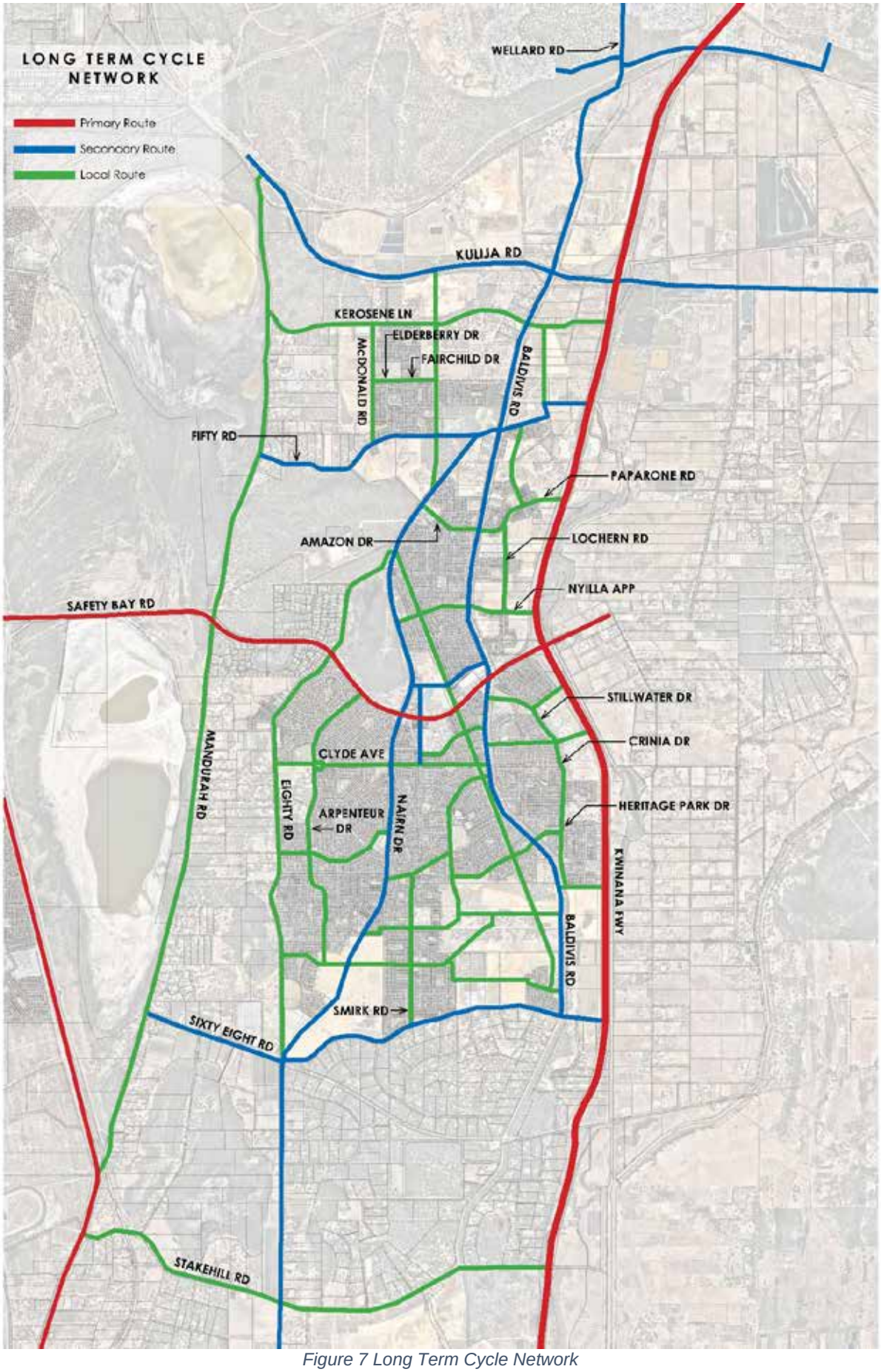


Figure 7 Long Term Cycle Network

3.7 Public Transport

Existing Public Transport

The existing available public transport and future priority public transport routes within Baldivis are shown in Figure 8.

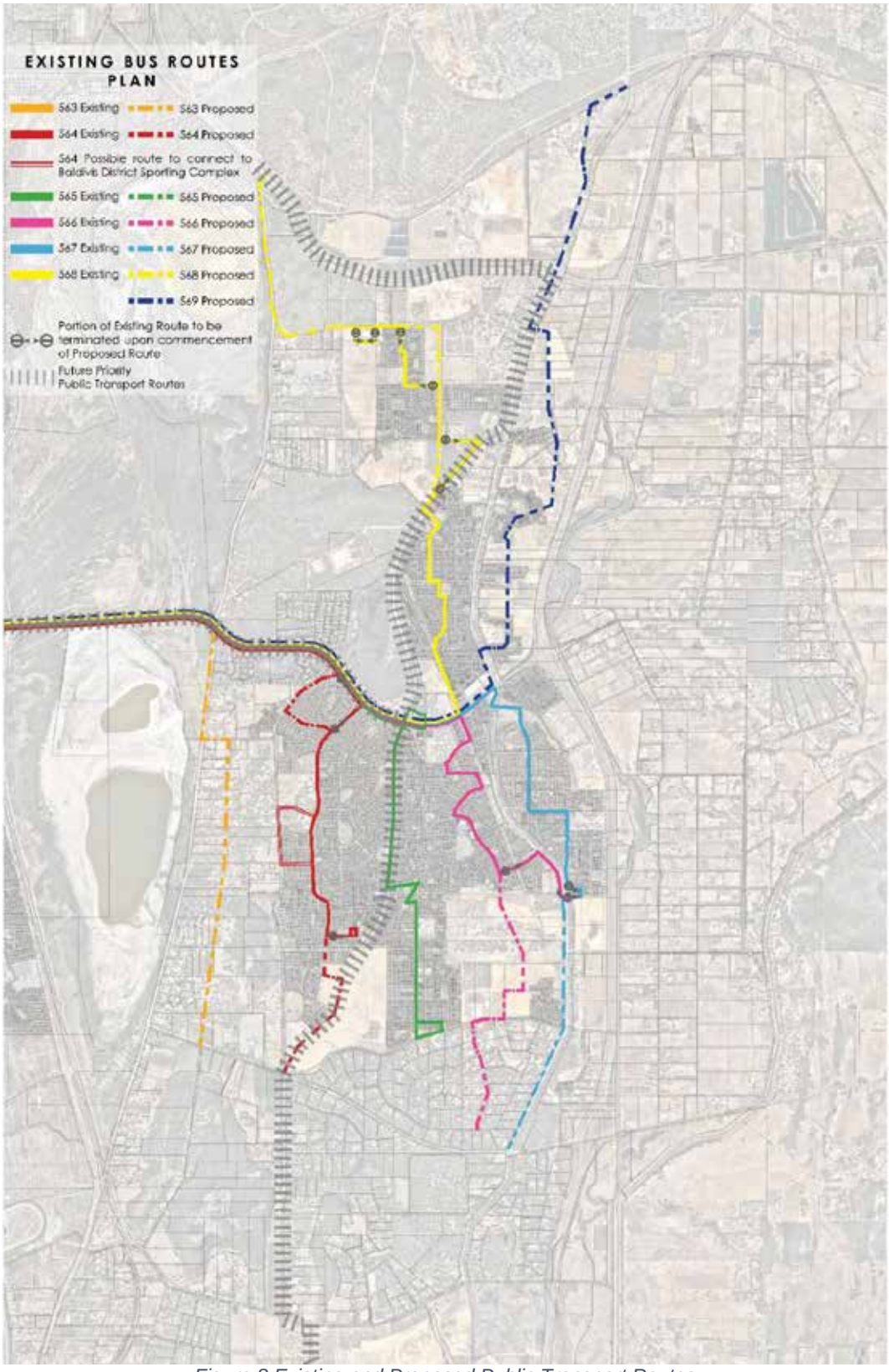


Figure 8 Existing and Proposed Public Transport Routes

Proposed Public Transport

The Public Transport Authority (PTA) has provided the following information regarding potential public transport services within Baldivis. It is noted that the information provided is fluid and not for public release.

PTA also provided the following additional comments:

- Route 563 is subject to the area west of Eighty Road being zoned urban between Safety Bay Road, Sixty Eight Road and Mandurah Road. If this area is not rezoned and redeveloped the route will not be introduced and Route 564 (i.e. eastern bus route) will also not be realigned.
- Route 564 needs a suitable terminus constructed on/near Sixty Eight Road. Note that Transperth have received multiple requests for a terminus near Vibe Lifestyle Village to provide residents access to public transport.
- The extensions of Route 566 (i.e. eastern/central bus route) and 567 (i.e. eastern bus route) are also subject to development, a suitable road network and suitable terminus being located.
- Route 569 is also subject to the road network being completed but will likely operate on Baldivis Road north, right Key Avenue/Lochern Road, right Paparone Road, right Baldivis Road north. It is likely this route will be introduced in stages so interim terminus will be required.

4. Mode Share for Travelling

4.1 2016 Census for Baldivis

4.1.1 Number of Cars Available within a Household

A summary of the number of cars available for a given household is shown in Figure 9.

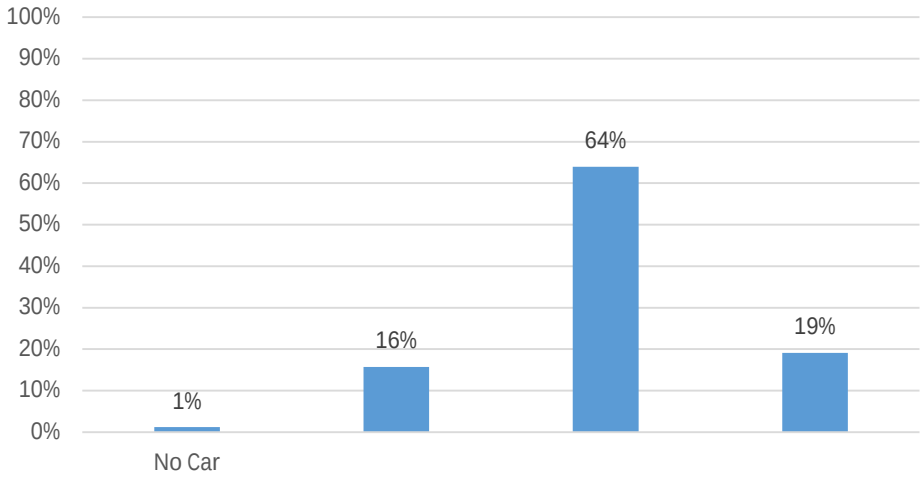


Figure 9 Number of Available Cars within a Household

It is clear from the survey data that people living in Baldivis has very good access to a car which encourages its usage.

4.1.2 Methods for Travelling to Work

A summary of the mode share for travelling to work is shown in Figure 10.

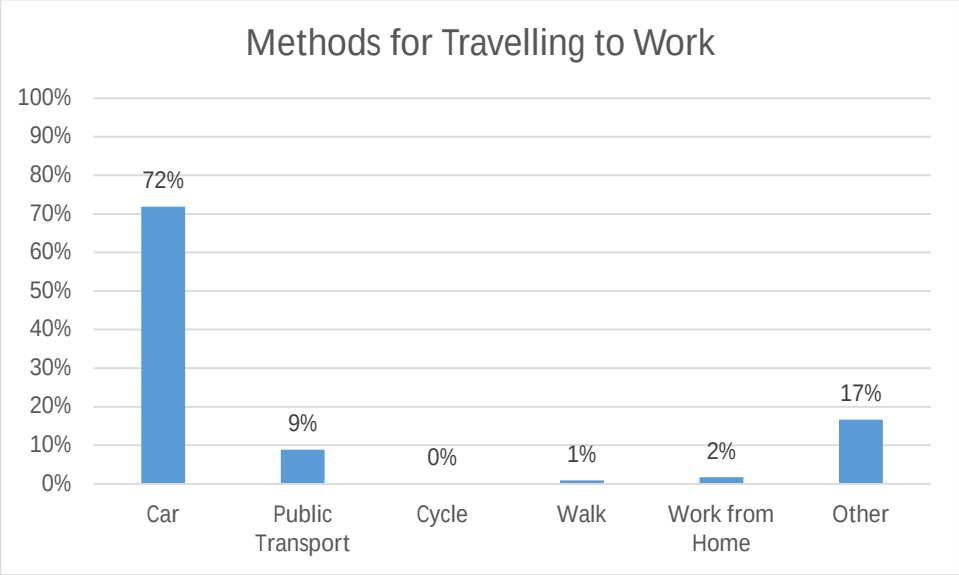


Figure 10 Methods for Travelling to Work

The *Transport @3.5 Million (Perth and Peel Transport Plan For 3.5 Million People and Beyond)* aims to achieve the following:

- Increase the proportion of public transport usage to 11%
- Increase the uptake of walking and cycling to 18%
- Reduce the reliance of car travel to 50%

The survey data suggests that the majority of people chose to travel to work by car. This suggests that there are opportunities to achieve the target set by *Transport @3.5 Million* in relation to shifting some of the vehicle mode share to other means (i.e. public transport, walking, cycling, etc.) in order to reduce the number of vehicles on the road.

5. The Way Forward

The main focus of this report is to consider the functionality of the entire road network within the Baldivis area instead of concentrating on intersection treatments and road cross sections in isolation (i.e. when proposed developments arise).

There needs to be consideration for where road upgrades should be provided and how it should be provided, as opposed to responding to individual ad-hoc development proposals.

Better understanding and the regional road network can also help to increase accessibility and encourage use of particular transport routes or alternative modes of transport such as public transport, cycling and walking if this available. Over the long-term, as greater provision is made for alternative modes, reductions in traffic numbers on local roads could then be expected.

The previous sections of this report have provided recommendations on potential upgrades to the existing road network which consider the impact of the vehicle traffic volumes increase due to the expected growth in population within Baldivis. It is recommended that the current mindset of "*Building new roads to accommodate for increase in vehicular traffic volumes*" be changed in the long term (i.e. more than 10 years) as there will be a limitation on how much land could be used (i.e. it is not always possible to widen the existing road reservation width) to cater for the road upgrades.

5.1 Recommended Actions

5.1.1 Changing Traffic Behaviour

One possible means is to change traffic behaviour. It is understood that this would take some time to educate and engage the general population, however, this initiative should start at the earliest time possible in order to minimise the anticipated constraints (e.g. road reservation width) in the future.

The following are some ideas on possible means for changing traffic behaviour:

Task	**Team**
Encourage walking and/or cycling Ÿ Design residential dwellings such that they are located within close proximity to the required amenities (i.e. in accordance with Liveable Neighbourhoods) Ÿ Promote regular events that involves walking or cycling within Baldivis. It is also an opportunity to showcase areas of interests to the local residents. Ÿ Promote that walking and/or cycling would be good for health and general well-being as well as spending quality time with family members and/or friends. Ÿ Improve the connectivity of pedestrian and cyclist network.	Strategic Planning and Environment Community Capacity Building Health Services Engineering Services
Encourage uptake of public transport Ÿ Liaise with Public Transport Authority regarding routes and frequency. The more convenient a person in using public transport, the more likely people would be using it. Ÿ Provide dedicated traffic lanes to reduce delays experienced by patrons. Ÿ Provide free public transport services during special events (e.g. with discussion with Public Transport Authority). Ÿ Provide readily available information about using public transport facilities. This information could be located within the shopping centre or other areas of interest showing how patrons could arrive at this destination by using public transport.	Engineering Services

Ÿ Consultation with Public Transport Authority to consider a bus service route (either through modification or a new route) for the Baldivis District Sporting Complex.	
Encourage travelling during off-peak hour Ÿ Provide information regarding expected peak hour for a road or point of interest.	Strategy, Marketing and Communications Engineering Services
Reduce the number of vehicle trips Ÿ Design local neighbourhood centres such that patrons can complete all of the required business within one location (e.g. groceries shopping, banking, medical, etc.) to reduce the number of trips between areas. Ÿ Encourage people to complete their business online or through the telephone (e.g. groceries, take-away restaurants, transferring money, telehealth, etc.) Ÿ Discussion with commercial business owners to encourage usage of telephone or online transactions for their customers.	Strategic Planning and Environment Community Capacity Building
Vehicle sharing Ÿ Educate the general population regarding the possibility of sharing vehicles (e.g. through mobile phone app) to minimise the number of vehicles on the road. Ÿ Encourage families or friends to complete their business together in one car instead of meeting at say a shopping centre.	Strategy, Marketing and Communications Engineering Services Strategic Planning and Environment
Flexibility with Working from Home	All
Hard restrictions (only applicable when traffic congestion is no longer tolerable) Ÿ Restrict the number of vehicles based on number plates (e.g. odd numbers on Monday, Wednesday and Friday). Ÿ Requirement that at least three people be inside a travelling car. Ÿ Introduce toll for using certain sections of road	Compliance and Emergency Liaison

In summary, there is only limited land available that could be used for road upgrades to accommodate for the expected traffic volume increase. A different mindset of changing traffic behaviour is required to ensure that the road network is still capable of accommodating the expected growth in population within Baldivis in the long term.

5.1.2 Baldivis Traffic Modelling

The traffic assessments for Structure Plans are normally based on a range of different assumptions and prepared under different requirements throughout the years. This suggests that the estimated future traffic volumes for Structure Plan would be specific to that area and may not consider Baldivis as a whole.

This presents an opportunity for the City to develop a complete traffic model for the whole of Baldivis (i.e. roads associated with a hierarchy higher than a Neighbourhood Connector classification) such that the information could be used as an independent verification for submitted applications (e.g. Structure Plans, Subdivisions, Development Applications, etc.).

It is noted that there are benefits for having a traffic model, however, the following matters should also be considered:

Ÿ Traffic modelling development and software cost is likely to be high;

Ÿ Maintenance cost is likely to be high and may require a dedicated officer to update the model such that it reflects the most recent land use information;

- A decision need to be made regarding whether the general public would have access to the traffic model (i.e. they can make changes to the traffic model if they have the software);
- The results from the traffic modelling is likely required to be made public as local governments are required to be transparent therefore it must be robust. It should be noted that MRWA's ROM traffic model has been around for many years, however, it is not available for the general public;
- Traffic consultants may solely rely on the City's traffic modelling without doing any additional assessment; and
- The major road network has either been constructed or planned in the future based on current traffic assessments.

Task	**Team**
Create a traffic model for the Baldivis Area	Strategic Planning